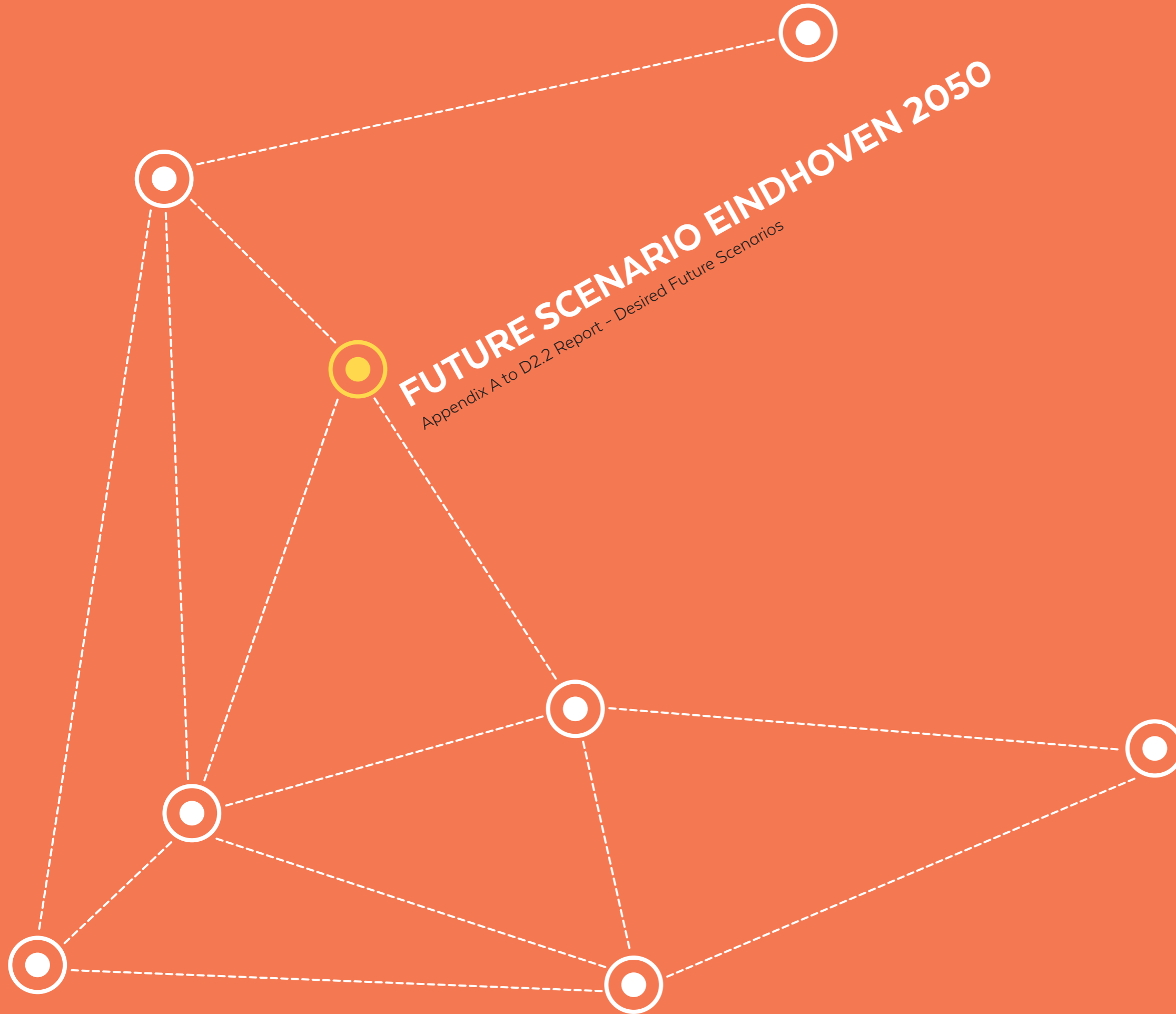




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FUTURE SCENARIO EINDHOVEN 2050

Appendix A to D2.2 Report - Desired Future Scenarios



This appendix is part of the D2.2 Report - Desired future scenarios - and contains all results of the vision development activities held in the city of Eindhoven.



The R4E project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649397.

Disclaimer: This report presents the views of the authors, and do not necessarily reflect the official European Commission's view on the subject.

Versions of this report:

11 December 2015	Concept for internal check in the city (limited distribution)
14 January 2016	Concept for sharing with R4E partners (limited distribution)
15 May 2016	Final version for public distribution
15 June 2016	Final version for public distribution - with minor corrections



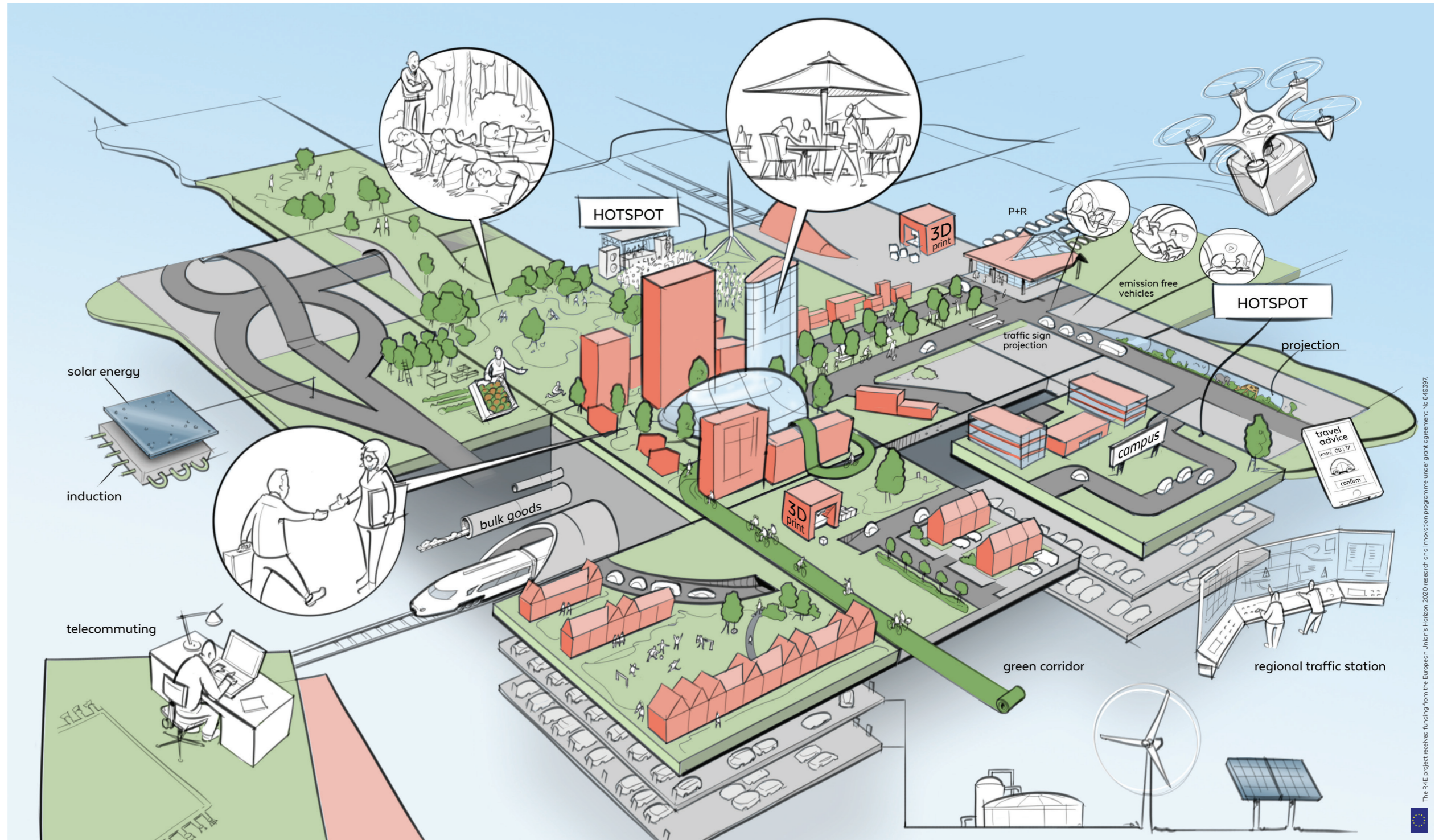
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SMART, SUSTAINABLE MOBILITY IN EINDHOVEN 2050

In 2050, people in the Eindhoven region enjoy a clean and safe city with energy-neutral mobility solutions. Their personal mobility needs are met by seamless services provided as and when they are needed, at that specific moment and in line with their personal lifestyles. A wide range of sustainable options 'nudge' them towards more sustainable lifestyles, but always with full freedom of choices. The spatial planning of the city and the region cherishes history and at the same time facilitates new dynamics. Solutions are chosen because of their flexibility to adapt to changing conditions and users' needs. The region offers an attractive climate for business. It functions as a 'living lab' in which innovative solutions are developed and proven in practice. People can experience these innovations in their own living environment, and can adopt them if and when they wish to do so. The region is an economic hotspot for smart and sustainable mobility.



Elements of the desired future scenario are:

Attractive and clean city

The city of Eindhoven and its surroundings are clean and attractive. Widespread greenery in public spaces creates a healthy living environment and encourages people to choose healthy transport options such as walking and biking. Extensive and attractive walking and cycling routes throughout the region connect areas for living, working and leisure. Quality of the living environment is high, with air quality, low emissions and road safety are better than average.

Sustainable transportation

Mobility in the region is energy-neutral, using of entirely renewable resources and sustainable materials. The city centre is free of private cars. The region is well connected with sustainable mobility solutions that enable convenient access to all destinations in different ways. Smart traffic management provides efficient guidance based on real-time analysis and predictions of traffic flows, demand and transport availability.

A range of options

People can choose from a range of mobility options. Individual choices are facilitated by (f)actual information and seamless mobility products and services that meet their personal needs at that moment. People experience autonomy and freedom in their choices, although they understand that service availability and prices can be influenced by scarcity of resources at specific times. Smart apps help them to choose the best solution at that moment.

Local facilities

Facilities for people's daily living are within walking/cycling distance in all neighbourhoods. Shops and other facilities provide social meeting opportunities for citizens in their direct living environment. Local produce (food, but also innovative solutions like 3D printing) is available in the local convenience stores. Green squares, school yards, recreational grounds and public spaces facilitate healthy lifestyles and social activities.

Diversity in experience

People enjoy a variety of environments in the region. They can choose from different areas in the city or surrounding villages that provide different experiences, and offer a range of options for different needs and lifestyles. People are free to explore new things and try them for themselves (for example faster or more attractive routes, or innovative sustainable vehicles). This makes it easier for them to choose and adopt sustainable solutions.

SAFE AND PLEASANT LIVING IN EINDHOVEN 2050

In 2050, the city's 'green and blue' spaces provide a safe and pleasant living environment for the citizens of the Eindhoven region.

A high quality of life is achieved by integrated physical planning to create a resilient region by strengthening the interdependencies between 'blue' (water), 'green' (flora), 'grey' (pavement) and 'red' (buildings).

Citizens, public and private parties jointly take care of private and public spaces to create a safe, pleasant and healthy living environment. People are aware of the value of the interplay between the built environment and nature. They adopt healthy lifestyles and behaviour, through which they also contribute to their surroundings.

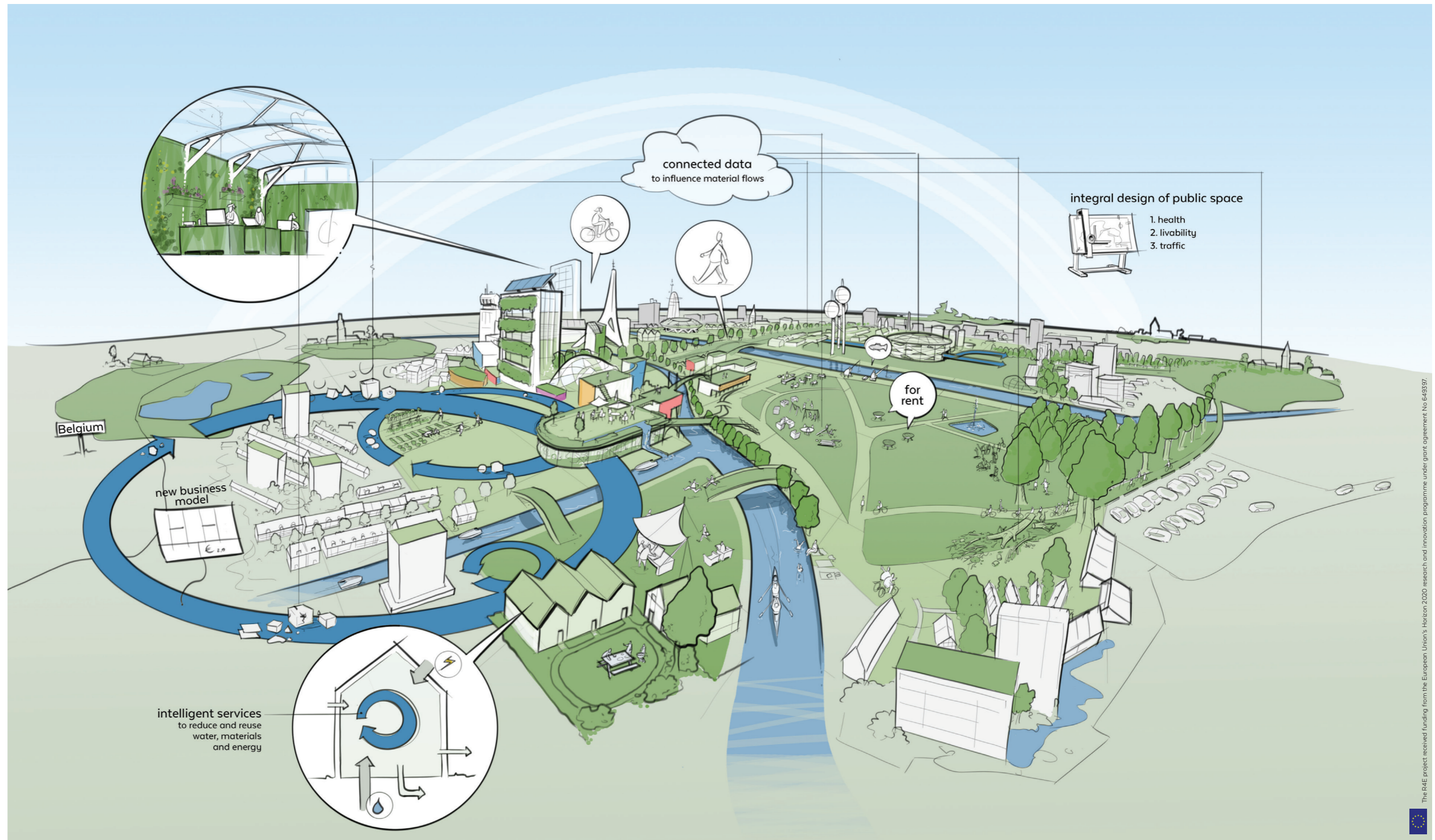
The region enjoys clean and safe water and green spaces that can be used actively for recreation (e.g. swimming, fishing) as well as to supply food (urban farming).

All meaningful resources are reused, thanks to circular systems on different scales.

The region values:

- a **safe living environment** that is resilient to the changing climate through the smart use of solutions on the appropriate scale;
- a **healthy living environment** with extensive 'green and blue' areas that support social activities and healthy lifestyles;
- a **circular water system** that provides sustainable re-use of water, materials and energy.

Elements of the desired future scenario are:



Active use of 'green and blue' spaces

People use public spaces actively for social interaction, working and leisure activities. Spaces are attractive in all seasons, and are accessible for all. The diversity of the spaces in the city and surrounding villages, and the flexibility in their use cater for different and changing needs and wishes. Smart use of spaces serves many different goals, with plenty of room for flora and fauna. Synergy between urban and rural areas is strong.

Human-scale design to promote sustainable living

People find everything they need for their daily living in their direct surroundings. The region is designed to encourage social interactions and sustainable lifestyles. People value the effects on their health and well-being, and spread the adoption of good lifestyles through social activities. The city and region provide an ideal environment for companies and start-ups with sustainable and healthy core-businesses.

Connected, integrated 'green and blue'

The region values well connected 'green and blue' spaces to strengthen climate resilience. The boundaries between public and private green areas are blurred, and people actively add green to roofs, gardens, squares and parks and make them accessible. Interconnected water systems reduce the risks of flooding and heat stress. Citizens' initiatives are valued, and are facilitated and encouraged by regulations.

Circular solutions on the right scale

The region uses circular systems at different levels to maximise re-use of water, materials and energy. Intelligent systems at the levels of homes, neighbourhoods, city and region are interconnected to balance demand and supply. Citizens use applications and sensors to monitor the quality of their water, food and environment, and contribute to its improvement. New technologies are used to make the systems intelligent.

New business and investment models

Public spaces are always freely accessible, and new business models are explored to provide added-value services. Decisions are based on an integrated view of value (economic, social, cultural and other) in both the short and long term. This 'Euro 2.0' approach enables new business with services in the public domain that create value for society at large as well as for individual citizens and enables investments in infrastructure.



Creating the visual of the desired future scenarios

The making of the desired future scenario

The approach

In the Roadmaps for Energy (R4E) project, the partners work together to develop a new energy strategy: their Energy Roadmap. The difference between the regular energy strategies and action plans and these new Energy Roadmaps is the much earlier, better developed involvement of local stakeholders. These include not only those who will benefit from the new strategy, such as the citizens themselves, but also relevant research and industry partners. They offer a much clearer view of the future potential of the city in terms of measures and technologies, as well as of the challenges presented by today's situations in the cities. The aim is to create a shared vision containing the desired, city-specific scenarios and the dedicated roadmaps to be embedded in the context of each city.

The R4E project follows a four step approach:

1. Set the ambitions of the participating cities on sustainable energy and Smart Cities, as well as their choice of three Smart Energy Saving focus areas: 1. Smart Buildings; 2. Smart Mobility; and 3. Smart Urban Spaces.
2. Develop scenarios for the selected focus areas.
3. Create the roadmap. Identify existing and future technologies and other developments – these will enable the desired future scenarios. Plot the opportunities and developments on a timeline, showing the route and milestones towards the desired scenarios. The roadmaps contain common parts for all the partner cities, as well as specific parts for the individual cities.
4. Create a portfolio of new projects and initiatives to achieve the ambitions, visions and roadmaps of the cities. This portfolio shows the shared and individual projects, and includes a cross-city learning plan and a financial plan.

Step Two: Vision development

The aim of Step 2 is to develop visions for the cities in the selected focus areas. A vision is based on a long-term perspective on the world – in this case we are focusing on 2050. Two main activities are taking place in this step: Future Telling research and the development of desired future scenarios.

Future Telling

The first part of the vision development activity is to identify Drivers for Change that influence the future of Smart Cities in general, as well as Smart Buildings, Smart Mobility and Smart Urban Spaces in particular. The Future Telling research method is an approach to create context-related possible future scenarios in a creative, imaginative way. Future Telling research consist of a structured method to map expertise and ideas of thought leaders from the Smart Cities domain. Through interviews and analysis leading to the Drivers for Change for liveable and smart cities in 2050. This research and the 18 Drivers for Change are described in the report Future Telling 2050 D2.1 Report – Drivers for Change.

Developing desired future scenario's

Out of the 18 Drivers for Change for smart and sustainable cities, the cities have chosen the most important Drivers for Change to be included in their further vision development. Together with the Ambitions, which the cities set in Step 1, the desired future scenarios for the focus areas will be developed in city scenario workshops. The ambitions are described in the Ambition Setting D1.1 Report – Specific ambitions of the R4E partner cities.

City scenario workshops

The desired future scenarios for the selected focus areas in the cities are created in a series of workshops held in each of the partner cities. These Scenario 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 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 results of the Scenario Workshops are reported in the same format for each of the city, facilitating cross-learning between the cities.

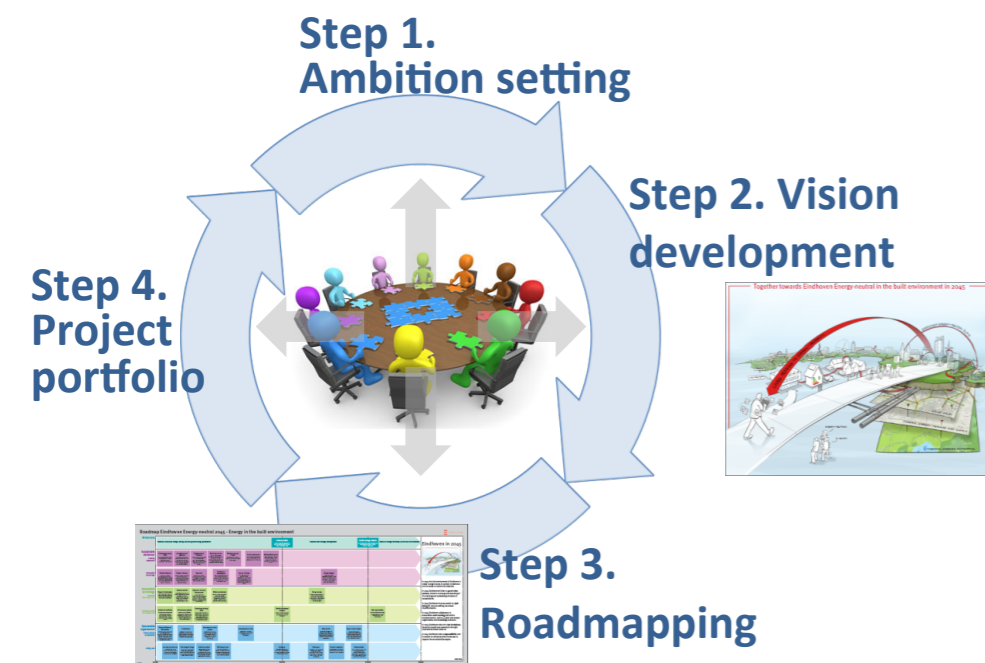
Two sessions are held for each focus area. In the morning session the outline for the vision and the desired future scenario is developed. The main stakeholders work with the set ambition for the focus area and the selected Drivers for Change to understand their impact on the city in 2050. Together, the participants define the main elements of the vision. Then, in the afternoon session a broad spectrum of stakeholders are invited to enrich the desired future scenario with specific additions. Based on the outlined vision they carry out a further in-depth exploration of the main elements of the vision in-depth.

In all the sessions, the participants will interactively build a visualisation of the desired future scenario. See also the pictures of the workshops.

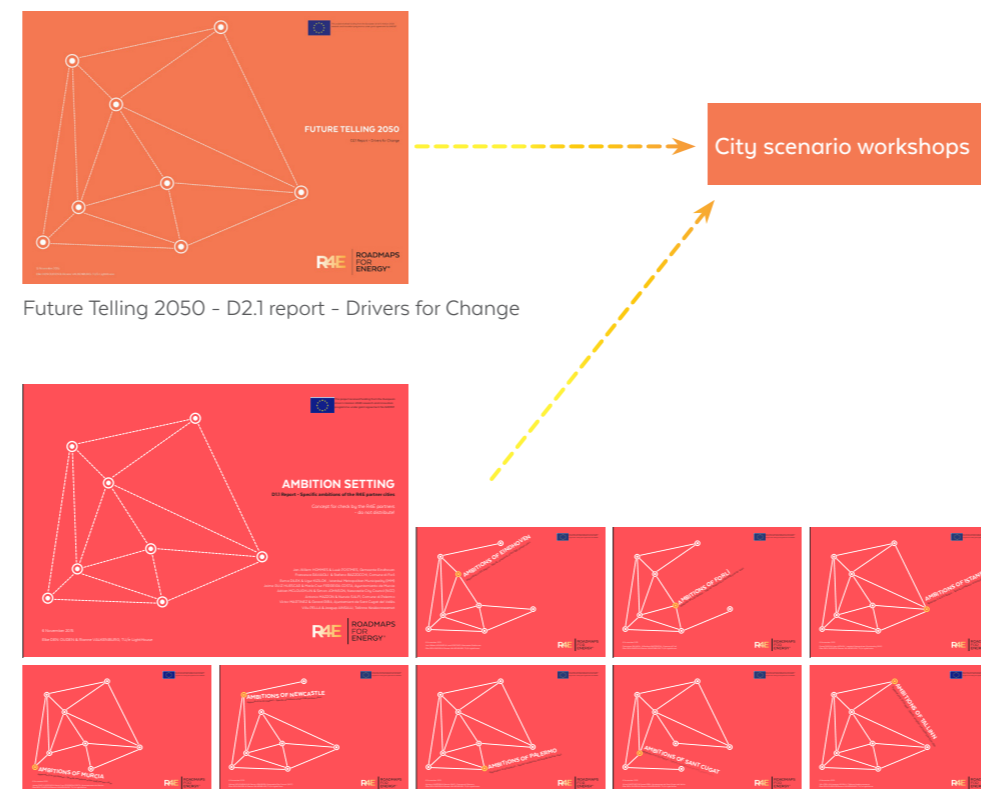
Day 1 - Focus area 1	Day 2 - Focus area 2	Day 3 - Reporting
Outlining the vision <ul style="list-style-type: none"> Exploring the Drivers for Change in relation to the future of the city Selecting the main elements of the vision 	Outlining the vision <ul style="list-style-type: none"> Exploring the Drivers for Change in relation to the future of the city Selecting the main elements of the vision 	Project team working session to prepare the report of the Scenario Workshop
Enriching the desired future scenario <ul style="list-style-type: none"> Exploring the future of the city and the main elements of the vision Enriching the vision with specific additions 	Enriching the desired future scenario <ul style="list-style-type: none"> Exploring the future of the city and the main elements of the vision Enriching the vision with specific additions 	

Program of the ambition workshops

The result of the vision development step is a visualisation of the desired future scenario. The visual is explained in this report and the main elements of the vision are described. The following pages also provide the background of the scenario: the ambition of the focus area, copied from the Ambition Setting D1.1 Report – Specific ambitions of the R4E partner cities and the selected Drivers for Change for each focus area, copied from the Future Telling 2050 D2.1 Report – Drivers for Change.



Four step approach of R4E



Ambition Setting - D1.1 report - Specific ambitions of the R4E partner cities

Ambition: Smart, sustainable mobility in Eindhoven 2050

1

Traveller-centric mobility

In 2050, mobility solutions are focused on what travellers want and expect. Their personal mobility needs are met by seamless services provided as and when they are needed (taking into account individual needs and usage, the frequency of use, weather conditions, traffic density etc.).

Travel is facilitated by accurate, up-to-date, personalised and reliable information on availability, travel times and connections to support decision-making. Different modes of transport (both public and individual) can easily be combined, and destinations are conveniently accessible in different ways. Easy access to mobility products and services makes them a logical choice. Citizens' mentality is open and socially driven, leading to choices that benefit not only the individual but also the social and ecological environment.

The region is open, and offers good conditions for shared mobility solutions. We aim to facilitate personal mobility decision-making with seamless solutions, both public and individual.

Strategic ambitions

- In 2050 individual choices for the type of mobility are facilitated by (f)actual information and seamless mobility products and services that fit personal needs at that moment.
- In 2050 sharing of transport solutions is an obvious choice, driven by a socially responsible and open mentality.

2

Sustainable, healthy mobility

In 2050, citizens of Eindhoven value the number of available mobility options with high levels of convenience and freedom of choice. There's a clear emphasis on sustainable, healthy choices. As a 'garden city' the Eindhoven region is 'green' and ecological, both in the public space and in the quality of the city air.

People and locations are connected through finely meshed walking and cycling routes, encouraging healthy lifestyle and behaviour. Quality of the living environment is high, with air quality, low emissions and road safety all above the national average.

The ambition to be energy-neutral by 2045 is reached by energy-saving transport and by the transition to renewable energy. Sustainable mobility and connectivity are key: sustainability for the environment, for people and for the city. We want versatile city transport, with high levels of convenience and freedom of choice. And we want to drive behavioural change towards a healthy lifestyle, with citizens choosing active mobility options.

Strategic ambitions

- In 2050 people obviously chose walking and cycling as means of mobility due to the attractive and safe routes created through 'place making': actually making place for more sustainable transport and the improvement of urban quality with more green.
- In 2050 mobility in the region is energy neutral and exclusively uses renewable sources and sustainable materials.

3

Thriving economic region

In 2050, people in Eindhoven value a thriving region with high levels of economic activity and employment. The Brainport region offers an attractive climate for business through multi-modal accessibility of the top economic locations. The places where people want to be, with strong economic activity, are easily and sustainably connected by different modes of transportation. Door-to-door travel times are acceptable and reliable. Smart systems based on real-time data direct traffic flows, benefiting quality, liveability and safety. Intelligent traffic management provides efficient guidance to the routes and directions users want.

The economic viability of the region is largely based on smart, sustainable mobility. The region functions as a 'living lab', in which innovative solutions are developed and proven in practice. Regional cooperation is a strong enabler for the leading position in technology development. We aim to be an economic hotspot for smart, sustainable mobility. And we want the new dynamics of the city and region to be supported by effective, convenient and reliable mobility solutions.

Strategic ambitions

- In 2050 new connections, routes and means of transportation facilitate the new dynamics in the city and the region, easily and sustainably connecting locations where people would like to be and where economic activity flourishes (the hotspots).
- In 2050 smart choices for regional flow and accessibility are based upon real-time analysis and predictions of traffic flow and transportation behaviour.
- In 2050 the region is an economic hotspot for smart and sustainable mobility and stimulates innovation and technological developments through living labs.

Drivers for change for the future of Smart Mobility in Eindhoven 2050



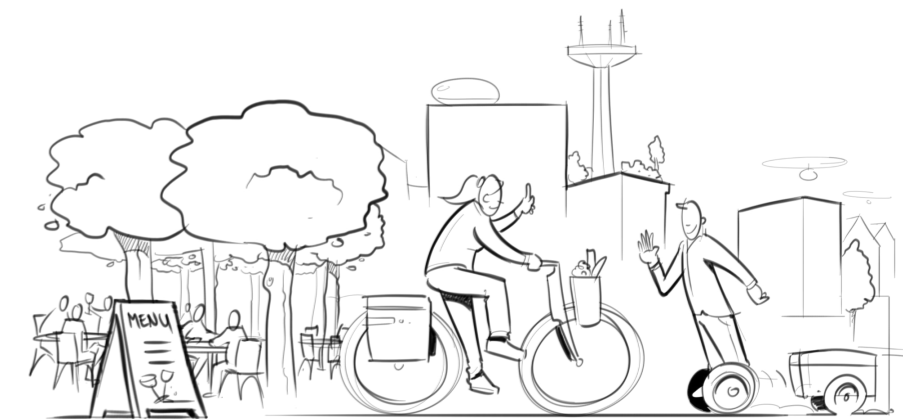
Experience, experience, experience

In 2050, city residents travel because they like the experience. For short (hyper-local) distances by walking or cycling, to reach places on a daily human scale. And for longer (hyper global) distances, the whole planet can be reached within a few hours. Even space travel could be an option! There's a range of convenient, clean mobility options, making use of abundant renewable energy. Travel has never been easier - it provides seamless connections from where you are to where you want to go. Services focus on what people need, and not on the available systems.



Better living at a human scale

In 2050, urban systems and spaces are designed on a human scale. Everyday activities are within walking or cycling distance. Communal spaces strengthen social cohesion, giving people the freedom to follow the activities they value most. The city offers an excellent living environment in the European tradition, merging high-quality urban space with nature, culture, the economy and social coherence. Good living means enjoying time with friends, and social life is further supported by availability of public devices in communal space. These enable new forms of communicating, blending the virtual and real worlds in these areas.



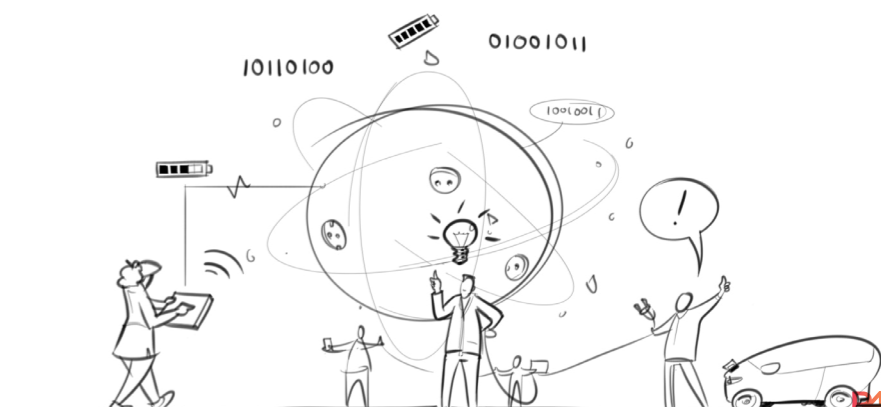
Flexible 're-purposing'

In 2050, we've adapted to continuous city dynamics. Buildings are part of the constant transformation of urban area. People know that 'things are always changing', so they have an open mind on how buildings and spaces are used. So this can change over time - or even during the day - in line with changing needs and events. As properties become available, they are used for meet the specific need at that time. Individuals and smaller collectives with shared interest have easy access to available properties, sites and services. Historic buildings and cultural heritage are 're-purposed', taking their specific qualities into account.



Democratised energy systems based on open data

In 2050, energy systems are open, bidirectional, multi-purpose platforms on which (renewable) energy and energy management services are open to all. Entrepreneurs have developed business models that provide value for them, for their users and for society at large. Citizens can choose freely from a range of available options. The system ensures privacy and security of users, who are always in control. Ambient energy networks provide connectivity for (wireless) access to data and energy. Increased computing power and artificial intelligence make system resilient: self-organising, self-sustaining and self-learning.



Ambition: 'Green and blue' spaces in Eindhoven 2050

1

Appreciation for nature in the living space

In 2050, people value a good, healthy and sustainable living environment with green and blue spaces. They are aware of the effects of climate change. That's why people highly appreciate the interplay between city and nature. That in itself encourages a healthy lifestyle and behaviour.

A higher quality of life in Eindhoven is achieved by making room for green and blue spaces. Today, all the necessary fundamentals are in place. Perhaps they are even too well organised – people are freed from problems, and may no longer be aware of the importance of water in the living space. We aim to create value through a healthy, liveable urban environment. And we want to create awareness and appreciation of nature, driving behaviour change towards healthy lifestyles.

Strategic ambitions

- In 2050 citizens are water aware and appreciate the water and green spaces in their habitat (the garden city).
- In 2050 our society properly handles and anticipates changes (e.g. climate change).
- In 2050 citizens or companies experience no mortality, damage or nuisance by water.
- In 2050 water consumption is limited to the first necessity of life (other needs are used from different wells)

2

Working together in the value chain

In 2050, partners in the public space value chain appreciate the entire ecosystem. All (infrastructural) aspects of the urban environment and their interdependencies are clear, and the public space is designed right from the start as a healthy environment.

A higher quality of life in Eindhoven is achieved by integrated, physical city planning. Different disciplines support each other, contributing to a healthy city. The municipality, the water board ('Waterschap De Dommel') and other partners already work together on joint innovations. We aim for an integrated value chain covering blue (water), green (flora), grey (pavement) and red (buildings) elements. And we aim for an even better cooperation and sharing of responsibility in a Quadruple Helix model (partnerships between government, industry, academia and civil participants).

Strategic ambitions

- In 2050 the high quality of the (swimming) water and green spaces attracts people to Eindhoven and to spend more time outside.
- In 2050 city planning is done in new, democratic public private partnerships and the public space is designed in a way that it supports all its ambitions.
- In 2050 public space is planned with water and green spaces in a way that contributes to a healthy city (e.g. biodiversity and nature).
- In 2050 the public sector is a 'value-ment' ('waardeschap'); this new governance ('tussenheid') is situated in the midst of society to maximise meaning for and with citizens.

3

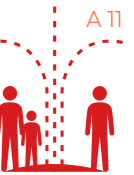
Towards a circular water region

In 2050, the municipality of Eindhoven and the water board ('Waterschap De Dommel') value sustainability. That means a circular water region in Eindhoven, drinking water usage, waste water, the mining of raw materials, and energy from waste water.

To reach this aim, we need a deep understanding of new technology for water treatment, water usage, circular water systems and re-use of raw materials. Investments in new technologies are high, and we aim to optimise their use in the circular water region Eindhoven. At the same time, we want to make sure our investments in new technologies are future-proof.

Strategic ambitions

- In 2050 all meaningful elements from waste water will be reused (energy and raw materials).
- In 2050 the mining of raw materials and energy from waste water will be optimised.



Drivers for change for the future of Smart Urban Spaces in Eindhoven 2050

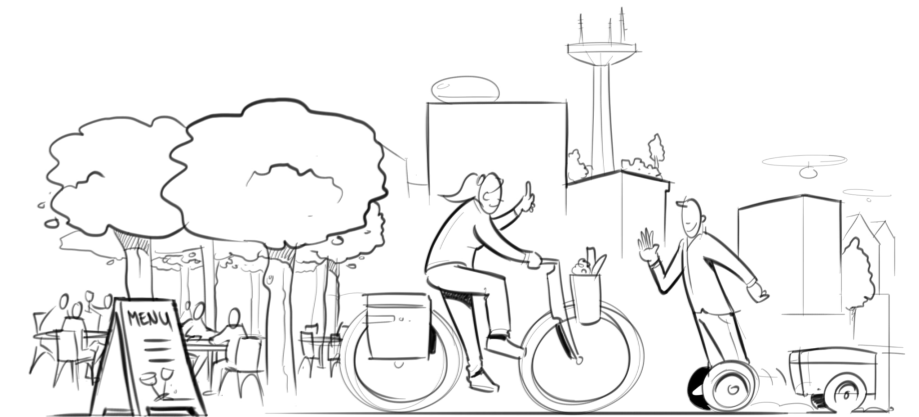
Connecting to 'green' and 'nature'

In 2050, people's need for 'green' and 'nature' is met by well-connected green spaces and landscapes all over the city. Soft birdsong and other nature sounds add an intangible quality and sense of well-being. Urban farming increases regeneration of resources, creating fresh, healthy foods, reconnecting with nature and mobilising local communities. People are aware of the effect of their living environment on health and well-being, and push for cleaner technologies. Advanced systems allow control of micro-climates, contributing to more resilient cities.



Better living at a human scale

In 2050, urban systems and spaces are designed on a human scale. Everyday activities are within walking or cycling distance. Communal spaces strengthen social cohesion, giving people the freedom to follow the activities they value most. The city offers an excellent living environment in the European tradition, merging high-quality urban space with nature, culture, the economy and social coherence. Good living means enjoying time with friends, and social life is further supported by availability of public devices in communal space. These enable new forms of communicating, blending the virtual and real worlds in these areas.



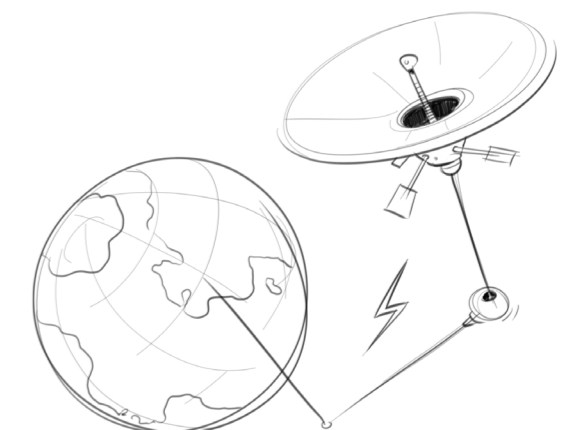
Regenerating resources in a circular economy

In 2050, the circular economy ensures self-sufficiency of cities. Renewable energy is abundant, and this ensures a secure supply of vital resources for life (energy, water, food and clean air), although other resources may still be scarce. Cities have implemented circular systems to regenerate all the resources needed by their populations. These mechanisms are based on small-scale, local solutions, enabled by changed decision-making levels.



Applying new technologies

In 2050, a range of new technologies are available and affordable. Some of them are already in development, others are still unknown. Cities apply those technologies in new solutions that contribute to the quality of life, and in particular to the creation of smart buildings, smart mobility and smart urban spaces.





Contributions

We would like to thank the participants for their contribution to the scenario workshops:

- Ronald Aben Provincie Noord Brabant
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