Visions of UNaLab Follower Cities

Citation for published version (APA):

Document status and date:
Published: 24/05/2019

Document Version:
Publisher’s PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:
• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher’s website.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

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Visions of UNaLab Follower Cities

D6.5 Joint Vision Report
24/05/2019

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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
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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.

Partners

This report is designed in A3 landscape format to provide sufficient space for important visuals and to fit tables and figures properly.
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Section I — Introduction
1. **Introduction**

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;
- Companies that offer nature-based solutions and related services;
- 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
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 nature-based 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 NBS-related 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.
- For inspiration regarding visions on climate resilience and potential solutions, the follower cities visit the ULL of the front-runner cities. 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 workshop 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.
Section II — Introduction to the follower cities
UNaLab Follower Cities

Stavanger Kommune
- Population: 130,000 (1,867 inhabitants/km²)
- Area: approx. 70 km², of which 66 km² land and 4 km² water

Hlavni mesto Praha
- Population: 1,270,000 (2,416 inhabitants/km²)
- Area: approx. 496 km²

Ayuntamiento Castellón de la Plana
- Population: 171,000 (1,569 inhabitants/km²)
- Area: approx. 109 km²

Commune de Cannes
- Population: 75,000 inhabitants and 2,000,000 visitors each year
- Area: approx. 20 km², with a shoreline of about 16 km

TC Başakşehir Belediyesi
- Population: 350,000 growing to 800,000 by 2020
- Area: approx. 105 km²

UNaLab Replication Stakeholders

Buenos Aires
- Population: 3,091,000 (15,226 inhabitants/km²)
- Area: approx. 202 km²

Hong Kong
- Population: 7,191,000 (6,514 inhabitants/km²)
- Area: approx. 1,104 km²
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.
Stavanger, Norway’s densest populated municipality

The city centre with the harbour ‘Vågen’, the main square and the historic centre on the right.

‘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

- **ROBER**
  In the project ROBER 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-brekr aftige-lokalsamfunn](http://www.nibio.no/prosjekter/robuste-og-brekr aftige-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 cities. The flagship 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.

- **ANYWHERE**
  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 with regards to sea level rise.

- **Stavanger Smart city**
  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”
Flooding of the underpass during heavy rainfalls at Jåttåvågen

Master plan for city centre, including green belts

Flood route mapping and simulation for climate adaptation

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

The city centre harbour during a storm

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

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.
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.

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

**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 livability / quality of life / biodiversity.
- "The world’s 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.

**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 ideas within NBS.
- 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.

**Opportunities**

What would be concrete opportunities for implementation of NBS?

- 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.

**Barriers**

What is hampering the realisation of NBS?

- Difficulty to achieve/maintain trans-disciplinary cooperation between the different actors and stakeholders (silo-thinking):
  - 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 resources to succeed.
- 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 higher cost/controversy.
Lesser Town Square
Prague city centre
View from Štělecký Island to Charles Bridge
Green axes in Prague

Lesser Town Square
Imperial Island
Imperial Island
Green axes in Prague
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 know-how 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 pollution. Primary concerns in Prague are stormwater management and urban air quality, which the city aims to address using NBS to enhance the pollution. Prague is the recipient of 33% of the total national expenditure in research and development.

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 socio-technical 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.

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.

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• 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.
Flooding of the river Vltava

Planting of Trees on Vinohradská Street

Revitalization of Rokytku stream

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
### 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.
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 long-term 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.

- **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.

- **BUILDING TECHNOLOGIES ACCELERATOR**, The BTA Living 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.

- **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.

- **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.

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
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)
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.
Overall planning of climate resilience strategies © Ville de Cannes
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.
Protecting the coast from erosion

Farm for local production

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

The dry river - Vallon de la Foux - impasse legoff

The dry river - Vallon de la Foux - Rue Merle

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.
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 sanitation 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 CO₂ 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
Sazlidere Dam

River bed reclamation and artificial lake park

Artificial lake

River bed reclamation

Sezildere Dam

Artificial lake
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.
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
Ecological enhancement works in river channels
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.
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 Sábado” (Sábado’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
- 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
Section III — System Analysis
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 intention 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

Regulations and Incentives
29. Application of a holistic cost-benefit scheme for larger municipal investments
30. Mapping and evaluation of ecosystem services
31. Alignment of budgets with sustainability / nature-based solutions
32. Non-tax own-source municipal instruments (fees, charges, utility charges and fees, etc.)
33. Green municipal financial instruments
34. Co-financing: public-private partnership (PPP)
35. Innovation/sustainability-based procurement
36. Alternative criteria and procurement procedures for real-estate-property.

Blue and Green Infrastructure
44. Flood mitigation through integrated stormwater management
45. Water body daylighting and renaturalisation of rivers
46. Urban regeneration through the greening of urban space
47. Pollution control and enhancement of urban water and air quality
48. Increasing local resource generation and use
49. Supporting community-based urban agriculture
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
16. Non-tax own-source municipal instruments (fees, charges, utility charges and fees, etc.)
17. Green municipal financial instruments
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
53. Promoting soft mobility modes and public transport
54. Implementing traffic calming measures
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
3. Development of resilience strategy and planning
4. Establishment of sustainability advisory boards (or equivalent)
5. Systematic long-term planning of the city structure
6. Negotiated / Voluntary agreements for higher social and environmental standards

Participation and Stakeholder Engagement
21. Experimental governance and multi-stakeholder approaches to urban development projects
22. Development of Visions / goals together with civil society
23. Participatory budgeting
24. Awareness campaigns targeting local stakeholders (including citizens) for NBS or similar
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 infrastructure
27. Innovative bottom up housing concepts
28. Creation and administration of platforms for citizen participation
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.

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:

3.2.3. Impact factor level
No two cities are the same. This level incorporates the local context-specific 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
- Identification of potential sites for NBS implementation
- Identification of initial NBS project ideas

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.
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.

**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 the dominance of car ownership in the mid-term.
- General gap between what transport planners think and what citizens want.

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

**Participation and Stakeholder Engagement**
- Innovative Co-Creation processes are already being tested within the municipality as well as on-site developments.
- There is an increasing willingness of Stavanger’s citizens to participate in planning processes.
- The benefits of complex city interventions, such as NBS are hard to communicate to non-experts.
- Lack of clear visions on the municipal level.
3.4. Stavanger

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 short-term 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 fociusses, 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 an issue on national level, decisions on this matter are expected by the end 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 tap 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.

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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.
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 important 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 a 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 well-received and actively used. Different parks, meeting points and walking trails invite people to spend more time outdoors and in the public. Several successful renaturing projects and requalifying projects have taken place and enhanced the social and ecological value of public space. The area of the Emnaus wetland area. Furthermore, scientific demonstration projects are being carried out, e.g. 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 linkages 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, Byfjordparken, 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 sea level rise. Local stakeholders wish to explore the potential of NBS to help address this issue.
Pocket park

Working groups during the workshop

Site Visit: Nibio Green Roof Demonstration Facilities

Internal working session

Project idea templates

Site Visit: Dam og Treningspark Emmaus
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.

### 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: There are several small streams in Stavanger which should be day-lighted to improve water management and quality of urban space

**Background**
Even though historical waterways have not been mapped so far, there are many hidden little streams in the city. Parts of these should be brought back to the surface.

**Potential elements**
- Enhance runoff capacity of the waterways
- Requalify areas and habitats (increasing biodiversity and livability in public space)
- Strengthens the image of Stavanger as “water city”
- Connecting Vannassen to the sea
- Daylighting Skolebekken – creating a connected waterway between Mosvatnet, Breivatnet and the sea
- Revheimskanalen, Kemvik

**Goals**
- Targeting NBS to achieve social development goals; widen the umbrella; taking NBS beyond water management
- Hillveaag and/or Kveimvik as target areas
- Financing through social entrepreneurship fund (Breedskap)
- Integration of the community gardens
- Expansion of 1000 trees project

**Workshop Summary:** Identified core values of these interventions were to improve runoff capacity whilst at the same time enhance quality and biodiversity in public space. Health, livability, attractiveness and history are some of the named drivers. Desired elements were waterfalls, connectivity to open waters and the sound of water in the city. It is expected that a large range of stakeholders would benefit from such interventions. Opening of rivers should therefore be made a requirement or explicit goal in the local plans and the overall masterplan. Additionally, first feasibility studies should be carried out in high potential locations.

### Hypothesis: Stavanger should mobilise NBS explicitly for the purpose of achieving social cohesion and other social issues

**Background**
NBS is very much a “water issue” in Stavanger. A more holistic perspective on the concept is necessary to maximise its potential. NBS for social cohesion has tried and tested (1000 Trees). A similar approach should be rolled out to other target areas.

**Potential elements**
- Targeting NBS to achieve social development goals
- Widen the umbrella; taking NBS beyond water management
- Hillveaag and/or Kveimvik as target areas
- Financing through social entrepreneurship fund (Breedskap)
- Integration of the community gardens
- Expansion of 1000 trees project

**Goals**
- Enhance biodiversity
- Cultural cohesion
- Positive publicity
- Increased run-off capacity
- Hillveaag
- Stonehouse Nymansvæien
- Olav Kyrres Gade
- Pilot streets with rain gardens

**Workshop Summary:** Participants identified significant value in the idea from intergenerational exchange to improved public health. The importance of co-creation and citizen management to ensure ownership of people on the part of public space users was highlighted. The municipality is to play the role of the facilitator allowing for citizens to design and manage their own public spaces. There is significant potential to build on existing projects. This topic has potential to broaden the understanding of resilience to include aspects such as social capital and community, while broadening the understanding of NBS beyond being a water management issue.

### Hypothesis: Stavanger should have testing grounds for showcasing NBS and their effect on the liveability of public urban spaces

**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 elements**
- Enhance biodiversity
- Social cohesion
- Positive publicity
- Increased run-off capacity
- Hillveaag
- Stonehouse Nymansvæien
- Olav Kyrres Gade
- Pilot streets with rain gardens

**Goals**
- Enhance biodiversity
- Social cohesion
- Positive publicity
- Increased run-off capacity

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

### Hypothesis: The blue green factor (BGF) needs to become more diverse and adaptable to the local context of construction and NBS projects

**Background**
The BGF is rarely adaptable to the local characteristics of constructions sites. There is no mechanism to capture the wider effects NBS could have, e.g. on biodiversity and social cohesion.

**Potential elements**
- Incentivise private developers to go beyond regulatory requirements
- Consider the specific context of construction sites
- Integration of new dimensions and elements beyond water management (e.g. biodiversity, social cohesion)
- Coupling to incentive structures or regulations
- A green factor spatial map that shows the most relevant indicators and elements at each given site

**Goals**
- Enhance biodiversity
- Social cohesion
- Positive publicity
- Increased run-off capacity

**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 be the use of native, biodiverse, edible and pollinator-friendly species but clear goals need to be jointly defined. Furthermore continuous improvement mechanisms and KPIs should be developed and a suitable name has to be found. The project ownership lies within the planing 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
- Vitava river flooding protection is now state-of-art
- Flash floods due to extreme rainfall remain underestimated
- The confluence of the Vitava 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

**Inclusive Urban regeneration**
- Insufficient link between the environmental and social objectives
- Dramatic increased rents in previous years: gentrification a challenge
- Lower socio-economic areas of the city a potential target areas for regeneration
- Lack of social housing

**Organisation and Structure**
- Highly fragmented structure (57 boroughs)
- Prague is both a region and capital, which causes inefficiencies in planning, economic development, staffing and coordination
- Overlap of responsibilities and general competition for resources and power
- Scope of control is quite narrow, and highly hierarchical, 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

**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 quantified in financial terms
- Projects that have allocated budgets, where NBS could be a integrated and piloted (Karlova náměstí, Confluence of Berounka and Vitava 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)

**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

**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 environment

**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 participatory-approval 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 high-intensity exchange across the different boroughs. Furthermore, some of the boroughs have differing by-laws and regulations, hindering a cross-borough 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 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 field of climate adaptation and urban planning, as they have specific tools and knowledge to support the implementation of NBS in the city.
When aligned, these organisations could be pushing from the bottom-up 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 focuses on the confluence area of the Berounka and Vltava 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.

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 short-term. 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.
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 Vltava & Berounka) (O)
- Rokytky revitalization (O)

- Palmovka, Rohansky peninsula (F)
- Libensky island masterplan (F)
- Street projects: Vinohradska, Letna (D)
- Prague 14 Vybíralka Housing estates (F/O)
- City centre
- Karlovo namesti (F/O)
- Vlačavske Square (F/O)
- Cisarsky Ostrov Troja (O)
- Novy Smichov (Brownfield) (F/O)
- Sporilovska spojka (Bypass) (F)

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

UNaLab Team

Defining Intervention Areas

Working Session
3.5.8. Project idea workshop

Over the course of the week, 17 ideas for projects were collected. During the internal workshop at the end of the week, the participants each had three votes and used these to pick the top 3 most promising ideas for potential NBS projects.

Hypothesis: Prague should showcase the benefits of NBS at the IPR offices at Smichovy monastery gardens

Hypothesis: Prague should use NBS as a driver for higher-value projects such as the confluence park of Vitava and Berounka rivers

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

Hypothesis: NBS should be integrated into the street revitalisation projects of Vinohradská and Letná

Hypothesis: The Prague 14 pilot project, which aims to improve the public space in the area of an housing estate (prevention of degeneration of the area), should promote its planned NBS as an 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

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

Intervention Area: Raising awareness of NBS and their impacts through a small-scale living lab at the Centre for Architecture and Metropolitan Planning (CAMP)

| Background | NBS are to some an abstract concept. The living lab at 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. |
| Potential Elements | Demonstrator of positive effects of NBS; Space for Education and Interaction with NBS; Sustainable energy system (including photovoltaics); Refurbishment of an area within a UNESCO site; Green facades; Community garden (produce will be used in the local coffee shop at IPR) |

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

Intervention Area: Collaboration with a private investor while integrating NBS in a large-scale real estate development

| Background | NBS are a “heat-island” issue among others in Prague. The current investor and developer are open to introducing green spaces to the new district that will be developed in the specified brownfield. |
| Potential Elements | Targeting NBS to achieve sustainable development goals; Decreasing heat-island effect in the city centre; Andel / Novy Smichov as target areas; Funded by private capital; Expansion of green spaces and making these accessible to the local community |

Workshop summary: One of the main challenges in Prague are urban heat islands. A key potential to address those by integrating more NBS is brownfield development. During the interviews and during the workshop the development of Novy Smichov (Prague 5) was identified as very promising target area. This area is mainly privately funded but additional costs that could come up by integrating more NBS could be covered by the public sector. First ideas for NBS in this area were for example integrating a central park, green roofs and more trees. The IPR will take the collected ideas to discuss it with the developer of Novy Smichov. This project can be another showcase project for how NBS can be a central part in redeveloping projects.

Intervention Area: Integration of NBS in a main square redevelopment within the historic city centre, while testing the ability to work across a variety of departments

| Background | Karlovo Namestí (Charles square) is part of the historic city centre and is surrounded by a main transport axis. Therefore the 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 much more. |
| Potential Elements | Improving the vital function of the park and converting it to an even better recreation site by implementing NBS; Sustainable water management / Water retention; Improving park reputation; Historical park with UNESCO heritage |}

Workshop summary: Karlovo namestí is a central square and park located in the city centre close to the IPR. The public reputation of this space has been in decline in previous years, mainly because the extremely busy roads surrounding it. Since the process of redeveloping this square has already started the discussion on how NBS can be integrated carries a high potential. During the workshop, the participants emphasised the importance of NBS for revitalising this space to improve it’s vital function. A sustainable water management system was mentioned as a key and very promising element for this project. The key challenge is to combine the interests of the heritage office with the visions of the revitalisation of this space. The next steps will be defining 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)

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

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

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

Participation and Stakeholder Engagement
- 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 and engagement
- Frequency of external consultations is considered insufficient
- Cooperation between the municipality and private sector can be improved

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
3.6. Castellón

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<th>Category</th>
<th>Indicator</th>
<th>Value</th>
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<tbody>
<tr>
<td>Demography</td>
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<td>Net urban population density</td>
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<td>Land use and urban structure</td>
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<td></td>
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<td>Per capita (including private cars, excluding motorcycles and trucks) model split</td>
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<td>Waste and resources</td>
<td>Total amount of solid waste sent to landfills per capita</td>
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<tr>
<td></td>
<td>Municipal water consumption per INDUSTRY</td>
<td>90%</td>
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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 (EDUSI) 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...
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 and 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 Río Sico: Dry River

Presentation of results during workshop

Working groups during the workshop

Depuradora: water treatment plant

La Marjalería
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 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: Castellón’s latent risk of flooding requires improvements of its rainwater management system. Improving soil permeability, retention and treatment capacity reduces risks and optimizes its management.

Potential elements
- Increase soil permeability in the urban area
- Increase retention capacity and management of rainwater in buildings and parks
- Sustainable water drainage surfaces (SUDS)
- Pilot projects of rainwater collection
- Surplus reclaimed water pumping for rural areas
- Rain parks and artificial slopes towards “flooding parks”

Goals
- 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

Workshop Summary: Castellón and cities like Mallorca are at high risk due to the natural phenomenon called “Io gota fina” (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 who much concern about the houses and buildings in the Mont-roig who are build below water table level, representing a major 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.

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

Potential elements
- Improve environmental awareness
- Contribute climate change mitigation and adaptation
- Re-conceptualisation of planned green corridors
- Planning of additional corridors: Sports, Downtown, Via del Mar, Paseo de Morella, Ribolto, etc.
- Include innovative elements of NBS in their design

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

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 promoted in the city. The whole SWM system needs to be re-structured to make it environmental and financially sustainable. First interventions can be done at the fiscal level, by a more “fair” taxation system. Recycling can be promoted by introducing a „ponts“ system and so called „Recycling points“ in the city. The industry needs to be regulated but first actions easier to implement would be to promote green activities such as recycling by reducing the property tax (Ibi) payed. The refund “waste” into value can be then combined with the implementation of NBS. Points earn can be translated eg. to financetree planting.

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

Potential elements
- New, improved sidewalks and cycle paths
- Integrated urban mobility centers
- Implementation of the concept of super islands

Goals
- 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

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 Castellón. 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.

Hypothesis: The current lack of sustainable management of solid waste in Castellón requires a redesign to better sensitise and enforce environmentally friendly behavior. Industry waste management needs closer regulation.

Potential elements
- Implement 3R policy: reduce, reuse and recycle
- Increase environmental awareness
- Reduce the environmental impact of solid waste
- Reduce water pollution
- Promote waste separation and return
- Regulate the production of containers and materials
- Restructuring the waste collection fee based on the “polluter pays” principle

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

Workshop Summary: Castellón and cities like Mallorca are at high risk due to the natural phenomenon called “Io gota fina” (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 who much concern about the houses and buildings in the Mont-roig who are build below water table level, representing a major 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 then 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.
Key findings: Cannes

Green and Blue Infrastructure
- Croix des Gardes, the Islands and Basse Vallée de la Siagne as protected green lungs of the city
- Dry valleys as special geological feature (high flood risk areas)
- Focus on native, pollinator-friendly and drought resistant species has to be strengthened
- Existing green blue infrastructure is well used
- Protection of marine ecosystems has to be enhanced

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.

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 city
- 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

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

Regulations and incentives
- Building and zoning regulations pay special attention to flood risk and water retention capacity.
- Better regulation of public water use, soil quality 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.
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 Marais) 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 urban planning. The newest version is being enacted these months and additional tools might need additional budget.

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 cross-sectoral 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 national risk prevention, the Ministry of Ecology manages the Fond Burinier 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).

On 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 €/m³). Perceived challenges include that, until now, there are no holistic cost-benefit 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 (~ € 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.
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 cross-sectoral 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 data governance processes such as politiques des quartiers provide 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.

3.7.5. 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 projects are underutilised. 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, politiques 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 Platanus) 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 Posidonie) 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 €/m2 to 150 €/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...
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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 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.
Heavy rainfall event

Interview & visit CPIE

Voting during the workshop

Site Visit: Basse Vallée de la Siagne

Interview & visit CPIE

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

**Background**
The former industry area will be rehabilitated in the coming years to become a mixed use district. It should be home to the new creative economy, first high-rise buildings and could become a NBS demo site.

**Goals**
- Show the potentials of integrating NBS in urban planning
- Renature and redirect parts of the La Frayère river to create a blue green park that runs through the district
- New and natural river course park
- Green corridor from Basse Vallée de la Siagne down to the sea
- Green roofs on former industry buildings & "green skyscrapers"
- Building integrated circular water systems, renewable energy from sewage system and individual composting
- New and naturally sustained beach

**Potential elements**
- Land practices
- Pedagogic feasibility as and
- Renature and redirect parts of the
- Support local respect the solution and pollution Mediterranean possible.

**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.

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

**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 other 210 ha with good potential. Treated freshwater should be made available for irrigation.

**Goals**
- Maintain natural state of the area and reinforce water retention capacity
- Ensure water availability during dry periods
- Promote local agriculture and strengthen social cohesion
- Extend family gardens
- Pedagogic farm
- Fruit orchards
- Wetlands (phytoremediation)
- Redirect treated wastewater from ReUse project for permaculture

**Potential elements**
- Rainwater retention, energetic insulation, biodiversity
- Soils
- Green roofs, demos should be preferred option in Cannes. To show the viability and benefits of green roofs, demos should be installed on flat roofs. Potential sites include the airport, former industrial buildings, Forville market, schools, etc.

**Workshop Summary:**
Identified core values were green and leisure areas for families, storm water retention, biodiversity, permaculture 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 regally 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.

### 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 green roofs are the preferred option in Cannes. To show the viability and benefits of green roofs, demos should be installed on flat roofs. Potential sites include the airport, former industrial buildings, Forville market, schools, etc.

**Goals**
- Test and promote green roofs (special focus on rainwater retention, energetic insulation, biodiversity & aesthetics)
- 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

**Potential elements**
- ReUse - wasteland (taking into account)

**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: 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

**Workshop Summary:**
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
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 profit from depaving and more urban green (reducing heat, shading, etc.) and could be redesigned so as to serve as water retention spots in times of heavy rainfall.

**Goals**
- Creation of healthier and more attractive environments
- Support flood mitigation in urban areas
- School yards, Kindergartens
- Playgrounds, recreation areas
- Hospital yards, public buildings
- Sport facilities such as soccer fields, running tracks, etc.
- Parking facilities
- NBS elements: Basins, green spaces, trees for shading, vegetation, permeable paving.

**Workshop Summary:** This intervention could help to increase nature 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 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 la Bastide Rouge and La Bocca.

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

**Background**
The TIGRE platform aims at bringing together all relevant (real-time) data for risk management. This tool should be further developed to be also used for training and awareness raising.

**Goals**
- Increase awareness regarding natural risk
- Prepare citizens for eventual crisis
- 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

**Workshop Summary:** Key element of this intervention is that TIGRE becomes accessible to all citizens of Cannes and can be used as pedagogical 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 opportunities such as the Climathon. Important preconditions are the improvement of the database (citizen data) and incentives for citizens to register and participate. First steps would be to create the application and pedagogical resources and to run an awareness 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

**Background**
The 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.

**Goals**
- Systematically and gradually improve water sensitive urban design
- Link the glamorous image with green space
- Enhance green space connectivity and accessibility
- Reintroduction of native species
- Increase of permeable paving and reduction of concrete
- Automatic irrigation systems
- Green street furniture
- Pilot projects to improve visibility

**Workshop Summary:** Special elements and locations that have been mentioned include increasing the permeability of all pavements and alleys, ecological continuity in Petit Juas, 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.
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. Başakşehir 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 maintain an informal but rather clear relationship with the municipality, including a well-established link to different departments of the 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.

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
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

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

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

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 years
- 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 Engagement
- 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 institutions

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
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 into built structures (such as green roofs, green walls, pocket parks 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 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.

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 public space.
High urban density

Green pockets

Significant space occupation for transport infrastructure

Integrating recreation elements into green spaces

Green corridors

Basaksehir Living Lab
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.

### 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:

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Background</th>
<th>Goals</th>
<th>Potential Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipality should develop a comprehensive green infrastructure plan</td>
<td>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.</td>
<td>• Building well connected, accessible green infrastructure&lt;br&gt;• Including a variety of native species, ecological value added&lt;br&gt;• Foster social cohesion / inclusion with different functions that target different users&lt;br&gt;• Minimum quality standards of green spaces&lt;br&gt;• Green space design aligned with climate adaptation aims&lt;br&gt;• Vision and the strategic plan of the municipality reflected in green infrastructure plan</td>
<td>The plan would require contributions of ISKI, Metropolitan Municipality and other authorities.</td>
</tr>
<tr>
<td>The city needs a cross departmental structure to manage topics such as sustainability, smart city and/or resilience</td>
<td>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.</td>
<td>• Integrate the activities of the departments to work on these cross-sectoral topics&lt;br&gt;• Create the link on the topic with other municipalities and other levels of government.</td>
<td>Covering risk assessment, climate change mitigation and adaptation, biodiversity management, etc.</td>
</tr>
<tr>
<td>NBS should be utilised to increase awareness of sustainability in schools and local communities</td>
<td>The municipality has the goal of raising awareness about sustainability issues; NBS is a topic that many people can relate to by identifying their own challenges and solutions through nature to solve them. Schools are small communities in which the concept can be operationalised.</td>
<td>• Increase awareness of the topic (climate change, biodiversity, value of nature)&lt;br&gt;• Increase stewardship and ownership over green infrastructure&lt;br&gt;• Improve community identity</td>
<td>E.g., „Build your own rain gardens“&lt;br&gt;• Define your own challenges&lt;br&gt;• Co-creation workshops (collecting inputs for urban interventions)&lt;br&gt;• Providing tools, information and other resources&lt;br&gt;• Competitions between schools and building communities</td>
</tr>
<tr>
<td>The Living Lab should be boosted as a central multi-stakeholder platform to host co-creation of NBS in Basaksehir</td>
<td>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.</td>
<td>• Build up a community of practice around NBS through articulating the (private and public) benefits of NBS&lt;br&gt;• Increased awareness of the topic: knowledge sharing&lt;br&gt;• Integrate citizen perspective into urban development approaches.&lt;br&gt;• Mobilise financing for NBS&lt;br&gt;• Facilitate strong cooperation with local university that cover topics relevant to city planning.</td>
<td>An analysis of local stakeholders and their potential stake in developing pilots&lt;br&gt;• Production of a white paper that promotes NBS in local city development&lt;br&gt;• NBS related events at the living lab&lt;br&gt;• Public-Private financing: A public-private fund to pool local financial resources for potential NBS applications&lt;br&gt;• Local companies to sponsor competitions to solve their specific challenges through NBS&lt;br&gt;• 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</td>
</tr>
</tbody>
</table>
Section IV — Ambition setting
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 Başakşehir at the Ambition Workshop - 13 April 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 - 14 February 2018

The project team of Stavanger at the Ambition Workshop - 8 December 2017
4. 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.

Day 1
- Interview with policy makers
- Workshop with strategy department

Day 2
- Workshop with internal stakeholders
- Workshop with external stakeholders

Day 3
- Working session with project team to formulate final results
- Preparing main content of concept report

Programme of the ambition workshops in 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.

Morning
- Finalising Step 1
  - Presentations of the cities ambitions
    • Each city presents its ambition for the focus areas
  - Learning from each other’s ambitions
    • In-depth discussion on common and specific ambitions
    • Selection of front-runner city / ULL for buddy system

Afternoon
- Preparing for Step 2
  - Presentations of the Drivers for Change
    • Sharing of results of Future Telling research
  - Preparing for Vision Development
    • Exploring the relevance of the Drivers for Change for the ambitions and preparing for the vision workshops

Programme of the joint ambition workshop

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.

The results of the joint ambition workshop are presented at the end of this chapter.
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.
Stavanger 2050: Urban resilience through nature and knowledge

1 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.

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 2
- In 2050 rainwater 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 an attractive element for recreation and resource of nature-based solutions to increase the 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

2 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 the people of 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

3 Utilising the co-benefits of NBS-solutions 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.

Strategic ambitions from the sessions

- In 2050 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 makers 3
- 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 tourists. Policy makers 3
- 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 makers 1
- 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 minutes reach). Strategy 2
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 the workshop is shown on the next page.
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, wood and recreational facilities. The urban green — forest, parks, trees, green roofs and façades — contributes to climate resilience and a healthy micro-climate.

Strategic ambitions from the sessions

- **In 2050 the people enjoy greener spaces that add functionality to the urban quality.** A well-structured & 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 multifunctional 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 serve people, offering local food, wine and fish, using synergistic effects and distinguishing through identity. **Policy 3.2**

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.

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 façades that also contribute to water retention. **Policy local 3**

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 urban development 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. **Strategy 3**

- **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 mobility solutions. **External stakeholders 1**

- **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 public transport. **Policy 1.2**

- **In 2050 Prague has reduced its CO₂ footprint and raised awareness as a response to climate change. This is achieved through integrated economical, social and ecological developments. **Policy 1.3**
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.
Castellón 2050: A green city for all people to live

1 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.

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. Internal stakeholders 1
• In 2050 the people value the city for its acoustic quality. Castellón is seen as the quiet city in between Valencia and Barcelona. Policy makers 2
• 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 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. 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
• 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
• 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 people act responsibly with regard 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 companies follow. External stakeholders 1
• 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 coal 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

2 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.

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 people act responsibly with regard 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 companies follow. External stakeholders 1
• 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 coal 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

3 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.
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.
Cannes 2050: A green, safe and pleasant city

1 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. 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 1
• 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 1
• 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 2
• 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 1.1

2 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

3 A new way of planning the city

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

• 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 creative activity. Strategy 2
• In 2050 new urban politque 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 outdoor life. Policy 2.3
• 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 regulations. Internal stakeholders 1
• 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.
Basaksehir 2050: Smart city of happiness and well-being

### 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.

### 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.

### Circular and self-sufficient

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 resources.

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**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 resources. Basaksehir is a well-known and prestigious place through this and acts as a role model for Turkey and the world. Policy makers
- 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 are widely available. Internal stakeholders
- 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

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**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 Basaksehir. Water and waste types are collected separately and recycled to create value. Strategy 2
- In 2050 all water in Basaksehir 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 authority to ensure companies comply with the regulations. Internal stakeholders 2
- In 2050 not one drop of water is wasted in Basaksehir. 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

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**Strategic ambitions from the sessions**

- 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 Basaksehir 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 stakeholders 3
- In 2050 the people of Basaksehir 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 well-balanced 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 technologies. External stakeholders 3
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.
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.

**EINDHOVEN**

The city of Eindhoven is one of the ten largest cities in The Netherlands with 310,000 inhabitants, while the Eindhoven region has about 730,000 inhabitants. The city is one of the five most dynamic regions of The Netherlands and a global technology leader. It is also the largest urban region in the South-East of the Netherlands, known as a centre of innovation, R&D expertise, and design.

Eindhoven is facing serious challenges due to rapid population growth, from 250,000 inhabitants in 2010 to an estimated 300,000 by 2030. This rapid growth is mainly due to immigration, younger age groups, and the growth of the knowledge-based economy. These changes have led to a significant increase in urbanisation, strain on infrastructure, and pressure on the environment.

**SOLUTIONS**

- **Green spaces**
- **Trees and urban forests**
- **Urban agriculture**
- **Green roofs**

**GENOVA**

Genova is the largest city in the Liguria region and is characterised by a wide coastal area with hills and deep mountains in the backgrounds. Genova is the third largest city in Northern Italy with a population that amounts to 607,000 people. This number is expected to increase by 2030, with the whole metropolitan area expected to reach 1.2 million inhabitants.

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 serious environmental challenges relating to extreme weather conditions, urban management issues, heat stress, as well as water and air pollution.

**SOLUTIONS**

- **Green spaces**
- **Trees and urban forests**
- **Urban agriculture**
- **Green roofs**

**TAMPERE**

Tampere is the third largest city in Finland and the largest island city of the Nordic countries. Tampere has in total 219,000 residents and close to 500,000 people live in the Tampere region, which includes Tampere and its neighboring municipalities. The Tampere region is one of the three most rapidly developing regions in Finland.

A critical issue for Tampere is flooding and storm water management. As both demonstration sites in Tampere, Vuores and Hiedanranta, are under construction to become dense urban areas, the rapid population growth will pose a significant challenge. Other challenges the city is facing include water pollution and reduced biodiversity.

**SOLUTIONS**

- **Green spaces**
- **Trees and urban forests**
- **Urban agriculture**
- **Green roofs**

**WUORES**

Vuores is a new greenfield district extending to the south of the city centre and the Vuores industrial area that will be developed into a housing area for 25,000 people and more than 10,000 jobs.

A critical issue for Vuores is flooding and storm water management. As both demonstration sites in Vuores, Vuores and Hiedanranta, are under construction to become dense urban areas, the rapid population growth will pose a significant challenge. Other challenges the city is facing include water pollution and reduced biodiversity.

**SOLUTIONS**

- **Green spaces**
- **Trees and urban forests**
- **Urban agriculture**
- **Green roofs**

**LAGACCIO**

Natural-based solutions in key climatic and water-related challenges will be demonstrated in Lagaccio. Lagaccio, which is a rural site already populated with characteristics of small villages near urban environments, is defined by abundant natural environments and natural sites. The Lagaccio district occupies a core area of Genova, connecting the old part of the city with areas of significant social and cultural value.

**SOLUTIONS**

- **Green spaces**
- **Trees and urban forests**
- **Urban agriculture**
- **Green roofs**

**HIEDANRANTA**

Hiedanranta is a new NBS demonstration site. Hiedanranta is a new greenfield district extending to the south of the city centre and the Vuores industrial area that will be developed into a housing area for 21,000 people and more than 10,000 jobs.

**SOLUTIONS**

- **Green spaces**
- **Trees and urban forests**
- **Urban agriculture**
- **Green roofs**
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.

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 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.
4.8.1. Elements of the strategic ambitions related to green

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.

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.

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.

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 nature

In 2050 Başakşehir 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

<table>
<thead>
<tr>
<th>Front runners</th>
<th>Followers</th>
<th>Observers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eindhoven</td>
<td>Genova</td>
<td>Tampere</td>
</tr>
<tr>
<td>Lack of space for green areas or NBS</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Lack of connection between green areas</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Difficulty implementing NBS in the dense city centre</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Distance to nature or between people and nature</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Conditions for walking and cycling</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Developing local agriculture could be a way of preserving green areas</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Combine beauty and usefulness</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Lack of / limited biodiversity</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Lack of water to sustain green</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Lack of management of green space (resulting in lack of accessibility and awareness)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Nature vs cultural heritage in historic city</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Private green</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Greening buildings</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>More green with less money for maintenance</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Maintenance costs</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Water quantity</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Flexible green heritage sites</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
### 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 high-quality 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.

### Challenges in the strategic ambitions related to ‘Water’ and their relevance for the partner cities

<table>
<thead>
<tr>
<th></th>
<th>Front runners</th>
<th>Followers</th>
<th>Observers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sometime too much water, and sometimes too less water...</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revitalisation of creeks and rivers</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Heavy rain falls — floods</td>
<td>● ●</td>
<td>● ●</td>
<td>●</td>
</tr>
<tr>
<td>Awareness of importance</td>
<td>● ●</td>
<td>● ●</td>
<td>●</td>
</tr>
<tr>
<td>Water quality</td>
<td>● ●</td>
<td>● ●</td>
<td>●</td>
</tr>
<tr>
<td>The draughts increase the risk of fire (forest)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Involve citizens in water management on private areas</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Rising sea levels</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Managing natural rain water</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Re-use of waste water to prevent lack of water</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Climate resilient buildings</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Lack of permeability</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Lack of areas for infiltration and storm water management</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Finance the NBS solutions</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
4.8.3. Elements of the strategic ambitions related to processes

**Utilising the co-benefits of NBS-solutions 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 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.

**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.

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**A new way of planning the city**

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 République 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 resources.

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**Challenges in the strategic ambitions related to ‘Processes’ and their relevance for the partner cities**

<table>
<thead>
<tr>
<th>Front runners</th>
<th>Followers</th>
<th>Observers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eindhoven</td>
<td>Genova</td>
<td>Tampere</td>
</tr>
<tr>
<td>Bráskehir</td>
<td>Cannes</td>
<td>Castellón</td>
</tr>
<tr>
<td>Prague</td>
<td>Stavanger</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

- Policies, procedures & incentives
- Knowledge, e.g. how to plant a tree
- Knowledge on the value of nature
- Teaching young people ‘the future’
- Climate adaptation is a shared responsibility (public, private, citizens)
- Prioritising design principles
- Funding processes
- Auditing & penalties
- Processes of creating public awareness
- Organisational structures to have a wider coverage
- Silo thinking & planning
- Construction rules / permits
- Lack of knowledge how to do co-creation and lack of working capacity
- Lack of sustainable mindset / change of mindset
Section IV — Vision development
## 5. 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.

### 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.

This joint vision workshop served two purposes:

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

### Programme of the joint vision workshop

<table>
<thead>
<tr>
<th>Morning</th>
<th>Finalising Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of the cities desired future scenario</td>
<td>Each city presents their vision for 2050</td>
</tr>
<tr>
<td>Learning from each other’s visions</td>
<td>In-depth discussion on common and specific needs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Afternoon</th>
<th>Preparing for Step 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of the Roadmapping process</td>
<td>Sharing of the solutions available in the NBS Technical Handbook</td>
</tr>
<tr>
<td>Identifying topics and experts for the interviews</td>
<td>Selecting topics for the roadmapping interviews and making a list of suggested experts using the networks of all partners</td>
</tr>
</tbody>
</table>

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

### Programme of the vision workshops in the cities

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlining the vision</td>
<td>Enriching the desired future scenario</td>
<td>Describing the desired future scenario</td>
</tr>
<tr>
<td>- Exploring the Drivers for Change in relation to the future of the city</td>
<td>- Exploring the future of the city and the main elements of the vision</td>
<td>- Enriching the vision with specific additions</td>
</tr>
<tr>
<td>- Selecting the main elements of the vision</td>
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</tr>
</tbody>
</table>

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.
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 the different sites.
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.
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 taken at the site.

Gavoglio Urban Park
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 its historical architectural structures.

During the consortium meetings in Genova (21, 22 and 23 November 2017) visits were organised to the Lagaccio district.
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.
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 depaving; 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.
6. 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.

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 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.

6.1.4. 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 thought 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.
6.2. Thought Leaders

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 PhDs divided over 3 departments. Within IVM, Jeroen is also head of the department ‘Water and Climate Risk’. Jeroen has 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 modeling, Jeroen was awarded by the prestigious NWO-VICI grant (1.5 mln Euros) in 2014.

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.

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.

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.

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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”.

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.
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.

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.

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
- Mario Cucinella, MC Architects, Bologna, Italy
- Gianfranco Franz, University Ferrara, Italy
- Rudolf Giffinger, Technical University Vienna, Austria
- Pieter van Wesemael, Eindhoven University of Technology, Netherlands
- Stefan Schurig, World Future Council, Hamburg, Germany

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

We would like to thank all participants for their contribution to the Future Telling research.
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.
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 world 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 f*cked 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 know, 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. 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. 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. 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. 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 for not 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. FT14. 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
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 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 focuses. But those narrow focuses 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, Iburg, 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.
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 of 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 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 into a 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, when 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 ages ago, they were very much ahead in being green. They were already investigating how to re-use old buildings 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 spaces. 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.

FT5. 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 is able to grow more when they have a highway. But it was decided to make a park 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 this 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 much top of the house. 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 window 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 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. Social movements in general, from feminism movement and ecological movements, etc.

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 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, that is it that is much more urbanised landscape, fusing all kinds of qualities, not replacing one for another. That is also why, we in the Netherlends, 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 now, 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 nature is inside the city. But what that means, and that may help with our energy problems and social problems. It seems as is 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 of what 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 deep need, that is met by green space, that is met by quiet sound and birds drooping, there is this very tangible 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 countryside 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.

FT15. 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 fracting, 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 fracting 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.
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 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 on 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 cost 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.

FT5. Those who actually able to glean knowledge from a huge mishmash of data are going to be invaluable, I think. To the extent that it has an impact to cities, to putting individuals, but also organisations and communities, in a position of power. Depending on the data they have to access 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 as you have. Therefore we have to use examples of what nature-based 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 irrelevancy they dismiss everything. That comes across everywhere in the world.

FT5. New ethical and legal dilemmas are going to be really challenging. Especially with autonomous vehicles, drones. What is privacy when I can have a camera reading FT5.
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 that we have the capability to reduce our supply chain dependency tremendously.

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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 with water. 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 bit more 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.

FT5. 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 advet some body 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 go.

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. But companies like insurance companies, they are very much interested in lowering risk, also from climate change. Companies can also play a big role in awareness. If you look at an insurance for theft, for example, then you see all the campaigns. But companies like insurance companies, they are very much interested in lowering risk, also from climate change.
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 petrochemicals. 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 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 consequence 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 well-being. I would like to think that part of the impact will be that 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 or, 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.

FT2. If I imagine the future, I have a line in mind. I can put all these elements on 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 guerilla, 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 autarchic 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 co-creation 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 m2. 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.
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 climate and weather conditions. The people benefit from the resilience of these cities, and they enjoy an environment in which urbanization 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.

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 values 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 they interrelate and meet 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 view of a healthy and enjoyable living environment. These green spaces serve as ‘lungs’ and ‘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 areas to create pleasant places that are also resilient to extreme weather events. Green areas in each neighborhood allow recreation by people’s own surroundings, and connected green areas – such as 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.

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 urban-bound life. This knowledge allows cities to judge in and around the city. For example, with organic food production augmented by high-tech to activate resources and make cities self-sufficient. In this way, science breaks new solutions, together with evidence of the impact of the solutions implemented in the city. Data enables fast-based decision-making and builds 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.

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.
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).

<table>
<thead>
<tr>
<th>Cities as living organisms</th>
<th>Leveraging natural value at micro and macro level</th>
<th>Reinventing nature in the city</th>
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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
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
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 the 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 traditional 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!

5. Storm water as a resource

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.

We expect that streams are opened, but only when it is natural and 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 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?
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
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
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 the 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 drought 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 education 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.

Involving the public and local people and inhabitants 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.
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 flea market, or places where people can leave excess food for others to use.

4. Smart planning and design

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.

It is also important to attract new, skilled people to be involved in this 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.
Second session of the vision workshop in Prague
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.

Prague 2050: A liveable city in harmony with nature

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.

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
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
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 the 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 sea, 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$_2$ 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 eco-passport – 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.
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 façades provide a comfortable space for happy and vital employees.
First session of the vision workshop in Cannes.
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.

Grean areas should be able to absorb rain water, but for very heavy rains we will need additional measures.

Side note: if you want shadow in 2050 you need to plant the trees now!

2. Mountains

The ambition is to increase agriculture in general and especially on the 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.
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
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 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.

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. 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.

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.

Key elements of the desired future scenario:
First session of the vision workshop in Başakşehir
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 the 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 on tv and in open spaces further support the creation of awareness.
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 Bosphorus 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 it 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
**Başküşehir 2050: Smart city of happiness and well-being**

** Desired future scenario **

In 2050 Başakşeher 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 resources.

**Key elements of the desired future scenario:**

**Sustainable awareness and behaviour**

In 2050 the people of Başakşeher 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 environment 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**

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 matching supply and demand.

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.
The shared themes that were discussed are shown in the table below.

<table>
<thead>
<tr>
<th>Green factor</th>
<th>How to implement the green factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A green/blue factor</td>
</tr>
<tr>
<td>Daylighting</td>
<td>How to keep daylighting on the agenda (complexity and takes a long time)? Collaboration in river daylighting</td>
</tr>
<tr>
<td>Citizen participation</td>
<td>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?</td>
</tr>
<tr>
<td>Support tools</td>
<td>Tools to support NBS roll out Legal and regulatory instruments Innovative procurement schemes</td>
</tr>
<tr>
<td>Education</td>
<td>Linking NBS projects to environmental education</td>
</tr>
<tr>
<td>Cross-departments</td>
<td>Engage cross-departmental networks &amp; collaboration Communication between administration and stakeholders Organising opposition</td>
</tr>
<tr>
<td>Sweet mobility</td>
<td>Improving non-motorized mobility: bicycle lanes and green networks</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Solutions for and experience with underground infrastructure</td>
</tr>
<tr>
<td>Circularity</td>
<td>Circular systems for water, waste, resources</td>
</tr>
<tr>
<td>Industry</td>
<td>How to involve industries to be clean and sustainable To involve industries, one must understand economic benefits of NBS Monitoring and measuring effects</td>
</tr>
</tbody>
</table>

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
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 agriculture?
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, Pasque Morella, Parque Ribalta)?
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
1. Which NBS can create comfortable streets in the historical city centre, with shade and water retention systems, that enhance the quality and liveability of the historical setting?
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 retention systems?
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 Prague inhabitants?
5. Which NBS around the creeks and rivers will protect the city from flooding and draughts?

Stavanger
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

Integrating all relevant UNaLab deliverables

NBS INTERVENTIONS

System analysis result:

GOVERNANCE INTERVENTIONS

Vision development result:

DESIRED FUTURE SCENARIO

Do all interventions together lead to the desired future scenario? How can we enrich the portfolio to achieve our ambitions?

Enrichment of portfolio:

Vision development result:

DESIRED FUTURE SCENARIO

Do all interventions together lead to the desired future scenario? How can we enrich the portfolio to achieve our ambitions?

Enrichment of portfolio:

Vision development result:

DESIRED FUTURE SCENARIO

Do all interventions together lead to the desired future scenario? How can we enrich the portfolio to achieve our ambitions?

Enrichment of portfolio:

Vision development result:

DESIRED FUTURE SCENARIO

Do all interventions together lead to the desired future scenario? How can we enrich the portfolio to achieve our ambitions?
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, Tastavelden, 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?

**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?

**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?

**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.
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.

8.1. Participants in the System Analysis

8.1.1. Stavanger - 11-15 June 2018

- Gunn Jorunn Aasland, Director, Department of Urban and Societal Planning
- Gabriele Brennaugен, Senior adviser, Department for the Environmental
- Gunnar Crawford, Head of Stavanger Smart city
- Ingrid Eilerås, Senior Advisor
- Per Fretheim, CEO, MAD architects
- Jarle Furue, Head of Department, Water and sanitation
- Nils Henrik Haaland, Senior procurement officer
- Tord A Haaland, Chief Medical Officer
- Felicitas Heimann, Head of Parks Unit, Department of Road and Parks
- Hugo Kind, Societal safety and emergency preparedness
- Lene Kløvning Jørpeland, Unit for Citizen involvement and co-creation
- Eirik Mannsåker, GIS expert, section for geodata
- Per Müller Pedersen, Director, Storm Aqua
- Anne Grethe Nes, Department of Human Resources and Strategy
- Torstein Nielsen, Resilience manager, Emergency preparedness and societal safety
- Harald Rastvik, Professor Urban Planning & Sustainability, University of Stavanger
- Arne Sebø, Senior researcher, Nibio
- Elin Scanche, Director, Grcm
- Leidulf Skjørestad, Director, Department of Urban Development and the Environment
- Anne Merete Skogland, Department head Ramboll
- Torger E Sørensen, Department head Parks and roads
- Marit Sletteberg Storli, Project manager IKDP Forus
- Lars Stangeland, Managing director GMC, Property Development
- Aslaug Tveit, Leva Urban Design
- Elin Valand, Senior adviser, Rogaland county council

8.1.2. Prague - 20-24 August 2018

- Milan Brlík, Head of Participation Department, IPR Prague
- Jaroslava Čečurová, Water Management, Municipality of HMP
- Martin Čenus, Director of Section of Spatial Development, Prague City Hall
- Kristýna Drapálová, Spatial analyst, IPR Prague
- Zdeněk Ent, Green Infrastructure Office, IPR Prague
- Martin Fejfar, Specialist in Nature and Landscape, IPR Prague
- Michal Fišer, Chairman of the Board of Directors and CEO, Operator ICT
- Dan Frantík/deputy, Magistrát HMP, Head of Greenery Care Department
- Jaromír Hainec, Head of Department of Urban Design, IPR Prague
- Petra Horáčková, Section strategies and policies: office strategy and development, IPR Prague
- Tereza Horejšová, Vltava River Basin
- Ivan Jacko, Head of Sustainable Energy Department, OCP MHMP, Prague City hall
- Plamínková Jana Radničková, HMP MHMP, Prague City Council
- Škalický Jiří (čj), Director of territorial decision making department, Prague City Hall
- Jaromír Kačer, Water Management, Municipality of HMP
- Rozalie Kasparova, Public Space Office, IPR Prague
- Mária Kazmuková, Magistrát HMP coordinator of Prague's Adaptation Strategy
- Marek Kundrata, Landscape Architect, Section Office: Public Space, IPR Prague
- Štěpán Špoula, Director of Section strategies and policies: head of office strategy and development, IPR Prague
- Jaroslava Tveit, Head of Environmental Protection Department, Prague City Hall
- Lukáš Vacek, Managing director, ESPAITEC (science and technology park)
- Milan Brlík, IPR Prague

8.1.3. Castellón - 15-18 October 2018

- Alicia Andreu, Tecnologic Institute of Ceramics
- Begoña Antequera, Hort del Manyano (non-profit organisation focused on local development)
- Cristobal Badenes, Director of infrastructures, urban services and sustainability, Municipality of Castellón
- Inés Beltrán, engineer, Municipality of Castellón
- Guillermo Berlanga, FACS (Water company)
- Juan Antonio Bertolini, Managing director, IPR
- Fernando Calduch, Coordinator of City development, sustainability, environment and urban services, Municipality of Castellón
- Javier Climent, FACSA (Water company)
- Tomás Fabregat, Agronomist sustainability department, Municipality of Castellón,
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8.1.5. Başakşehir - 5-9 November 2018

- Recep Ali Topçu - Adell
- Kenan Apaydın - Business Manager, Emlak Yönetim - Toki Public Housing Administration
- Hasan Basri Gümüş - Deputy Mayor, Başakşehir Municipality
- Emre Bingöl - Director, Department of Zoning and Urbanism
- Taner Bingöl - Director, Department of Health Services
- Serkan Çelik - Deputy Mayor, Başakşehir Municipality
- Elif Dükkançlı - Director, Department of Planning and Projects
- Haci Dursun Agac - Director, Department of Sanitation
- Fatih Erol - Environmental Protection Manager, IBB Metropolitan
- Gülten Erçuğal - Chef of Environmental Control, İOSB
- Mustafa Gülçek - Director, Environment and Waste Management
- Kazım Gülüm - Director, Department of Parks and Recreation
- Sebahatdin Kayas - Board Member, IOSB
- Aykut Koçak - Aktif Çevre
- Abdullahigen Kurt - Deputy Mayor, Başakşehir Municipality
- Ramazan Oruç - Strategic Planning Manager ISKİ İstanbul Water and Sewerage
- Emre Öztürk - Director, Department of Technical Works
- Serhat Öztürk - Department of Planning and Projects
- Seda Özdemir - Environmental Protection Manager, IBB

8.1.4. Cannes - 5-9 November 2018

- Benoit Agassant - Environmental Department, the city of Cannes
- Luc Aribaud - Researcher, CSLI Association
- Dominique Aude-Lasset - Deputy General Technical Services, the City of Cannes
- Stéphane Becker - Projects and Buildings, the city of Cannes
- Christophe Biche - Roads and Infrastructure, the City of Cannes
- Thierry Bono - Information Systems (DSIT), Agglomération Cannes Pays de Lérins
- Jérôme Briot - Projects and Buildings, the city of Cannes
- Florence Bunodière - Lérins Country - GEMAPI
- Valérie Capon - Urban Architect, Department of City Planning
- Estelle Carrier - Projects and Buildings, the city of Cannes
- Serge Castel - Director DDTM, Nice
- Laure Cayla - Lérins Country – GEMAPI
- Laurent Chevalier - Director City Planning, Agglomération Cannes Pays de Lérins
- Éric Dumetz - Deputy Director of IMREDD, Université Côte d’Azur, Nice
- Laurence Estimbre - SICASIL (water & flooding), Agglomération Cannes Pays de Lérins
- Christophe Fiorentino - Deputy Mayor, Urban Planning, the City of Cannes
- Cécile Garçon - Communication
- François Loques - Projects and Buildings, the city of Cannes
- Fabien Laganne - Information Systems (DSIT), Agglomération Cannes Pays de Lérins
- Claude Leneiger - Green Space Department, the city of Cannes
- Aurélien Leroy - DSIT ?!
- Franck Liange - Waste management, Agglomération Cannes Pays de Lérins
- Frédéric Marandon - Researcher, CSLI Association
- Thierry Migne - Transport, Agglomération Cannes Pays de Lérins
- Thomas Onzon - General Director, the City of Cannes
- Carole Orly - General Manager of Technical Services, the City of Cannes
- Xavier Peraldi - Electricity Services, ENEDIS
- Marie Agnès Portero - Green Space Department, the city of Cannes
- Marie Poureyron - Agriculture, Waste, Environment, Agglomération Cannes Pays de Lérins
- Frédéric Poydenot - Deputy Mayor, Sustainable Development and Environment, the City of Cannes
- Education, CPIE Association
- Jamila Poydenot - Education, CPIE Association
- Claire-Anne Reix - Deputy Mayor of Risk, the City of Cannes
- Florence Richard - City Planning
- Michel Tani - Agriculture – SCOT, Cannes Lérins
- Pascal Teisseire - Circulation, highways, the City of Cannes
- Magalie Thabuis - International Relations, the city of Cannes
- David Toriti - Waste management, Agglomération Cannes Pays de Lérins
- Pascale Vaillant - Formerly elected Sustainable Development, the City of Cannes
- Elodie Zavattero - SICASIL (water & flooding), Agglomération Cannes Pays de Lérins
8.2. Participants in the Ambition Workshops

8.2.1. Stavanger - 6-8 December 2017

- Janne Nilsen Aalhus: Department for the environment
- Hilde Blokkum: Parks department
- Gunnar Crawford: Stavanger smart city
- Anne Drageset: NTNU
- Elke den Ouden: TU/e LightHouse
- Per Fretheim: Architect, MAD
- Jarle Furre: Department of water and sanitation
- Tom Hawxwell: Fraunhofer IAO
- Frode Heigre: Department of parks and roads
- Felicitas Heimann: Section head, parks, and roads department
- Katrine D. Henriksen: Leva / Urban sjofrent
- Kristen Håyer-Mathiasen: Member of the political body for city environment and development
- Bjørn Zimmer Jacobsen: Section head, water and sanitary department
- Linn Jensen: Stavanger smart city
- Hugo Kind: Department of civil protection and emergency preparedness
- Signe s. Kvandal: City of Stavanger
- Laila Lothe: Architect with the municipalities own building department
- Aina Hovden Lunde: Natural resources manager, department of parks and roads
- Kjartan Alexander Lunde: Member of the political body for urban planning
- Eirik Mannsåker: GIS expert, section for geodata
- Per Møller-Pedersen: Storm-Aqua
- Trygve Petter Nilsen: Head of road section, park and road department
- Mari L. Nordheim: Department of urban planning
- Ingerid Pegg: Water and sanitary department
- Kari Raustein: Leader of the political body for urban planning
- Harald Rustvik: University Stavanger
- Arne Sæbo: Nibio
- Elin Scanche: Gromn by
- Gerd Seehuus: Triangulum
- Anne Skare: Section for urban planning
- Leidulf Skjørestad: Department for urban development and environment
- Anne Merethe Skogland: Ramboll
- Torgeir Esig Sørensen: Department of parks and roads
- Kjersti Tau Strand: Asplan Viak
- Simon Tamminga: Architect, municipal planning
- Ellen Figved Thoresen: Section for road and transportation planning
- Bengt Tovslid: Bergknap AS
- Rianne Valkenburg: TU/e LightHouse
- Tor Brynjjar Welander: Section for municipal planning

8.2.2. Prague - 8-10 January 2018

- Eliška Bradová: IPR Prague - Director of City Planning Department
- Karel Brezina: Povodí Vltavy, Water management State Enterprise
- Lenka Burgerová: Prague 7 District - Councillor
- Martin Churavý: City of Prague - Department of the Mayor’s Office
- Elke den Ouden: TU/e LightHouse
- Tomáš Drdáčky: Prague Troja District - Deputy of the mayor
- Adam Emmer: Czech Globe - Department of the Social Millenium
- Růžena Fišáková: Czech Watermanagement Company (PVS)
- Miroslav Havránek: Charles University Environment centre
- David Hora: SZKT (Czech landscape and horticulture association) - arboretum
- Magdalena Hubená: City of Prague, Project Manager, Project Preparation and Implementation Unit
- Tomáš Lapáček: IPR Prague - Director of Strategy and Politics
- Jaromír Kačer: City of Prague - Department of water
- Jiří Karnecki: City of Prague - Head of the greenery department
- 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
- Tereza Libová: City of Prague - Department of Environmental Protection - Air protection specialist
- Eliška K. Lorencová: Czech Globe - Department of the Social Dimension of Global Change
- Milošlav Mikučík: Operator ICT - project manager of department Smart Prague OICT
- Tereza Myšková: CENIA - Czech Environmental Information Agency
- Ondřej Mirovský: Prague 7 District - Deputy of the mayor
- Hana Perniová: Czech Environmental Information Agency
- Jana Plamínková: City of Prague - Councilors for Infrastructure, Technical Equipment and the Environment
- Radek Rejna: Prague Zbraslav District - Deputy of the mayor
- Jan Richr: IPR Prague - Public Space Office - Landscape architect
- Kristýna Schwarzová: Operator ICT
- Ivana Sibrtová: City of Prague - Head of the state administration of monument care
- Karel Slánský: IPR Prague - Infrastructure and Landscape Section: Head of the Technical Infrastructure Office
- Lubor Smejtek: City of Prague - Department of Nature and Landscape Protection - Nature and Landscape Protection Specialist
- Marie Smetana: IPR Prague - Metropolitan Plan Office - specialist for nature and landscape
- Štěpán Špoula: IPR Prague - Public Space Office - landscape architect
- Petr Suska: Fraunhofer IAO
- Tomáš Trubačík: Šance pro budovy (Chances for Buildings) - analyst for economical building
8.2.3. Castellón - 12-14 February 2018

- Alicia Andreu
- Cristobal Badenes
- Mireia Ballester
- Ines Beltran
- Juan Antonio Bertolin
- Fernando Caldach
- Irina Celades
- Sergio Chiva
- Javier Climent
- Elke den Ouden
- Tomás Fabregat
- Luis Gargori
- Elena Gil
- Consuelo Leal
- Raul Martinez
- Maricelisa Padilla
- Alicia Palarès
- Rosa Pardo
- Juan Carlos Sanchis
- Rafael Simó Sancho
- Rianne Valkenburg
- Carmen Vilanova
- Elena Zuriaga

8.2.4. Cannes - 7-9 March 2018

- Benoît Agassant
- Johara Amarouche

8.2.5. Başakşehir - 11-13 April 2018

- Ali Alper
- Enda Balcı
- Serkan Çelik
- Soner Dedoğlu
- Elke den Ouden
- Elif Dükkançı
- Sencer Ertas
- Gülen Ertuğral

- Dominique Aude-Lasset
- Michele Baudry
- Stéphane Becker
- Richard Colson
- Elke Den Ouden
- Laurence Estimbre
- Christophe Fiorentino
- Romain Grillot
- Magalie Thabuis
- Philippe Marie
- Thierry Migoule
- Sophie Mok
- Thomas Onzon
- Xavier Peraldi
- Marie-Agnès Portero
- Marie Pourreyron
- Claire-Anne Reix
- Noemie Samson
- Pascal Teisseire
- Rianne Valkenburg
- Elodie Zavattiero

- Ville de Cannes (Deputy General Director)
- Ville de Cannes
- Ville de Cannes (Project)
- Ville de Cannes (Europe)
- TU/e LightHouse
- Communauté d’agglomération Cannes pays de Lérrins (Water - Flooding)
- Ville de Cannes
- Ville de Cannes (International Relations Office)
- Ville de Cannes
- Ville de Cannes (General Director)
- Ville de Cannes
- Ville de Cannes
- Ville de Cannes (Deputy Mayor Urban Planning)
- Ville de Cannes
- Ville de Cannes (Deputy Mayor Risk)
- Ville de Cannes (Circulation)
- Ville de Cannes
- Ville de Cannes
- Ville de Cannes
- Ville de Cannes (Parks & Gardens)
- Ville de Cannes (Mayor)
- Basakşehir Municipality (Vice Mayor)
- Basakşehir Municipality
- Basakşehir Municipality (Planning & Project Mgr)
- Istanbul Organized Industry District

8.2.6. Joint Ambition Workshop - Eindhoven 29 May 2018

- Hilde Blokkum
- Sivia Campana
- Margherita Cioffi
- Anna Jole Corsi
- Elke den Ouden
- Luis Gargori
- Abdolrasoul Habibipour
- Tom Hawxwell
- Gijs Hoogmoed
- Heidi Johansson
- Sami Kazi
- Johanna Kuusisto
- Charissa Leung

- Başakşehir Municipality
- Başakşehir Municipality (Vice Mayor)
- Başakşehir Municipality (Mayor)
- Başakşehir Municipality (Vice Mayor)
- Aktif Isı (Environment Mgr)
- Başakşehir Municipality (Vice Mayor)
- Fraunhofer IAO
- Başakşehir Municipality (Recycling Chief)
- Istanbul Technical University (President Consultant)
- Istanbul Metropolitan Municipality (Environment Protection Chief)
- Istanbul Organized Industry District (Permissions)
- Aktif Isı (Environment Mgr)
- Makro Insaat Tic. A.S. Mimar Adell (Chairman)
- Başakşehir Municipality (Building Control)
- TU/e LightHouse
- Başakşehir Municipality (Permissions Chief)
- City of Stavanger
- City of Genova
- Rina Consulting
- City of Genova
- TU/e LightHouse
- City of Castellon
- Luleå University of Technology
- Fraunhofer IAO
- City of Eindhoven
- ERRIN
- VTT
- VTT
- Hong Kong Polytechnic University

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
8.3. Participants in the Vision Workshops

8.3.1. Stavanger - 13 and 14 June 2018

- Tereza Libová (City of Prague)
- Max Alberto Lopez (University of Aveiro)
- Emest Maciulyte (Fraunhofer IAO)
- Delia Mitean (City of Eindhoven)
- Sophie Mok (Fraunhofer IAO)
- Ömer Onur (Başakşehir Living Lab)
- Thomas Onzon (City of Cannes)
- Marielisa Padilla (Fraunhofer IAO)
- Marta de los Rios (ENoLL)
- Peter Roebeling (University of Aveiro)
- Maarit Särkilahti (City of Tampere)
- Stepan Spoula (IPR Prague)
- Monika Uhlenbruch (IPR Prague)
- Ines Vaittinen (ENoLL)
- Rianne Valkenburg (TU/e LightHouse)
- Mariangeles Viqueira Gabarain (UBATEC)
- Mayke van Dinter (City of Eindhoven)
- Yuhong Wang (Hong Kong Polytechnic University)
- Laura Wendling (VTT)
- Spela Zalokar (ENoLL)
- Sonia Zarino (City of Genova)

8.3.2. Cannes - 11 and 12 July 2018

- Elzbieta Lekve (Department of urban planning)
- Mari Lode Nordheim (Stavanger)
- Elke den Ouden (Stavanger Utvikling KF)
- Bjorn Zimmer Jacobsen (University of Stavanger)
- Eli Nessa (Stavanger)
- Per Møller-Pedersen (Stavanger)
- Ingerid Pegg (Public Road administration)
- Claus Sigurd Petersen (Stavanger)
- Per Magne Pedersen (Stavanger)
- Jan Jaap Rietjens (TU/e LightHouse)
- Siv Merethe Berge Rosland (University Stavanger)
- Harald Røstvik (University Stavanger)
- Anne Merethe Skogland (Ramboll)
- Lise M Storås (Ramboll)
- Kjersti Tau Strand (Asplan Viak)
- Simon Tammenga (Ramboll)
- Rianne Valkenburg (TU/e LightHouse)
- Siri Warland (TU/e LightHouse)
- Falk Weih (TU/e LightHouse)

8.3.3. Stavanger - 22 and 23 August 2018

- Marie Pourreyron (Ville de Cannes)
- Claire-Anne Reix (Ville de Cannes)
- Florence Richard (Urban planning)
- Jan Jaap Rietjens (Splinter)
- Magalie Thabuis (Ville de Cannes)
- Rianne Valkenburg (TU/e LightHouse)
- Elodie Zavattaro (Communauté d’agglomération Cannes pays de Lérins)

8.3.4. Cannes - 11 and 12 July 2018

- Marie Pourreyron (Ville de Cannes)
- Claire-Anne Reix (Ville de Cannes)
- Florence Richard (Urban planning)
- Jan Jaap Rietjens (Splinter)
- Magalie Thabuis (Ville de Cannes)
- Rianne Valkenburg (TU/e LightHouse)
- Elodie Zavattaro (Communauté d’agglomération Cannes pays de Lérins)

8.3.5. Prague - 22 and 23 August 2018

- Daniela Blažejová (City of Prague)
- Jaroslava Čechurová (TU/e LightHouse)
- Elke den Ouden (TU/e LightHouse)
- Jan Jaap Rietjens (TU/e LightHouse)
- Zdeněk Ent (IPR Prague)
- Matěj Glišor (Ministry of regional development)
- Jaromír Hainč (IPR Prague)
- Tereza Horejšová (POVODÍ)
- Magdalena Hubená (City of Prague)
- Ivan Jacko (City of Prague)
- Eva Jeníkova (Czech Globe)
- Jiří Karnecki (City of Prague)
- Péter Barák (Czech Globe)
- Rozálka Kašparová (Czech Green Building Council)
- Mária Kazmuková (Czech Green Building Council)
- Štěpán Kyjovský (Czech Globe)
- Magalie Richard (Czech Globe)
- Claire-Anne Reix (Ville de Cannes)

8.3.6. Prague - 22 and 23 August 2018

- Marie Pourreyron (Ville de Cannes)
- Claire-Anne Reix (Ville de Cannes)
- Florence Richard (Urban planning)
- Jan Jaap Rietjens (Splinter)
- Magalie Thabuis (Ville de Cannes)
- Rianne Valkenburg (TU/e LightHouse)
- Elodie Zavattaro (Communauté d’agglomération Cannes pays de Lérins)

8.3.7. Prague - 22 and 23 August 2018

- Daniela Blažejová (City of Prague)
- Jaroslava Čechurová (TU/e LightHouse)
- Elke den Ouden (TU/e LightHouse)
- Jan Jaap Rietjens (TU/e LightHouse)
- Zdeněk Ent (IPR Prague)
- Matěj Glišor (Ministry of regional development)
- Jaromír Hainč (IPR Prague)
- Tereza Horejšová (POVODÍ)
- Magdalena Hubená (City of Prague)
- Ivan Jacko (City of Prague)
- Eva Jeníkova (Czech Globe)
- Jiří Karnecki (City of Prague)
- Péter Barák (Czech Globe)
- Rozálka Kašparová (Czech Green Building Council)
- Mária Kazmuková (Czech Green Building Council)
- Štěpán Kyjovský (Czech Globe)
- Magalie Richard (Czech Globe)
- Claire-Anne Reix (Ville de Cannes)
8.3.4. Castellón - 18 and 19 September 2018

- Alicia Andrea
  ITC Instituto de Tecnologico Cerámica
- Ines Beltran
  Municipality of Castellón
- Juan Antonio Bertolin
  Esppaice Science Park
- Elke den Ouden
  TU/e LightHouse
- Luis Garig
  Municipality of Castellón
- Elena Gil
  Municipality of Castellón
- Josep Nebot
  Heliotec
- Aina Macias
  UJI
- Alicia Pallarés
  Municipality of Castellón
- Pedro Romero Pavia
  Civicons
- Jan Jaap Rietjens
  Splinter
- Sara Sanchez
  BECSA
- Rianne Valkenburg
  TU/e LightHouse
- Elena Zuriaga Aguoti
  Fasa
- Serkan Çelik
  Başakşehir Municipality
- Muammer Çınar
  Başakşehir Municipality
- Soner Dedegöl
  Başakşehir Municipality
- Elke Den Ouden
  TU/e LightHouse
- Elif Dündarcan
  Başakşehir Municipality
- Hasan Basri Gül
  Başakşehir Municipality
- Mustafa Gülek
  Başakşehir Municipality
- Kazım Gülüm
  Başakşehir Municipality
- Ömer Karabayaraktar
  Başakşehir Municipality
- Yasin Kartoglu
  Başakşehir Municipality
- Sebahatlin Kayas
  IOSB – İkitelli Organised Industry
- Pelin Kivrkoğlu
  Environment Conservation Specialist
- Abdullahi Kurt
  Başakşehir Municipality
- Ahmet Melik
  Başakşehir Municipality
- Ömer Onur
  Başakşehir Living Lab
- Taceddin Özcan
  IOSB – İkitelli Organised Industry
- Sinan Özkorkmaz
  District Mgmt Office
- Serhat Öztürk
  Başakşehir Municipality
- Ahmet Pehlivon
  Başakşehir Municipality
- Irem Reis
  Aktif Çevre
- Jan Jaap Rietjens
  Splinter
- Mehmet Tan
  Makro İnşaat
- Tayyip Tanırkulu
  Başakşehir Municipality
- Bekir Temel
  Başakşehir Municipality
- Rianne Valkenburg
  TU/e LightHouse
- Gülen Yücel
  IOSB – İkitelli Organised Industry
- Gülten Yücel
  District Mgmt Office

8.3.6. Joint Vision Workshop – Başakşehir 27 November 2018

- Hilde Blokkm
  City of Stavanger
- Silvia Campailla
  Comune di Genova
- Elke den Ouden
  TU/e LightHouse
- Jan Jaap Rietjens
  TU/e LightHouse
- Shahryar Ershad Sarabi
  Municipality of Castellón (Spain)
- Luis Gargori
  Municipality of Castellón
- Abdolrasoul Habibipour
  Luleå University of Technology
- Tom Hawxwell
  Fraunhofer IAO
- Magdalena Hubená
  City of Prague
- Heidi Johansson
  ERRIN
- Sami Kazi
  VTT
- Pierre Kil
  OpenRemote / InnoHub BV
- Salla Leppänen
  City of Tampere
- Erneste Maciulyte
  Fraunhofer IAO
- Tommaso Martin
  M3S
- Sophie Mok
  Stavanger Kommune
- Ömer Onur
  Başakşehir Living Lab
- Luuk Postmes
  Municipality of Eindhoven
- Jan Richtr
  IPR Prague
- Maarit Särkilahti
  City of Tampere
- Anna Stähbleröst
  Luleå University of Technology
- Ryan Titley
  ERRIN
- Monika Uhlenbruch
  IPR Prague
- Ines Vaittinen
  ENoLL
- Rianne Valkenburg
  TU/e LightHouse
- Mayke Van Dinter
  Municipality of Eindhoven
- Spela Zalokar
  ENoLL
- Sonia Zarino
  Comune di Genova