AMBITION SETTING

D1.1 Report - Specific ambitions of the R4E partner cities

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Abstract

This report contains the results of the Ambition Setting (WP1) activities from March to October 2015. For this purpose Ambition Workshops with the local stakeholder network were held in each partner city and a Joint Ambition Workshop was held in Palermo to enable sharing of the ambitions and cross-city learning.

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R4E - ROADMAPS FOR ENERGY

Introduction

In the Roadmaps for Energy (R4E) project the partners will work together to develop a new type of energy strategy, which they call their Energy Roadmap. The difference between the regular energy strategies and action plans and these Energy Roadmaps lies with the much earlier and more developed engagement of local stakeholders. These include not only the benefactors of the strategy, such as citizens, but also relevant research and industry partners that offer a much clearer picture of the future potential of the city regarding measures and technologies and the impossibilities regarding the situation of the city today. The creation of a shared vision, with city specific desired scenarios and dedicated roadmaps allows for embedding of the city specific context, taking into account the diversity in geographical, ecological, climatological, social and cultural diversity of the 8 partner cities of the project: Eindhoven, Forlì, Istanbul, Newcastle, Murcia, Palermo, Sant Cugat and Tallinn.

The R4E project focuses on developing vision creation and roadmapping capacities within municipalities to initiate joint activities to spur development and implementation of innovative energy solutions in cities. Thus the city partners in R4E learn the process, gain know-how on the full structure of roadmaps and will obtain the skills to work independently on future roadmaps.

The ultimate aim is to implement a process that allows the partners to develop roadmaps for the various themes that together form the Energy Roadmap towards their ambition of becoming Smart Cities. Since energy and smart cities are too broad to cover in one project, R4E focuses on three areas within the domain of sustainable energy that are closely linked to the municipalities main responsibilities:

- SMART BUILDINGS
- SMART MOBILITY
- SMART URBAN SPACES

Approach

In the R4E project a four step process is applied. The FIRST step sets the ambitions for the project. The ambitions of the participating cities on sustainable energy and Smart Cities in general are set, as well as the partner cities’ choice for 2 focus areas within Smart Energy Savings: 1. Smart Buildings, 2. Smart Mobility or 3. Smart Urban Spaces. The SECOND step is to develop desired scenarios for the cities for the selected focus areas. During the THIRD step the roadmap will be created, existing and future technologies and other developments will be identified, which enable the realization of the desired future scenarios. Opportunities and developments will be plotted on a time-line to provide insight in the required steps and milestones towards the favoured scenarios. The roadmaps will contain generic parts that are common for the partner cities, as well as specific parts that cater for the specific context of the cities. During the final and FOURTH step a project portfolio will be generated with new projects and initiatives to reach the ambitions, visions and roadmaps of the cities. This portfolio provides an overview of individual and joint projects and includes a cross-city learning plan and a financial plan.

Step One: Ambition setting

The aim of WP 1 is to set the ambitions for the project. For this purpose the ambitions of the participating cities on sustainable energy in general are defined/refined in a co-creation process, using existing policy documents as a basis for workshops with individual cities. Based on these ambitions a final selections is made for two selected focus areas for each city. For each of these focus areas specific city ambitions are defined. In a joint workshop with all cities, the ambitions are presented. During this workshop also the first results of the Drivers for Change (WP2) are available and the cities select the Drivers for Change to be included in the vision development in WP2.

How to read this report

This report describes the ambitions of the partner cities, and contains all results of the Ambition Setting (WP1) activities from March to October 2015. It starts with a brief description of the eight partner cities. Then follow three separate sections for each of the three focus areas. Each section starts with an introduction to the focus area, followed by a brief description of today’s reality and the ambition for 2050 for the specific cities that selected this focus area. At the end of the sections the results of the joint ambition workshop are presented, including a brief description of the joint ambition for the focus area.

The complete results of the ambition setting workshops in the workshops can be found in the appendices (added as separate reports to this main report).
**Approach in WP1 - Ambition Setting**

**Ambition Setting**

The aim of WP1 is to set the ambitions for the project. For this purpose the ambitions of the participating cities on sustainable energy in general are defined/refined in a co-creation process, using existing policy documents as a basis for workshops with the individual cities. Each city selects two focus areas for which specific city ambitions are defined.

**Today's reality**

During the kick-off meeting the cities present their current state of affairs regarding the energy policy in general and the selected focus areas in particular. A summary of the information is given in this report; the complete descriptions can be found in the Appendices.

**Ambition Workshops**

During a series of workshops in each of the partner cities the strategic ambitions for energy related themes in general and for the selected focus areas in particular are assessed. The Ambition Workshop consists of 3-day visits to the individual cities in which several workshops with policy-makers and stakeholders are held to get a deep understanding of the ambitions and specific contexts of the cities. Through the networks in the cities the local stakeholders (companies, citizens, public and private organisations and knowledge institutes) are invited to participate in the workshops. The results of the Ambition Workshop are reported in similar formats for each of the cities, to enable cross-learning between the cities.

**Joint Ambition Workshop**

The last step in WP1 is a joint meeting in Palermo, where the cities share their ambitions with each other, and have in-depth discussions to understand the common and specific aspects of their ambitions. The main aim of the Joint Ambition Workshop is to enable cross-city learning. The cities get a deeper understanding of the Ambition Setting process, and can improve their own ambition with inspiration from others.

The Joint Ambition Workshop is a 1-day workshop that finalises the activities of WP1 and prepares for WP2.

**Programme of the Ambition Workshops**

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**Programme of the Joint Ambition Workshop**

- **Morning Finalising WP1**
  - Presentation of the cities ambitions
  - Learning from each other's ambitions
  - Presentation of the Drivers for Change
    - Understanding the Drivers for Change
      - Exploring the relevance for the focus area and selection of drivers for scenario workshops

- **Afternoon Preparing for WP2**
  - Sharing of results of Future Telling research

This report includes the results of the morning session. The results of the afternoon session will be included in D2.1 Future Telling 2050 - Report on Drivers for Change.
INTRODUCTION TO THE PARTNER CITIES

This section briefly introduces the R4E partner cities. More detailed descriptions are provided in the appendices.

Gemeente Eindhoven, the Netherlands
- Population: 220,000
- Area: 90 km²

Newcastle City Council, United Kingdom
- Population: 282,000
- Area: 114 km²

Istanbul Metropolitan Municipality, Turkey
- Population: 14,100,000
- Area: 1.830 km²

Tallinna Keskkonnaamet, Estonia
- Population: 430,000
- Area: 160 km²

Ayuntamiento de Murcia, Spain
- Population: 440,000
- Area: 885 km²

Comune di Forlì, Italy
- Population: 120,000
- Area: 228 km²

Comune di Palermo, Italy
- Population: 885,000
- Area: 160 km²

Ajuntament de Sant Cugat del Vallès, Spain
- Population: 86,000
- Area: 50 km²
Eindhoven
Eindhoven is located in the province of North Brabant in the south of the Netherlands, originally at the confluence of the Dommel and Gender streams. The Gender was dammed short of the city centre in the 1950s, but the Dommel still runs through the city. The population was 221,402 in 2014, making it the fifth-largest city in the Netherlands and the largest in North Brabant.

Neighbouring towns and cities include Son en Breugel, Nuenen, Geldrop-Mierlo, Heeze-Leende, Waalre, Veldhoven, Eersel, Oirschot and Best. The agglomeration has a population of 337,487. The population of the metropolitan area is 419,045. The city region has a population of 749,841. Also, Eindhoven is part of Brabant Stad, a combined metropolitan area with a population of more than 2 million inhabitants.

Eindhoven has grown from a small town in 1232 to one of the biggest cities in the Netherlands. After the independence of the Netherlands in 1815, Eindhoven was a small village of some 1250 people in an economically backward and mostly agricultural area. Cheap land, cheap labour and the existence of pre-industrial home-sourcing made Eindhoven an attractive area for industry. During the 19th century Eindhoven grew into an industrial town with factories for textiles, cigars and matches. Most of these industries disappeared after World War II. In 1891 the brothers Gerard and Anton Philips founded the small light bulb factory that would grow into one of the world’s largest electronic companies. Philips’ presence was probably the largest single contributing factor to the major growth of Eindhoven in the 20th century. It attracted and spun off many high-tech companies, making Eindhoven into today’s major ‘Brainport’ technology and industrial hub. In 2005, a full third of the total spending on research in the Netherlands was in or around Eindhoven. A quarter of the jobs in the region are in technology and ICT, with companies such as FEI Company, NXP Semiconductors, ASML, Simac, Newways, Philips and DAF.

Eindhoven haslong been a centre of cooperation between research and industry. This tradition started with Philips, and has since expanded to large cooperative networks. Eindhoven University of Technology (TU/e) hosts an incubator for technology start-ups (the Twinning Centre), and the Philips Research (formerly the ‘NatLab’) has developed into the High Tech Campus Eindhoven.

Due to its high-tech environment, Eindhoven is part of several initiatives to develop and promote the knowledge economy in the region. Some examples are:

- Brainport: a cooperative initiative by local government, industry and Eindhoven University of Technology to develop the local knowledge economy in the Eindhoven region.
- MRE (Metropolitan Region Eindhoven): a cooperative agreement among the municipalities in the Eindhoven metropolitan area.
- ELAt (Eindhoven-Louvain-Aachen triangle): an extensive cooperation agreement between the universities and surrounding regions of Eindhoven, Louvain (Belgium) and Aachen (Germany).
- Within the Eindhoven region (and particularly Helmond), several parties are working together in the automotive sector. In particular in the Automotive Campus — a testing facility on a European scale — for testing and European certification of vehicles. This cooperation involves the Eindhoven University of Technology, TNO Automotive and a number of automotive companies in and around Helmond and Eindhoven.

As a result of these efforts, the Intelligent Community Forum named the Eindhoven metropolitan region as Intelligent Community of the Year in 2011.


Eindhoven has selected two focus areas for the R4E project:

- SMART MOBILITY
- SMART URBAN SPACES
Forlì

- Sforza Fortress (XV century)
- Saffi Square (Main Square)
- Romanesque Church of San Mercuriale in the main square
Forlì is located in the Emilia-Romagna Region (Northern Italy - Po Valley). Along with the nearby city of Cesena, Forlì is the administrative centre of the Province of Forlì-Cesena and is located between Bologna (capital of the region) and Rimini along the Via Emilia. It is located at about 35 km from the Adriatic coast.

The city, founded as ‘Forum Livii’ on the Via Emilia by the ancient Romans in 2nd century BC, is located in the area between two rivers (Ronco and Montone-Bidente). It covers an area of 228,45 km² and has a population of 118,517 (at 31.12.2014), of whom 12,25% are foreign citizens, with 52,564 families.

The historic centre keeps many testimonies of the past, such as the Romanesque church of San Mercuriale (in the main Saffi square) with an impressive 12th century bell tower, the 15th century Sforza Fortress and many buildings from the Renaissance period.

Forlì shows many examples of fascist architectures, mainly concentrated in the area between the railway station and the Victory Square, that have been included in the ‘Atrium’ European cultural route specifically dedicated to the architecture of the 20th century totalitarian regimes.

The city hosts a university campus (part of the multicampus system of the University of Bologna). The university campus is located in the area of the old Morgagni Hospital, whose buildings were recovered and integrated with new spaces and modern buildings. There are degree courses in economics, management, statistics, aerospace engineering, mechanical engineering, political science and a school for language interpreters and translators.

The ‘San Domenico Museum’ is a main attraction centre. It hosts the Town Art Gallery, where important temporary exhibitions of painting and sculpture are organized, attracting many visitors each year from all over Italy.

The airport was recently assigned to a new private management responsible for relaunching its activities in late 2015. Next to the airport area there is the Technological Aeronautical Center with the Academy of ENAV (Flight Assistance National Agency), a school for air traffic controllers, and the Aeronautical Institute, the headquarters of the degree course in Aerospatial Engineering.

The main Morgagni-Pierantoni Hospital complex, located on the outskirts of the city, is part of the regional health centre of excellence.

The city is served by Adriatic Railway, connecting with Bologna, and a dedicated railway goods delivery point is located in the southern area. The A14 highway from Bologna to Taranto (in the south of Italy) runs through the Municipality of Forlì.

Some of the main manufacturing enterprises that have factories in Forlì are Electrolux (domestic appliances), Cantiere del Pardo (racing boats) Ferretti Group (luxury motor-yachts), Querzoli (precast concrete), Bonfiglioli Group (gear motors) and Marcegaglia (stainless steel tubes). Forlì has a specialised district for manufacturers of upholstered furniture and furnishing accessories.

The city of Forlì is characterized by a predominantly old housing stock. This makes it important for Forlì to renovate and redevelop existing buildings in a sustainable way. Equally it is important to take action on urban spaces to make them more accessible and useful to all citizens.

Forlì has selected two focus areas for the R4E project:

1. SMART URBAN SPACES
2. SMART BUILDINGS
Istanbul
Istanbul is like a state on its own. With a population of almost 14 million, it is larger than 23 European countries. The metropolitan area falling under the responsibility of the Metropolitan Municipality is 5,389 km², extending for 165 km from east to west, with a north-to-south distance of 45 km.

For centuries, Istanbul has always had a very strategic position along the historical Silk Road and naval routes between the Mediterranean and the Black Sea. This strategic location has helped the city to develop a cosmopolitan population.

Istanbul is the largest city in Turkey. The officially registered population is 13.8 million as of 2014, which is about 18% of Turkey’s population. This means one in five Turkish citizens live in Istanbul. Istanbul is also the third-largest metropolitan area in Europe, after London and Moscow.

Istanbul Metropolitan Municipality has a massive budget, which is larger than those of 18 of the 29 Turkish ministries. The consolidated budget generally increases by 7.7% each year, and for 2013 it was around USD 12 billion. Of this figure, USD 8 billion is the investment budget, and around half of this budget is dedicated to transport.

So far, the municipality has succeeded in solving all its problems for the foreseeable future (i.e. water supply, pollution, housing etc.), except for transport: traffic congestion within the city is a growing problem, which is why the Metropolitan Municipality has dedicated almost half of its resources and energy to solve the transport problem.

Istanbul is one of the world’s fastest-growing megacities, both with 14 million population and its strategic location. 27% of national GDP, 60% of Turkish trade and 40% of national tax revenues come from Istanbul. Besides being at the heart of the Turkish economy, Istanbul has many universities which make the city attractive for thousands of students from all over Turkey. Istanbul is located at the intersection of Asia, Europe and Africa, which makes it an international trade hub. In addition, thanks to its good accessibility from countries all over the world countries, many international organizations and exhibitions take place each year in Istanbul. As a result, there is a growing demand for all types of facilities in Istanbul especially for transportation.

The Istanbul Metropolitan Municipality:

- Serves as the municipal government centre for Turkey’s thriving transcontinental hub
- Carries out local administrative tasks in Istanbul
- Provides public services for a population of around 14 million
- Has 25 municipal enterprises, 2 subsidiary public utility corporations and a total of 43,500 employees.

Istanbul has selected two focus areas for the R4E project, both in the area of mobility:

- Smart Public Transport
- Smart Traffic Management
Murcia
Murcia is the major city in south-eastern Spain, and the capital and most populous city of the autonomous community of the region (with the same name, Murcia). It is Spain’s seventh-largest city, with a population of 439,712 inhabitants (about one-third of the total population of the region). Murcia has a mild climate with hot summers, mild winters and relatively low rainfall. In global terms, the region’s climate can be described as ‘an eternal spring’.

Murcia is a municipality of 890 km$^2$, at 43 metres above sea level, covering the city and 52 parishes in the surrounding 40 km. The region has 2,800 hours of sunshine each year, and the average rainfall in the Segura basin is one of the lowest in Spain (only 301 l/m$^2$).

The average temperature is 17.8 ºC. Yearly average relative humidity is 59%. Irrigation uses the 85% of the 240 Hm$^3$ consumed in the basin, whilst domestic, industrial and other uses represent only the 15% of the water consumption, 50% of it will soon be supplied with desalinated water.

Due to its location, Murcia has high levels of solar radiation during the whole year. Specifically, it has a yearly average of 5 kWh/m$^2$/day, one of the highest in Spain. The Municipality of Murcia owns 27 roof-mounted PV installations on a number of buildings to generate electricity, producing 362 Kwp. The income from the sale of this energy is used to improve the energy efficiency of the installations in these buildings.

On the other hand there is little rain, which is why Murcia has developed very advanced irrigation system to make efficient use of the available water. Traditionally Murcia has been known for its agriculture, and at present it exports fruits and vegetables to the whole of Europe. The shortage of water and its importance for crops has forced farmers to invest in high-tech systems to get the most out of the available water.

The Municipality of Murcia has a complex land planning system. 83% of the population live within a 5 km radius, and within a radius of 7 km the figure is 89%. The city centre attracts most commuters each day, and this is also the area with the most severe congestion problems.
Newcastle
Newcastle upon Tyne, commonly known as Newcastle, is a city in the metropolitan county of Tyne and Wear in North East England. Located 120 miles (193 km) south of Edinburgh and 280 miles (450 km) north of London, it is situated on the north-western bank of the River Tyne estuary and is 8.5 miles (13.7 km) from the North Sea. Newcastle is the most populous city in the North East region, and lies at the urban core of Tyneside, the seventh most populous conurbation in the United Kingdom and the most populous in the North East. Newcastle is a member of the English Core Cities Group and, together with nearby Gateshead, is part of the Eurocities network. Newcastle was part of the county of Northumberland until 1400, when it became a county in its own right, a status it retained until becoming part of the Tyne and Wear metropolitan county in 1974. The regional nickname and dialect for people from Newcastle and the surrounding area is ‘Geordie’.

The city developed in the location of the Roman settlement called Pons Aelius. It was named after the castle built in 1080, by Robert Curthose, William the Conqueror’s eldest son. The city grew as an important centre for the wool trade in the 14th century, and it later became a major coal mining area. The port developed in the 16th century and, along with the shipyards lower down the river, was among the world’s largest shipbuilding and ship-repair centres. Newcastle’s economy includes corporate headquarters, learning, digital technology, retail, tourism and cultural centres, from which the city contributes £13 billion towards the economy of the United Kingdom. Among its main icons are Newcastle Brown Ale, a leading beer brand; Newcastle United F.C., a Premier League football team; and the iconic Tyne Bridge. It has hosted the world’s most popular half marathon, the Great North Run, since it began in 1981.

Newcastle has selected two focus areas in the field of buildings for the R4E project:

- Smart Domestic Buildings
- Smart Non-domestic Buildings

Adrian MCLOUGHLIN & Simon JOHNSON, Newcastle City Council (NCC)
Palermo
Palermo is a city of the Insular Italy, the capital of both the autonomous region of Sicily and the Province of Palermo. The city is well-known for its history, culture, architecture and gastronomy, playing an important role throughout much of its existence. It was founded as a port town by the Phoenicians around 734 BC.

Palermo is located in the north-west of the island of Sicily, right by the Gulf of Palermo in the Tyrrhenian Sea. Palermo is the fifth-largest Italian city by population after Rome, Milan, Naples and Turin.

Many monuments, churches and palaces in Palermo have been recognised for years as national monuments and in 2015 the Arab-Norman buildings were included in the UNESCO’s ‘World Heritage List’.

For cultural, artistic and economic reasons Palermo is the main city of the Euro-Mediterranean region, and today is one of the top tourist destinations in Southern Italy also for Mediterranean cruise ships.

The city is the main centre of the Sicilian Region, it has the oldest parliament in the world, and it is also the home of the University of Palermo and of the regional archdiocese.

It was established as city-port by the Phoenicians around 734 BC. It has always been a trading and cultural cooperation centre between West and East. It has been conquered by several populations at different times. Its a long history has given rise to a remarkable and unique artistic and architectural heritage.

Analyses of the greenhouse gas emissions by the city of Palermo show that the distribution of energy consumption between the sectors is characterised by a clear predominance of the building sector (both housing and service industries) and transport.

For this reason the main objectives of the Sustainable Energy Action Plan (SEAP) are the reduction of CO₂ emissions in these sectors. This will be achieved by reducing the energy consumption of buildings and improving the efficiency of public and private transport.

As a consequence, it has been decided to focus the local activities of the R4E project on the issues of:

SMART BUILDINGS
SMART MOBILITY
Sant Cugat
The city of Sant Cugat del Vallès is located in the region of Catalonia, Spain, approximately 20 km from Barcelona. The city of Sant Cugat del Vallès is a municipality with a population of around 85,000, and enjoys a privileged natural environment and urban green landscape with a strong commitment to sustainability. It is the central hub of the communication network of highways, railways and public transport systems, linking Sant Cugat with the rest of the region.

Faced with a complex economic situation, Sant Cugat needs a strategy for an environmentally sustainable economic future. The government wants the city has to provide more efficient public services, but to achieve this the city is asking the public to be active participants in the strategy. This requires a strong and innovative strategy for the future economy. And it also calls for a social and environmental strategy to promote economic, social and environmental sustainability for individuals, organisations and companies. These strategies aim to improve the quality of life, spread the values and encouraging innovation, talent and creativity. Rapidly changing technology calls for models that can be updated quickly, the integration of systems and their adaptation to end-uses that meet the needs of society. The Smart City is not a ‘Gadget City’, but a city that creates value by intelligent data collection from daily activity in the surrounding area. The information must support improving the efficiency of services and boost the economic competitiveness of the region. Reduction of energy consumption is achieved by intelligent management of buildings, public space, and lighting; intelligent and advanced waste management systems; multi-modal transport and the implementation of sustainable vehicles, accessibility, management centres and traffic control. Secure, integrated telecommunications use open data to create the conditions for competitiveness and innovation. These connect people and talent in an environment of co-creation and social development, transparency and citizen participation in an inclusive and committed city. All this takes place with the focus on democratic solutions for citizens and improving the quality of life.

Since the city has updated its SEAP, it realises that the major goal seems to be to reduce the energy consumption of buildings, not only public but also private. Sant Cugat has selected two focus areas for the R4E project:
Tallinn
Tallinn is the capital and largest city of Estonia. Approximately 33% of Estonia’s total population lives in Tallinn. Tallinn never fails to amaze visitors with its historic charm. At its heart is the Medieval Old Town, an area of cobblestone streets, gabled houses, churches and squares that developed here from the 13th to the 15th centuries when Tallinn was a booming Hanseatic commercial hub. The Old Town has long been the main draw for visitors — in fact it is so unique that UNESCO added it to its World Heritage List in 1997. Other areas of the city reflect different ages, from the romantic, Tsarist-era Kadriorg Park to the unforgettable, early-20th-century wooden house district of Kalamaja. A modern shopping and business district in the city centre completes the city scene and blends the old and new faces of Tallinn. Tallinn is a small, relatively quiet city with 40 km² of parks and forests and a beautiful 2 km sand beach bordering its bay providing fresh air and relaxation.

Visitors can stroll along well-developed seaside pathways, explore the natural, suburban bog trails, take sailing trips to nearby islands or use a neighbouring golf course. Tallinn is widely recognised as one of the world’s most technology-oriented cities, offering a range of solutions ranging from e-government to mobile parking. Free Wi-Fi is available almost everywhere. The city also hosts a dynamic business community, in which technology plays a major part. The city is home to the world development headquarters of the Internet telephony company Skype.

Tallinn has selected two focus areas for the R4E project:

- **SMART BUILDINGS**
- **SMART MOBILITY**
The focus area Smart Buildings has been selected by:

- Forli
- Murcia
- Newcastle: domestic & non-domestic buildings
- Sant Cugat
- Tallinn

This section describes the current reality regarding energy in buildings and the ambitions of these cities towards 2050.
The Smart Buildings theme focuses on the built environment and the sustainable energy solutions for buildings. These include both residential areas as well as offices, public and commercial buildings. These buildings can be either privately owned or rented, which might impact the attractiveness of different solutions as well as the decision-making processes. The challenges that are faced in sustainable solutions for buildings depend highly on the use of the building, the existing energetic building performance, the climate and the density of the built environment (e.g. a megacity with high rise blocks has different challenges than low rise buildings in a park city). Sustainable energy generation has to be analysed in the context of energy efficiency, creating holistic visions for the existing building stock as well as for new buildings.

Aspects that might be covered in the visions on Smart Buildings are:

- Energy systems: smart systems for the generation and storage of sustainable energy
- Energy infrastructures: planning of the transition in urban energy infrastructures based on current and future needs and potential social and technical opportunities
- Solutions for residential areas: feasible solutions for home owners and tenants with suitable business models for small communities (smart homes)
- Solutions for public buildings: sustainable solutions for renovation and newly build
- Smart controls: optimising energy performance in relation to occupancy and activities
- Integral comfort: efficient and effective heating, cooling, lighting and ventilation

The visions for Smart Buildings will address aspects that link to other themes, such as (electrical) energy storage in combination with Smart Mobility.
Today’s reality in Forlì

Forlì is aiming to increase the energy efficiency and the use of renewable energy in public buildings through a programme of renovation and investments. The use of smart technologies could help to achieve these objectives by optimising the use of resources and reducing the need for energy. However the concept of ‘smartness’ for building also refers to the uses and opportunities. For example the renovation and/or change of use of historic buildings, taking into consideration their historical background and today’s needs and users, can offer good examples for a modern and liveable city.

In recent years a number of renovation projects have been concluded in Forlì. These include historical buildings of cultural and historical value such as San Domenico and Campostrino, which have been renovated and made newly available for exhibitions and cultural events. The San Domenico complex is now the most important museum in Forlì, hosting national and international art exhibitions, thereby improving access to culture in Forlì for its citizens and visitors.

The Campostrino complex, which originally was the first school gym in Forlì will soon be opened to the public as a communal space for cultural events. The Campostrino complex has been renovated though a joint process which draws the attention of citizens and associations who together decided on the best use of the building.

An important example of urban regeneration is also the new University Campus. It is located within the city centre and it saw the replacement and renovation of buildings that were part of the former city hospital.

Francesca RAVAIOLI, Comune di Forlì
History made smart in Forlì 2050

1. Buildings that reflect the cultural heritage

In 2050, people in Forlì value their historical heritage. Historic buildings are renovated with respect for their heritage, and have new uses that serve the community. Forlì boldly implement modern energy-efficient building technologies, both in top-quality new buildings and in the less valuable elements of existing buildings. All buildings are designed or renovated for safety and resilience to both normal climatic conditions and exceptional natural events.

Strategic ambitions
- In 2050 all buildings of historical value of Forlì are renovated and new use is created for them as a service for the community.
- In 2050 the (historical) buildings are energy efficient and resilient to nature and climate circumstances. Safety measures for renovation are developed and adopted. Schools have been the demonstrator to apply this integration of efficiency and safety in a right way.
- In 2050 the historical buildings are given a new life and new purpose by using them for cultural events or other means of leisure and social activities. Different approaches are used for public, private and mixed buildings to ensure ‘best’ use. Conditions for high quality living are met so people have moved back to the city centre. Policies enable differences in the areas of the city to meet the different groups of people (citizens, shops, banks, etc.)
- In 2050 Forlì is a zero-risk city, concerning earthquakes and other nature disasters for all buildings.

2. Infrastructure that enables the social environment

In 2050, the social environment of Forlì is supported by the technological infrastructure. People – both citizens and entrepreneurs – value high-quality connectivity and technical infrastructure. They interact with the urban space, and have real-time information inviting them to engage in social activities. The top-level infrastructure of Forlì attracts companies (both established and start-up) to set up their activities and contribute to local economy.

Strategic ambitions
- In 2050 Forlì is a leading example where people, spaces and new technology are meaningful connected. Technology is organised in a simple, yet effective way.
- In 2050 Forlì has high quality commercial routes, attracting companies to open new businesses. A more diverse set of activities and services (handicrafts, shops, banks, or headquarters) is present in the city. Young start-up companies use the suitable, smaller buildings all over town. Infrastructures (e.g. broadband connections) and set-up services for companies are at top level.
- In 2050 the population in the city has reached a level where people easily use technology (such as smartphones) that interact with urban space, so they are real time informed and invited to engage in social activities. The quality of the urban space increases the value of the buildings and the community of Forlì is involved in improving the value of the city.

3. Leading by example

In 2050, the smart people of Forlì value energy-efficient buildings. Schools and hospitals are leading examples of ‘people smart’ services that encourage learning and healing. Starting with young children, people are aware of the basic principles of sustainable living that has spread across the whole city. New technologies are used to achieve zero-emission, self-sufficient buildings.

Strategic ambitions
- In 2050 buildings of Forlì are smart in terms of technology as well as ‘people smart’ in enabling the service of the building (for instance improve healing in hospitals or learning in schools). The knowledge gained from redesigning hospitals and schools in this way is an example now for other buildings.
- In 2050 50% of the buildings in Forlì will be energy efficient, zero-emission and self-sufficient, using the newest technologies. Policies support this. Citizens are aware of the basic principles of sustainable living, already from a young age.
- In 2050 all new buildings in Forlì are 100% energy efficient and self-supportive as a result of targets. For existing buildings with less restrictions, the maximum improvement is reached. For historical buildings, new technologies are applied respecting the architecture and historical values.
The city of Murcia has seen a strong construction sector during the period 2000 – 2007. From that time, the property bubble meant that the city has not had many examples of private smart building projects. With respect to Municipal Buildings, the Murcia City Council has built some remarkable buildings like the ‘Edificio Municipal multiusos de Abenarabi’, which is a good example of monitored and integrated systems. It uses the latest advances in communications, and can be considered as a reference in energy efficiency at regional level.

Apart from these examples, the Murcia City Council has been involved in the European ‘Smart Spaces’ project to reduce energy consumption in municipal buildings using ICT and by raising awareness. Murcia City Council achieved a reduction of the energy bill by 16% in five of its more representative buildings. The use of metering equipment in such buildings, combined with recruitment and dissemination activities, helped to make this possible.

Thanks to this project, the municipal staff can monitor the energy consumption of their building in real time with just a few clicks. This ‘Free Access’ to energy consumption data has been very helpful in raising staff awareness about energy saving. The online platform, allows them to view the specific energy consumption of each department and to check how the behaviour of people in the offices affect energy use.

There is a lot of work to be done yet in the field of monitoring and improving energy efficiency in Murcia’s municipal buildings. There are a total of 500 buildings with different characteristics and uses, so the big challenge is how to install a precise and affordable monitoring system meets all the requirements and provide useful data to take decisions and act accordingly.
Smart, interconnected green buildings maximise user comfort in Murcia 2050

1. Interconnected buildings optimise comfort and use of resources

In 2050, the buildings in Murcia are interconnected by a tele-management system that enables sharing of energy and resources. This makes a big contribution to users’ comfort and convenience, both inside and outside the buildings.

Strategic ambitions
- In 2050 buildings in Murcia inter-communicate, think and act in order to provide comfort and user-centered services with energetic autonomy.
- In 2050 in Murcia tele-management will allow buildings to inter-operate in order to optimise resources.

2. Buildings proactively adjusting to changing user needs

In 2050, people in Murcia value buildings that proactively adjust to their changing needs. Through profiles based on the expected use (presence and activity) and external factors (weather, season etc.), buildings actively choose the optimal energy settings to maximise comfort for users.

Strategic ambitions
- In 2050 the buildings in Murcia adjust themselves to the needs of their users and to external factors. The buildings being flexible and granted in terms of comfort by the use of centralised intelligent systems. The use is also optimised.
- In 2050 buildings in Murcia inter-communicate, think and act in order to provide comfort and user-centered services with energetic autonomy.

3. ‘Clean & green’ buildings and city

In 2050, Murcia is among Europe’s top ‘clean & green’ cities. This is achieved by green urban planning that values CO2-neutral, energy-producing buildings. These use renewable energy sources and have a low impact on nature, both during their construction and in daily use.

Strategic ambitions
- In 2050 all buildings in Murcia are zero-net balanced throughout the city. The buildings generate clean produced energy to fit their use. The capacity to store the energy is also realised. A greener Murcia is energy self-sufficient.
- In 2050 in Murcia the buildings will run on renewable energies, will be built with reusable materials and will not generate waste that may have a negative impact on nature.
- In 2050 Murcia is amongst the top 10 green, eco-friendly cities in Europe. Urban planning creates enough green to minimize local CO2-emission and local heat stress. The citizens are aware of their energy consumption and reduce their use.
Today’s reality in Newcastle - domestic buildings

The domestic buildings include 122,000 properties in Newcastle, which contribute 33% of the CO₂ generated by the city. Reducing the CO₂ generated in the domestic sector not only makes a substantial contribution to the overall targets, but will also contribute to improving living standards by helping to reduce ‘fuel poverty’ and improving the physical condition of the property.

A residents’ survey gives some insights into respondents’ satisfaction with their homes and their local areas as a place to live. The survey is carried out every one or two years — most recently in 2012.

How satisfied are you with your home as a place to live?

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How satisfied are you with your local area as a place to live?

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Smart homes enabling a high quality of life in Newcastle 2050

1 Comfortable housing, affordable energy
In 2050, residents of Newcastle value living in the city because of the high quality of life and comfortable housing. Good data management supports an effective energy system, in which all the homes have zero energy usage from the grid. Controllability is achieved by new collaboration and business models for sustainable energy solution. These make energy accessible and affordable for all, in both new and existing housing.

Strategic ambitions
- In 2050 Newcastle domestic buildings have zero energy import from the grid.
- In 2050 the energy system is affordable, accessible, sustainable and fair.
- In 2050 all domestic housing enjoy energy efficient, comfortable and de-carbonised heating. Affordable retrofitting solutions and suitable business models have made it possible for all residents in both existing and newer housing to install such solutions.

2 Empowering residents
In 2050, residents of Newcastle have the means and the wish to make responsible choices in their energy usage. Retrofitting domestic heating systems and adding intelligent controls enables the most efficient, low-carbon options. At the same time it creates jobs in the local economy and helps to tackle fuel poverty. Residents are empowered to control their own energy usage, ensuring affordable, low-carbon heating and enabling healthy, safe energy consumption levels.

Strategic ambitions
- In 2050 the residents of Newcastle have the means and the desire to control their energy environment and make responsible choices.
- In 2050 fuel poverty is zero.
- In 2050 energy consumption in households uses a more diverse range of technologies. Distributed power generation, electrification of heat and connection to district systems are the norm. Other sources of local heat could include geothermal and a wider variety of heat pumps. This more complex, more local energy system offers jobs to the local economy. Many of the traditional jobs in the fossil fuel sector have diversified into the green economy, (e.g. services for offshore wind).

3 City leadership
In 2050, Newcastle City Council is valued for its strong leadership and clear vision. It has created a sustainable society, in which people themselves take responsibility and set the right example. Through the open data centre the City Council and its partners are able to implement evidence-based policies and decision-making. Through consistent, evidence-based programmes, partnerships have created a secure, self-sufficient and low-carbon energy system for the city.

Strategic ambitions
- In 2050 Newcastle City Council considers the local (regional) authority footprint, looking beyond the boundaries of a house, of a property, of a land ownership and creating shared responsibility.
- In 2050 Newcastle is low-carbon energy secure and self-sufficient.
- In 2050 Newcastle City Council benefits from their clear message, strong leadership and leadership by example.
Today’s reality in Newcastle - non-domestic buildings

Newcastle has a primarily service-based economy, with very few ‘heavy’ producers of CO₂. Within the private sector, this is distributed across the provision of professional services, financial services and a dominant retail and leisure sector. In this regional capital, the public sector is a significant operator with two universities, several major hospitals and central government agencies located in the city. The total number of non-domestic buildings in Newcastle is 7,283.

Simon JOHNSON, Newcastle City Council (NCC)
Smart buildings and infrastructure enable a thriving economy in Newcastle 2050

**1. Fit-for-purpose, energy efficient buildings**

In 2050, occupants and users of non-domestic buildings in Newcastle enjoy flexible, energy-efficient spaces which they can easily adapt to their own, changing needs. They use ongoing retrofit solutions to adapt the buildings to their specific usage and maximise efficiency. Buildings are exemplary in the use of innovative, sustainable technologies. High visibility of the solutions contributes to a thriving building sector that ‘exports’ design and consulting services. Newcastle City Council shows leadership and informs, supports and cooperates in creating efficient buildings.

**Strategic ambitions**
- In 2050 all buildings are as efficient as they can be with the newest technologies, despite when they were built. All buildings are flexible adaptable to changing occupancy needs and user requirements. The use of innovative solutions is visible in the city.
- In 2050 the buildings in Newcastle are affordable and fit-for-purpose. Occupants will have the necessary technology to flexibly adapt the spaces to their needs.
- In 2050 Newcastle is a leader in a smart cities approach and an exemplar in sustainable energy efficient buildings. This approach is adopted by all stakeholders. The City Council is a national leader in driving business participation through policy making and by getting things done.

**2. Collective approach to infrastructure**

In 2050, Newcastle has adopted a collective approach that enables joint decision-making with partners and stakeholders in the city. All buildings are smart – so they both receive and transmit information – and are connected to a physical infrastructure of all kinds of networks (grids, transport, heating, electricity, data etc.). Urban planning takes a broad, wide-area view to take full advantage of opportunities extending beyond site boundaries and city limits.

**Strategic ambitions**
- In 2050 a collective approach is realised that enables joint decision making as well as a physical infrastructure that connects all buildings. In urban planning a broader view and wider area is considered to link smart buildings into smart grids to reap the opportunities beyond the specific site boundaries.
- In 2050 Newcastle City Council has both direct service provision and a strong mix of innovative, collaborative and cooperative models for partnership and participation that supports the smart development of the city.

**3. Vibrant economy, happy people**

In 2050, Newcastle has a thriving economy based on new industries that attract young people. The smart buildings policy makes the city attractive to investors, resulting in new jobs and new forms of collaboration with stakeholders. Citizens enjoy high-quality facilities, community life and an attractive, green living environment.

**Strategic ambitions**
- In 2050 Newcastle has a vibrant economy based on new industries (like digital and software) that attract young people.
- In 2050 the city of Newcastle is a catalyst for job creation and industry investments for ethical and environmental developments.
- In 2050 Newcastle is internationally recognised as an innovative area where investments are rewarded through policy. Collaboration between policy and businesses is facilitating continuous investments for a sustainable city.
- In 2050 the outcomes of the smart buildings policy are visible and explicitly of value to all stakeholders, in the sense of health, jobs, cooperation, citizens and community experience. The economy is vibrant, with green jobs, maximising the potential of the city.
- In 2050 Newcastle attracts young people with a growing economy and attractive living environment (facilities, entertainment options, walking and cycling routes). The jobs in the gas/oil industry have been replaced by new jobs in the green economy (such as services for off-shore wind). The new economy in e.g. software and digital industries benefit from Newcastle’s heritage as international trading city.
Today's reality in Palermo

The building and transport sectors can be considered to have the main responsibility for energy consumptions, and therefore also for greenhouse gas emissions in the city of Palermo.

The building volume in the municipal area is about 201.5 million m$^3$, with an average density of 12,588 m$^3$/ha.

Approximately 134 million m$^3$ (67% of the total) are intended for housing, 50 million m$^3$ (25%) for the services industry, and 16 million m$^3$ (8%) for other industrial activities.

Over 47% of the total volume is within the Old Town and the urban area built up in the early 1900s. As regards the distribution of assets in different age classes, only 19% was built before 1945, 19% was built between the post-war period and the 1960s, and the remaining 59% of the total buildings were built between 1961 and 1991. The year 1991 is important because in Italy because of new rules on energy consumption in buildings that apply since then, and these have had a positive effect on the building sector. However, it was only in 2005 that the European directive on energy certification of buildings was implemented in Italian law.

Moreover, the data contained in the Register of Energy Certifications for the Sicilian Region shows that over 85% of housing units belongs to the classes G and F, which are characterised by high energy consumption.

Dealing with the theme of ‘Smart Buildings’ is therefore vital for the reduction of greenhouse gas emissions in the city of Palermo.
Cultural and social harbour Palermo 2050

1. Smart, ecological buildings
   In 2050, the city of Palermo values smart, ecological buildings and spaces. All buildings (both historic and new) use renewable energy and sustainable solutions for their architecture. (Re-)location of public service buildings supports sustainable living in the city. All waste is re-used completely, so it is no longer a cost but a valuable resource in itself.

   Strategic ambitions
   > In 2050 public buildings in Palermo are sustainable & energy efficient.
   > In 2050 new buildings are zero-emission compliant.
   > In 2050 services for citizens, such as schools, health care, etceteras, are located along public transport lines to decrease mobility.
   > In 2050 there is regulation for the use of renewable energy systems in the historical centre.
   > In 2050 all buildings in Palermo are smart & ecological, including energy and waste management.
   > In 2050 all buildings in Palermo use smart technology, including technology for the full re-use of waste.

2. Integrating new and historical knowledge
   In 2050, Palermo’s cultural heritage enriched with new technologies is greatly valued. Palermo builds on its historic strengths to design comfortable, energy-efficient houses and neighbourhood areas. The city explicitly using its mild climate, as well as its past knowledge (such as the building of Palazzos and villas), enriched with today’s technology solutions.

   Strategic ambitions
   > In 2050 Palermo uses its historical strength to build comfortable and energy efficient houses and neighbourhoods.
   > In 2050 the mild climate of Palermo is used to its full extend for sustainable buildings & energy production.

3. Cultural hub
   In 2050, people in Palermo value their city as a hub for meeting each other and for all kinds of social activities. Cultural exchanges enrich people’s lives in the city. Behavioural change is achieved by incorporating the city’s cultural and artistic heritage in education.

   Strategic ambitions
   > In 2050 Palermo is a cultural hub: a harbour for cultural exchange where people meet and bring in their own culture.
   > In 2050 Palermo uses culture and art in education to improve the quality of life by stimulating behavioural change.
Today’s reality in Sant Cugat

One of the most important goals for Sant Cugat is buildings as efficient as possible. To achieve this the city took part in the ‘3e-Houses’ project, which aims to improve housing energy efficiency by using information technology (ICT) and home automation systems. Specifically, Sant Cugat promoted the retrofitting of two buildings through Promusa, the municipal housing company with 118 rented apartments.

There is a contract with an energy service company (ESCO) for maintenance, heating and cooling of municipal buildings. Energy savings of 30% have been achieved, with cost savings of € 1,090,064 and non-emission of 3,138 tonnes of CO$_2$ compared with the baseline figure (2007-2013). This applies to 62 buildings in the city: schools and children schools, sports facilities, civic and cultural centres and libraries (including the Auditorium Theatre), museums (Monastery and House Aymat) and more than 14 municipal offices.

Sant Cugat implemented an ambitious local regulation, going beyond the existing Spanish building code, in order to improve the number of thermal solar energy systems installed within the municipality. As well as technical consultancy and tax reduction incentives for citizens, there is a special focus on the installation of solar thermal systems in public buildings;

Sant Cugat participates in an FP7 project, OPTIMUS, which aims to create a platform that will allow cities to predict their energy demand and consumption based on weather forecast, occupancy of the building and the energy cost. OPTIMUS will provide an integrated ICT platform that will collect and structure the multidisciplinary open data sets and use semantic, intelligent technologies and inference rules to combine the data and propose energy optimisation plans. Within the OPTIMUS scope, a Smart City Energy Assessment Framework (SCEAF) has been developed. The SCEAF is structured under three main pillars of evaluation, namely ‘Political field of action’, ‘Energy and environmental profile’ and ‘Related infrastructures and ICT’. Each of these includes 7 indicators to provide the assessment in a coherent, transparent and integrated way.

Sant Cugat has developed a pilot project which aims to improve well-being of citizens who cannot afford the costs of energy. The project involves energy refurbishment of inefficient houses by unemployed people from the neighbourhood, so it is both sustainable and socially smart. The project includes not only the improvement of houses, but also monitoring health indicators. For example respondents have been blood-tested several times; before, during and after the refurbishment.

Sant Cugat has signed an agreement with the University of Technology with the goal of defining and developing the local plan for energy refurbishment of Sant Cugat’s buildings, both public and private.
Smart citizens enjoy smart buildings in Sant Cugat 2050

1. Energy-aware, proactive citizens and other stakeholders

In 2050, all the stakeholders of Sant Cugat value collaboration and shared responsibility to manage their energy proactively. This approach is based on monitoring and management systems that provide a wide range of indicators to meet people's needs. It also helps them to understand their own energy footprint and to act accordingly.

Strategic ambitions
- In 2050 the citizens of Sant Cugat are 100% smart citizens.
- In 2050 the citizens of Sant Cugat are engaged and energy literate in achieving the energy goals and actively manage their energy use, supported by monitoring- and management system that fit their needs and understandings and that predict their future bills.
- In 2050 Sant Cugat provides a showcase for energy issues, through a holistic view on the urban metabolism, including citizens that are in control and receive the revenues of the network, stakeholders that are involved and stimulated to share, and the use of a broad scope of indicators.

2. Smart, energy-efficient buildings

In 2050, owners and occupants of buildings in Sant Cugat value the opportunity to save energy and water. They do this by using the latest energy-saving technologies and energy-efficient system designs. Although these concepts add up to significant energy savings, people don't have to make any compromise in the comfort of their living environment.

Strategic ambitions
- In 2050 in 2050 the newest technology will be used (e.g. the internet of things) to reduce energy use in buildings.
- In 2050 the buildings in Sant Cugat are designed (by materials, production and construction) to consume less energy and use mostly renewable energy.
- In 2050 The owners of Sant Cugat’s buildings know in real time the occupancy of the building, it’s use, and the important energy parameters, and based on that provides different modes to enable energy savings as well as the realisation of a comfortable environment.

3. Self-sufficient, renewable resources city-wide

In 2050, renewable resources are valued to create a self-sufficient smart energy grid that connects all buildings, both new and existing. Resources, both of energy and water, are used – and wherever possible re-used – responsibly.

Strategic ambitions
- In 2050 In 2050 Sant Cugat is self-producing all energy resources needed for smart buildings.
- In 2050 all new building projects and refurbishing of existing buildings will lead to an energy positive average. The city and the building owners act responsibly for energy and sustainability, using smart designs and smart information systems.
- In 2050 the city of Sant Cugat produces more (renewable) energy than it consumes. Each building is connected to the smart grid that also allows energy storage, using new technologies.
Today’s reality in Tallinn

The share of buildings in the total energy consumption of the city is nearly 40%. Apartment buildings in residential areas are mainly heated by district heating. Private houses in the Nõmme, Kristiina and Põhja districts use central heating systems based on a central furnace or a boilers.

After 1991, Tallinn City Government started to improve the energy efficiency of the residential buildings owned by the city, thereby contributing to reduction of greenhouse gas emissions. The city has launched a project to install heat meters and new heating units that automatically control the indoor temperature. With the installation of heat meters in residential buildings, customers began to pay for the actual amount of heat they consumed. This gave them the chance to adjust the indoor temperature of the building by making the appropriate setting regardless of changes in the ambient air temperature. The energy savings achieved amounted to at least 18 — 20% of consumption, compared with the consumption before the renovation.

A total of 37.5 million euros was invested to renovate Tallinn’s municipal buildings in 2011-2013, including 2.67 million euros derived from the sale of national CO$_2$ emissions. Mainly the façades of schools and kindergartens were insulated. It is estimated that annually 3370 MWh is saved through these measures.

In 2015-2020 the state will continue to support deep renovation of apartment buildings. It is expected that at least 400 residential apartment buildings will be renovated in Tallinn, with a closed net area of up to 1.2 million m$^2$ and a total investment of 240 million euros, which will reduce CO$_2$ emissions by 90,000 tonnes by 2020. The city of Tallinn will continue to invest in supporting the renovation of apartment buildings, and will continue to promote energy efficiency. In 2015-2020 a total of 142.5 million euros will be invested in the renovation of buildings owned by the city, resulting in calculated savings of 15,018 MWh/year and reduce greenhouse gas emissions by 50,195 tonnes.
Smart buildings and smart people in energy-neutral Tallinn 2050

1. Sustainable behaviour and renewable energy
   In 2050, people in Tallinn value sustainability. Their behaviour and energy usage are based on individual responsibility. That means their remaining energy demand is affordable for all. It is achieved by renewable energy sources, such as heat pumps, biofuels and energy from the sea. Thanks to all these measures, Tallinn is a CO2-neutral city.

   **Strategic ambitions**
   - In 2050 the citizens of Tallinn have guaranteed affordable heating. More renewable sources for heat production, such as bio-fuels, and heat plants, are used. The realised hospital is a demonstrator where a good climate is realised that is affordable in a smart way.
   - In 2050 smart solutions and smart behaviour has led to a strong reduction of energy consumption. The remaining energy use stems from the newest renewable energy systems for energy production to achieve high energy efficiency.
   - In 2050 the people of Tallinn regard the city as being open to the sea. The sea is also used as a heating source for a CO2-neutral city.

2. Energy-neutral city
   In 2050, Tallinn is an energy-neutral city. All the existing buildings are deeply renovated and modernised, while respecting their historical heritage. All the city’s energy systems are automated and connected, which supports new services. The energy-saving measures include smart materials and equipments.

   **Strategic ambitions**
   - In 2050 all buildings and districts in Tallinn use zero-energy. The heritage and history of older buildings is respected, also when new purpose is given to buildings.
   - In 2050 all energy used in buildings comes from renewable sources. Smart materials and equipment are applied to save energy.
   - In 2050 all buildings in Tallinn have automation systems that are connected and easy to understand. These smart systems also provide new IT-based services, such as guidance or information.
   - In 2050 all existing buildings in Tallinn are deeply renovated and modernised. They reach high energy classes and all energy systems are connected and online. Soviet time apartment blocks are either demolished or renovated.

3. Integrated, flexible city planning
   In 2050, land use planning in Tallinn values an energy-efficient smart city. Planners have the knowledge and awareness to work at an integrated system level. Their work takes into account all the relevant issues, and provides the flexibility to adapt to changing situations. These policies are implemented in practise through specific, integrated district plans.

   **Strategic ambitions**
   - In 2050 land use planning in Tallinn is done on an integrated system level, taking into account all sustainability issues, demographic changes, and mobility demands. The planning is also flexible to adapt to developments we do not know yet. The administrative units create specific district plans to integrate and implement these policies.
   - In 2050 we gained the knowledge and awareness to plan the city of Tallinn as an energy efficient smart city.
Common and specific ambitions

During the Joint Ambition Workshop on 19 October 2015 in Palermo the cities shared and discussed their ambitions for Smart Buildings.

One of the elements of the discussion was to identify the aspects of the ambitions that are common for all cities, and those that are specific for one or more cities only.

The results of this discussion are used to update the description of the focus area for further use in the R4E project.

Common aspects

• Self-sufficient buildings in terms of generating their own ‘green’ energy (public and private)
• Increase of people’s awareness of the need to save energy (public and private)
• Get people’s engagement to save energy by incentives and leading by example
• Building with very low environmental impact during construction, renovation and use
• Green roof as an energy-efficiency measure
• Self-sufficient city (district level)

Specific aspects

• Historic buildings (Forlì and Palermo)
• Cultural hub (Palermo)
• All building with a decision support system (Sant Cugat and Murcia)
• Planning energy transition by district (Newcastle and Tallinn)
• Eco-friendly green city of Europe (top 10 cities) (Murcia)
• Community as an energy supplier to the smart grid (Sant Cugat)

Joint ambition for Smart Buildings

The Smart Buildings theme focuses on the built environment and sustainable energy solutions for buildings, including residential, offices, public and commercial buildings. The ambition of the cities is to create self-sufficient buildings that can generate their own ‘green’ energy, and have very low environmental impact during construction, renovation and use. Self-sufficient districts and cities are created with a blend of suitable solutions for new as well as historical buildings. The owners and users of the buildings are well-aware and engaged in saving energy and applying energy efficiency measures.
FOCUS AREA SMART MOBILITY

The focus area Smart Mobility has been selected by:

- Eindhoven
- Istanbul: public transport & traffic management
- Murcia
- Palermo
- Tallinn

This section describes the current reality regarding energy in mobility and the ambitions of these cities towards 2050.
The world faces numerous social challenges presented by the everlasting demand for mobility and the impact this has on space and environment. Transportation networks in most urban centers are often packed, and any small disruption can easily lead to long traffic jams. Moreover, our transportation system, with its polluting emissions, has a negative impact on our habitat and on global warming. Aside from these aspects, 1.2 million people worldwide are killed in traffic accidents every year. These phenomena detract from the pleasure and freedom we experience from driving. They also endanger our health and cost society a lot of money. Technology is vital for answers to these problems.

Smart Mobility considers transport and mobility as a major issue for cities to achieve quality of life. While mobility uses significant amounts of fossil fuel and through its emissions impacts air quality directly, it also brings quality of life by providing a sense of freedom and access to all sorts of (public) services. Smart mobility refers in the long run to a zero concept relating to zero accidents and zero emissions. Other aspects that are covered in Smart mobility visions are:

- Next generation vehicles: smarter, cleaner and safer vehicles (e.g. electric vehicles)
- Intelligent traffic management: smart planning and communication, dynamic routing
- Public and private transport: efficient and effective systems suiting individual needs
- Greener transportation: modal shift from car use towards more sustainable solutions (walking, cycling)
- Smart logistics: efficient and sustainable solutions for transportation of goods in urban areas

Smart Mobility cannot be well understood without the development of mega city corridors and networked, integrated cities. City borders will expand out of suburbs to include daughter cities. The Core City will enclose multiple downtowns. Multiple Transportation Models will be used and more than 50% will use public transportation. Smart Mobility is also heavily enhanced because of the convergence of technologies, related to connectivity of devices (car-to-car and car-to-x communication, required for ITS), wireless communication, renewable energy production and use, electrification and smart grid integration. The visions for Smart mobility will therefore address aspects that link to various other themes, such as (electrical) energy storage and usage of public space. More particular with respect to the penetration of E-mobility, major changes are expected in the urban space. In 2020 it is expected that over 40 million electric 2 wheelers and 4 wheelers will be sold around the globe.
Today’s reality in Eindhoven

Jan-Willem HOMMES, Gemeente Eindhoven

Current ambition: Eindhoven - City of the connected traveller

Modal split: current and ambition

<table>
<thead>
<tr>
<th>Mode</th>
<th>2012</th>
<th>2025</th>
<th>Total numbers '12 – '25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrians</td>
<td>13</td>
<td>14</td>
<td>+35%</td>
</tr>
<tr>
<td>Bicycles</td>
<td>40</td>
<td>44</td>
<td>+35%</td>
</tr>
<tr>
<td>Public Transport</td>
<td>5</td>
<td>7</td>
<td>+55%</td>
</tr>
<tr>
<td>Car</td>
<td>42</td>
<td>35</td>
<td>+ 5%</td>
</tr>
<tr>
<td>Totaal</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

Sensor city – status quo

Sensor city – status quo

Innovation strategy: merging collective and private transport

Modular: open = able to include future services

Traffic plan with more attention for pedestrians and cyclists.
Cycle paths, e.g. Veldhoven.

Current strategy: towards an open, modular platform
The use of different transport modes feels very similar.

Community: ‘seamless mobility is sharing’

Innovation strategy: merging collective and private transport

Traffic plan with more attention for pedestrians and cyclists.
Cycle paths, e.g. Veldhoven.

Current strategy: towards an open, modular platform
The use of different transport modes feels very similar.

Community: ‘seamless mobility is sharing’
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.
Today’s reality in Istanbul - public transport

IETT, a general directorate of IMM, is in charge of delivering public transport services in Istanbul. IETT provides only public transportation by bus, Bus Rapid Transit (Metrobus) and Tunnel Operations and is also responsible for management and inspection of Private Bus Transit Services.

IETT equipped all its buses and Metrobuses with a smart payment system, which is the quickest and most preferred way of payment system for all public transport modes in Istanbul. IETT’s buses and Metrobuses are equipped with smart monitoring and surveillance systems, which gives confidence to the public in terms of security. IETT buses continuously transfer their GPS coordinates to IETT’s data centre which helps to monitor the buses and provides estimated arrival times to passengers at bus stops to avoid long waiting times. To provide the best-quality, high-tech solutions to its passengers, IETT has changed and renewed its bus fleet, which is now environment-friendly with lower gas emissions. IETT also takes advantage of hybrid systems in its buses, which use both oil and electrical energy.

<table>
<thead>
<tr>
<th>MODES</th>
<th>Average Passengers</th>
<th>SHARE (%)</th>
</tr>
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<tbody>
<tr>
<td>Metrobus</td>
<td>810,000</td>
<td>8.27</td>
</tr>
<tr>
<td>IETT</td>
<td>577,946</td>
<td>5.99</td>
</tr>
<tr>
<td>DTO</td>
<td>1,441,134</td>
<td>14.99</td>
</tr>
<tr>
<td>DAS</td>
<td>795,004</td>
<td>8.22</td>
</tr>
<tr>
<td>Metrobus</td>
<td>2,202,830</td>
<td>21.71</td>
</tr>
<tr>
<td>Shared Taxi</td>
<td>110,000</td>
<td>1.14</td>
</tr>
<tr>
<td>Taxi</td>
<td>1,100,830</td>
<td>11.37</td>
</tr>
<tr>
<td>Employee Shuttle</td>
<td>2,600,830</td>
<td>24.81</td>
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<td>TOTAL</td>
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<table>
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<tr>
<th>TRAIN SYSTEMS</th>
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</thead>
<tbody>
<tr>
<td>Metro</td>
</tr>
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<td>Light Metro</td>
</tr>
<tr>
<td>Train</td>
</tr>
<tr>
<td>Tunnel - Funicular</td>
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<tr>
<td>Kestelkön Express Train</td>
</tr>
<tr>
<td>Train AEC</td>
</tr>
<tr>
<td>TOTAL (Railway)</td>
</tr>
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<table>
<thead>
<tr>
<th>SEA LINES</th>
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</thead>
<tbody>
<tr>
<td>DHO</td>
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<tr>
<td>City Lines</td>
</tr>
<tr>
<td>Private Rental</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

Table: Mobility modal share: % use of different modes of transportation (bicycle, car, taxi, bus, train, trolley, ...)
Source: IETT
## Fully integrated, accessible & sustainable mobility in Istanbul 2050

### 1. Clean, green and healthy mobility

In 2050, a clean, green and healthy environment is valued by the citizens of Istanbul. Travellers appreciate the wide range of alternative routes and forms of transport. Travellers choose sustainable options: they use fewer cars and more public transport, and they frequently choose to travel by bike or on foot.

Public transport systems use renewable energy resources.

**Strategic ambitions**
- In 2050 we have energy-efficient, sustainable and green transportation.
- In 2050 we use less cars and more public transport and bikes.
- In 2050 we have increased the share of rail systems to beyond 50%.
- In 2050 we have attractive pedestrian and bicycle areas.
- In 2050 we use renewable resources for energy in public transport.

### 2. Fully accessible, seamless transport

In 2050, public transport benefits everyone by providing good accessibility of all modes of transport. These are seamlessly integrated, providing a finely meshed network that reaches every part of the city, while respecting its historical heritage. Public transport provides a single route to people’s destinations, without disruptions caused by changes between modes.

**Strategic ambitions**
- In 2050 we have accessibility of all modes of transportation through integration.
- In 2050 we achieved 100% social inclusion in terms of mobility.

### 3. Well-informed travellers

In 2050, travellers value the availability of accurate, up-to-date and cross-modal information. This enables them to choose from the best option as and when they need them, taking into account changing situations and transport availability.

The information provided includes available routes, fares and car parking facilities.

**Strategic ambitions**
- In 2050 all mobility elements will be smart, using all effective Intelligent Transportation Systems (ITS) solutions.
- In 2050 we have better information in information systems.
Today’s reality in Istanbul - traffic management

Esma DILEK, Istanbul Metropolitan Municipality (IMM)

IMM has a Traffic Control Centre (TCC) operating since 2003 to provide 24/7 online traffic information to the public. TCC Call Centre staff directs drivers to less crowded routes so they do not get stuck in traffic jam and waste time and energy while releasing harmful gases. By deploying Variable Message Signs that provide both congestion status and estimated travel times, IMM aims to optimise the use of its road network and direct drivers to alternative routes. Moreover, IMM has both web and mobile traffic applications that provide online traffic camera streams, estimated travel times, online parking information, weather information, road works announcements etc. which affect traffic in Istanbul.
Personalised, smooth, safe traffic in Istanbul 2050

1. Personalised travel advise
   In 2050, individual travellers are valued and facilitated by personalised travel advise. Smart technologies and apps enable personalised route planning. Communication between vehicles, drivers and infrastructure allows individual signalling. Green behaviour is encouraged by a range of personalised, sustainable options.

   Strategic ambitions
   • In 2050 everyone has its own route-planner using smart apps and technologies provided. There is no need to ask anyone else for your own discretion.
   • In 2050 we have individual signalisation so that communication with vehicles and drivers is possible.
   • In 2050 green behaviour is stimulated

2. Fast, smooth traffic flows
   In 2050, people value fast, smoothly flowing traffic, free from congestion. Automated systems support smooth traffic flows through the city. Mass transport solutions are attractive thanks to flexible charging and working hours. Alternative routes and transport modes are conveniently available.
   People value better air quality and choose healthier options such as walking and cycling.

   Strategic ambitions
   • In 2050 traffic congestion is not among the primary 10 problems in Istanbul.
   • In 2050 people move faster and fluently through the city, experiencing no congestion and using new transport modes (walking, cycling etc.). There is better air quality to stimulate healthier living and more walking and cycling.
   • In 2050 there is no congestion due to the use of automation and automated solutions.
   • In 2050 we have low emissions and a healthy environment.

3. Traffic safety
   In 2050, people in Istanbul value traffic safety. Smart safety measures help to avoid accidents and traffic violations. Vehicles are equipped with smart solutions and options to communicate, both with other road users and with the infrastructure.

   Strategic ambitions
   • In 2050 we have safe traffic management by communication between vehicles and infrastructure. Vehicles are equipped with smart safety measures to avoid accidents.
   • In 2050 Istanbul will be in world top 5 regarding traffic safety statistics.
Today’s reality in Murcia

Maria Cruz FERREIRA COSTA, Ayuntamiento de Murcia

Murcia has taken important steps towards becoming a reference in Smart Mobility in the past decade.

One of the major projects has been the construction on line 1 of the Murcia’s Tram, which has very positively benefited public transport in Murcia. Over the last two years this service has increased the use of public transport. Murcia’s tram has served 7,047,475 passengers in those 2 years.

MUyBICI is another recent and successful project that has been working since March 2015. MUyBICI is a public bicycle-sharing system that aims to increase the use of bicycles in Murcia. The system has 60 sharing stations and 600 bicycles, and it has a Smartphone App that informs users in real time about the availability of bicycles at each station. MUyBICI has been devised to provide a smart service for citizens and support them in their daily journeys.

MUTRANS is an online platform created to help citizens to plan their journeys using public transport in Murcia. Through MUTRANS, users can set their starting points and destinations, then they can see the most efficient route using public transport. The system combines the tram, the public buses and bicycles to make optimised route suggestions for the user. The platform also offers real-time video of 13 different points in the city, chosen to show the traffic in the main streets of Murcia. The MUTRANS project is complemented by a Smartphone App to facilitate access to information regardless of location. The goal is to facilitate intermodal transport use for Murcia citizens. Supporting this concept, an integrated transport card has been created to give access to the tram and both the urban and interurban bus services.
1. **Smart, integrated platform for mobility of people and goods**

In 2050, people in Murcia value a smart, integrated mobility platform that gives them ‘one-click’, low-cost movement around the whole city and its surroundings. The system provides optimal transport of both people and goods.

**Strategic ambitions**
- In 2050 the transport system of vehicles and goods will be optimised through smart and integrated platforms.
- In 2050 I will be able to leave home and move around the city with non-polluting public transport, with ‘one click’ and at low cost.

2. **Clean public transport and vehicle sharing systems**

In 2050, people in Murcia enjoy a clean and effective public transport system throughout the city. Vehicles can be shared, and are safe thanks to smart traffic management. Transport modalities incorporate incentives to reduce the user of private cars.

**Strategic ambitions**
- In 2050 vehicles will use clean energies. We will be able to share them and we will be safer thanks to smart management of traffic and mobility and we will be preferably use public transport.
- In 2050 Murcia will use a collective transport system, moved by clean energies. The use of private cars will be restricted and subject to a car sharing system.

3. **A safe, clean city for pedestrians in harmony with clean mobility**

In 2050, Murcia is a city that allows pedestrians to enjoy large, pollution and noise-free areas. These are shared in perfect harmony with cyclists and other safe, clean forms of mobility.

**Strategic ambitions**
- In 2050 Murcia will be a town for and in favour of pedestrians. It has large areas free of pollution and noise and in perfect harmony with bicycles and other transport means.
- In 2050 extensive pedestrian areas will predominate in Murcia, and in these pedestrians and other safe and clean mobility means will live in harmony.
Today’s reality in Palermo

In 2007 the Municipality of Palermo drew up the Strategic Plan for Sustainable Mobility (PSMS) followed in 2010 by the Urban Traffic Plan (PUT). The overall aims were to improve traffic conditions and road safety, reduce air and noise pollution and achieve savings in energy consumption and a reduction of CO₂ emissions by the transport sector.

Analysing transfers data for both the Municipality of Palermo and the entire urban area, it is clear that the most commonly used means of transport is the private car, which is used for about 35% of journeys. A significant percentage of travellers are (regular) passengers in private cars (15% of the total). As a result, almost half of the cars travel with 1 or 2 persons on board. The percentage of the use of public transport is low (it does not exceed 15%), but it can positively be observed that travel by bike and on foot represent almost a quarter of the overall commuter mobility.

Reasons for travelling are divided more or less equally between study and work.

Peak time is between 7.15 and 8.15.

The time spent travelling, in nearly half of cases, does not exceed 15 minutes.
‘Sweet & green’ mobility in Palermo 2050

1. ‘Sweet mobility’
In 2050, people in Palermo value ‘sweet mobility’: cycling, walking and sharing mobility services are obvious choices. These enable people to enjoy the city’s green spaces to the full. All areas of the city are easily accessible by all.

Strategic ambitions
- In 2050 Palermo provides safe mobility for all people: families, children, elderly, disabled, pedestrians and cyclists.
- In 2050 sweet mobility is an obvious choice: such as bike- and car sharing and walking.
- In 2050 the people of Palermo will use biking, because the foundation and infrastructure is available and accessible.
- In 2050 Palermo provides green areas and restricted areas for mobility to stimulate walking.
- In 2050 the coast and nature are preserved and more green areas in the city are realised.
- In 2050 the citizens of Palermo value walking and cycling as obvious part of life and mobility.

2. Safe, reliable public transport systems
In 2050, people in Palermo value safe, reliable public transport options. They enjoy a finely meshed transport network in the city and surrounding areas, all of which are easily accessible.

Strategic ambitions
- In 2050 Palermo provides reliable public transport options for the people through a large network of railways that connect all parts of the town and a subway to connect the city centre.
- In 2050 energy consumption will be reduced for mobility, buildings and public lighting.
- In 2050 a profound public transport system is realised (rail & subway).}

3. A valued cultural heritage
In 2050, people in Palermo value their cultural heritage. They enjoy a good education that gives them ecological awareness. Good citizenship and sustainable behaviour come naturally to everyone.

Strategic ambitions
- In 2050 Palermo will use education as a foundation for good citizenship and sustainable behaviour.
- In 2050 cultural and historical tourism will be a showcase for other cities.
Tallinn is located between Lake Ülemiste and the Gulf of Finland, and the main bottleneck is in the middle of the city with width less than 2.4 km. The maximum distance from east to west is 13km. Approximately two-thirds of traffic passing through the city centre is inner transit between city districts. Urban sprawl has caused major problems as it generates additional mobility needs for people who live outside the administrative city area and commute to the city for work.

Since the beginning of the 1990s the amount of car users has grown very rapidly. This has created a lot of problems such as a lack of parking spaces, increased vehicular queuing in the city causing the average speed in rush hours to fall by 2 km/h per year. To avoid these problems, Tallinn has decided to promote public transport. The goal is to make public transport much more attractive than the use of private cars.

In Tallinn, active developing of public transport started at the beginning of 2005, when the city joined the CIVITAS SMILE project. Just a few examples of the improvements in the public transport systems are 24.2 km of bus lines, integrated ticket system in Tallinn and Harju County, creating public transport priority system, implementing real-time information system, purchasing new fleet, and offering discounts for different groups of public transport users. To promote a healthy lifestyle, 214 km of light traffic roads have been established in Tallinn.

The newly designed identity of Tallinn public transport was launched to the public in 2012, and was created to make public transport more attractive. A policy document and design standard was created to fully define any design-related decision in connection with Tallinn Transport. In 2012 the design management for Tallinn Transport won an award in the EU ‘Design Management Europe’ design competition.

In January 2013 free public transport was launched in Tallinn for registered city residents who have a contactless Mifare card (‘green card’). Since 2013 free public transport has been expanded to trains travelling within the city borders. From 2016 Tallinn will start offering free public transport to residents of all the world’s cities who join the network established on September 17, 2015 by a memorandum between Tallinn and Avesta (Sweden). Today, the first results of free public transport can be presented:

- traffic load has been reduced by 20% compared with the last months of 2012;
- the number of public transport users has increased by 6%.

Due to free public transport in Tallinn, the number of Tallinn residents has increased rapidly, which has had a positive impact to the city budget. The increased funds derived from the increase in Tallinn residents are allocated to improving the quality of public transport even further.
Smart mobility enables an enjoyable living environment in Tallinn 2050

1. Enjoyable living environment

In 2050, citizens of Tallinn enjoy an attractive, clean and quiet living environment that encourages them to behave sustainably. More and integrated green and blue areas, with an extensive network of cycle tracks and pedestrian-only areas enables people to commute conveniently by bike or on foot.

The cityscape is dense, so all services are within easy reach or are provided in the home. More public space is allocated to living, and less for motorised transport.

Strategic ambitions
- In 2050 Tallinn is a liveable city where citizens get their services in walking/biking distance or at home. The city is planned for humans: user friendly facilities and more green areas invite more sustainable behaviour. People choose to walk/bike to commute.
- In 2050 the city of Tallinn has a good urban space where people are invited to move differently (more sustainable) resulting in an attractive, clean and quiet environment and livable streets. More public space is allocated to living, and less to motorized traffic. The green and blue areas in the city are well integrated.
- In 2050 the city scape is more dense, more functions are available within easy reach. More priority is given to pedestrians ‘above the ground’. Space is freed up for buildings and places by putting transportation underground (e.g. parking). The city is build in a way that it enables to use foot, bike and public transport.
- In 2050 the bicycle routes in the city are connected. The number of streets in the city centre that are pedestrian-only is increased. Tram and bus provide good connections to the centre. Car use is discouraged through limitations in lanes and parking fees. There is more lively boat traffic and water taxis.

2. Smooth, seamless public transport

In 2050, the citizens of Tallinn all have access to smooth, seamless public transport that connects all the city areas. Smart planning is used to respond to the (dynamic) demand for the transport of people and goods. The transport and ticketing systems around the Baltic Sea are integrated in a way that is simple, comfortable, affordable (free), clean and fast.

Strategic ambitions
- In 2050 the connections in the city centre of Tallinn and to the neighbourhoods are very good, so all people can reach their destination fast with public transportation (in less time than cars).
- In 2050 the people of Tallinn experience smooth and seamless mobility that better connects all areas of the city by different transport modes (e.g. an extended tram network). The system responds to the demands of goods & people by smart planning to arrive at the desired destination (in the city and outside) reliably and safely.
- In 2050 the green card for free public transport is used widely, not only in Estonia, but also in Helsinki.
- In 2050 the public transportation system around the Baltic Sea is integrated in such a way that it is simple, comfortable, cheap/free, clean and fast.

3. Open, collaborative decision-making

In 2050, planning and decision-making processes are based on open collaboration that includes different views and knowledge sources. Tallinn is recognised as an front-runner in openness. Citizens are aware of their roles, and actively take part in making decisions that influence their living environment.

Strategic ambitions
- In 2050 the planning and decision making process in Tallinn is knowledge based. Administrative organisations and departments collaborate to have an integral view. The people are aware and take their responsibility by actively taking part in decisions that influence their living environment.
Common and specific ambitions

During the Joint Ambition Workshop on 19 October 2015 in Palermo the cities shared and discussed their ambitions for Smart Mobility.

One of the elements of the discussion was to identify the aspects of the ambitions that are common to all cities, and those that are specific for one or more cities only.

The results of this discussion are used to update the description of the focus area for further use in the R4E project.

Common aspects

- Integrated data system available for management of services
- Multimodal transport with personalised advice based on actual data
- Open data platform for public transport
- Increased walking and biking
- Sustainable green environment by walking and biking
- Create attractive public space for residence and others
- Involvement of citizens in decision-making
- Vehicle-sharing solutions for public transport
- Integration of seamless transport
- One authorisation leader for solving public transport problems
- Sustainable behaviour and renewable resources
- Alternative energy sources (green energy)
- Clean air and healthy environment (low emission zones)
- Smart logistics: efficient & sustainable solutions for transport
- Precise and accurate multimodal transport information
- ‘Park & Go’ by walking or public transport (metro etc.)

Specific aspects

- Safety & reliable (public) transport (Palermo and Istanbul)
- Traffic demand management (Istanbul and Palermo)
- Traffic congestions (Palermo & Istanbul)
- Make cultural heritage accessible to citizens and visitors (Palermo and Istanbul)
- Parking space for bicycles (Eindhoven)

Joint ambition Smart Mobility

The Smart Mobility theme focuses on sustainable energy solutions for public and private transport and logistics. The ambition of the cities is to create attractive and clean public spaces and sustainable and healthy green environments that invite residents and visitors to go on foot or bike. Open data platforms, integrated systems and precise and accurate multimodal transport information provide personalised advice for seamless journeys integrating sharing of sustainable vehicles and green public transport.
FOCUS AREA SMART URBAN SPACES

The focus area Smart Urban Spaces has been selected by:

- Eindhoven
- Forlì
- Sant Cugat

This section describes the current reality regarding energy in urban spaces and the ambitions of these cities towards 2050.
The Smart Urban Spaces theme looks at the public spaces in cities. It is the area where many things physically come together: it literally provides space for multiple functions and activities. It hosts traffic solutions; it enables waste management solutions and ICT infrastructures. Public space is also important for the perception of safety, atmosphere and quality of life in the city, thus enabling social cohesion and interaction. Public lighting is also a considerable source of energy consumption in cities that offers also new opportunities for ICT based solutions.

Aspects that might be covered in the visions on Smart urban spaces are:

- Land-use planning: future proof planning of public spaces, taking into account the transitions towards more sustainable solutions in e.g. mobility
- Solutions beyond the scope of single buildings, such as solutions for neighbourhoods or city districts
- Smart urban spaces: intelligent and safe solutions for crowded areas, e.g. intelligent emergency guidance systems
- Internet of things in urban areas: new solutions to make public spaces smarter and more attractive and support citizens in the choice of more sustainable options
- Social innovations for communities based on new ICT solutions, which contribute to social cohesion and inclusion
- Smart context awareness services for citizens, which improve quality of life and comfort in urban spaces
- Smart ICT based lighting solutions: making cities more vibrant and sustainable by improving the atmosphere in public spaces

The visions for Smart urban spaces will also address aspects that link to the other themes, such as enablers for Smart mobility (e.g. charging units for electric vehicles) or collaborative solutions for Smart buildings that require public space for their implementation.
Today’s reality in Eindhoven

Roadmap light: light and data

- First implementations of smart lighting available, e.g. in Strijp-S

Eindhoven goes Greener
- Eindhoven is creating a greener environment:
  ‘Eindhoven goes Greener’
  -> Garden city

Current satisfaction level of citizens regarding urban spaces: 6.6 (on a scale from 1 to 10)
‘Green and blue’ spaces in Eindhoven 2050

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.

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).

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 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).

- 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 it’s 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.

- 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.
Today’s reality in Forlì

Stefano BAZZOCCHI, Comune di Forlì

Smart Urban Spaces are key elements of a thriving city. Forlì is committed to improving the quality of urban spaces and ensuring their sustainable use in relation to the needs of citizens. The pedestrian areas and recreational areas are two main focus areas in developing smart urban spaces. Key examples of smart urban spaces included places like Parco Urbano (Urban Park), Parco Repubblica (Republic Park) and Piazza Saffi (Saffi Square) with the availability of bicycle paths and public transport connections, bike sharing stations and wifi.

Urban space use is closely linked to urban mobility and cycling paths are of key importance. In Forlì there are 0.87 million users of cycling lanes with a total length of 82.850km.

Bike Sharing Stations, Smart Card for Bike Sharing, the MI MUOVO (I move) integrated regional transport system and the bike Sharing station next to the San Domenico Museum.

Guido da Montefeltro Square in front of the San Domenico Museum - Project to create a green area with pedestrian and bicycle paths

LED lamps in a new urbanisation and in the historic centre
Renewed, thriving city life in Forlì 2050

1. A lively centre in a compact city

In 2050, people in Forlì value a compact, well-planned city with a lively centre. This has regained its primary role as a social, business and residential hub. History and culture are respected, contributing to the attractiveness of the high-quality commercial areas. The city reflects the bold decisions to switch to new (multi-)functional use of buildings and spaces. People initiate and participate in social life and events that bring people of all ages together.

2. High quality of the urban space

In 2050, people in Forlì value healthy, high-quality urban spaces. They enjoy accessible spaces and new, sustainable forms of transport. The city offers many well-connected, well-equipped green spaces that enhance social life. People are digital, environmental and social ‘natives’, who appreciate and take responsibility for their city.

3. Open territorial cooperation

In 2050, people in Forlì benefit from the results of open territorial cooperation that encourages innovation in the use of the urban spaces. Ideas are turned into business, contributing to the city’s economic development. All public and private stakeholders work together to develop and implement new solutions for challenges in environmental resource management and a green circular economy.

Strategic ambitions

- In 2050 the historic city centre looks the same as in 2015, but is at the same time completely different. With respect for the historical and cultural values the town has become resilient to the climate change and courageous decisions were made to change the functional use of spaces and buildings, resulting in a lively city centre where people meet, join and participate.
- In 2050 the city of Forlì is a compact city where spaces are ultimately re-used and fruitful connection is established between private and public property. This is enabled by facilitation, regulation and incentives for people to join actively in the transition of the town.
- In 2050 Forlì has an extremely lively centre, that enables participation and social cohesion initiated by citizens themselves, or facilitated by event organisers. People from the coast come to visit the events in Forlì - enabled by a good mobility infrastructure.
- In 2050 the city of Forlì is more compact. The city is densified, to avoid excessive growth outside the current boundaries. The periphery of the city is preserved for agricultural use. A compact city adds to sustainable use of resources and soil.

Strategic ambitions

- In 2050 the people of Forlì are aware and take responsibility for their city. They are educated to be digital-, environmental-, and social natives, that appreciate sustainability and behave accordingly.
- In 2050 the urban space of Forlì is recovered and the qualitative value of the existing spaces is increased. The community benefits and respects the space by making better use of it. People gather for social meetings in the urban space.
- In 2050 the citizens of Forlì enjoy better and more accessible urban spaces. New ways of sustainable and improved quality transportation are used (e.g. bikes, public transport). The citizens are aware of the impact on their health.
- In 2050 Forlì will have the best air quality of Italy and therefore citizens suffer less from climate change. A micro-climate is developed that is ideal, because it makes use of waste/water/energy (re)generation and only exploits green-energy consuming mobility and systems.
- In 2050 the city of Forlì will have lots of small green spaces & squares that are well-equipped to enhance several types of social activities. New smart technologies are used to enhance this. Green spaces in private buildings (balconies, court yards, etc.) are also well-kept and contribute to the value of green spaces.

Strategic ambitions

- In 2050 the municipality of Forlì operates in a well-connected, cooperative region, where all stakeholders - public and private - join to connect infrastructure and green spaces. Cooperation is established to optimise energy, water and waste management, thus a green circular economy.
- In 2050 technological development & IT integration is developed to promote social cohesion & regional cooperation. In a living lab an integrated system for strategic thinking and cooperation is exploited.
- In 2050 Forlì is world-famous for technologies that were ‘born’ here in local enterprises. Innovative ways of working (e.g. marketing) are applied and contribute to the city as a whole. Young people turn their ideas into business. The city builds on its smart citizens. Good integration of citizens with people from the university and research centre. Forlì is open and connected. Collaboration between public and private sector is enhanced by aligning time-line and through coordination.
Today’s reality in Sant Cugat

The City of Sant Cugat has a firm and consistent commitment to transparency, with the aim of informing and accountability of all the action of government and the municipal administration. For years, the city has been a leader in governance through the Alignment and Strategic Competitiveness Plan (PACTE). With this tool, the city plans and manages its government action, while facilitating accountability and evaluation of public policies. PACTE is also key to the rationalisation of public resources and the reorientation of activities in a complex and changing environment. It is a management model based on budgetary strategy maps and scorecards for use by managers at all levels of the organisation, and defined the strategic objectives of management and functional indicators and values each year, both planned and real.

The vision of Sant Cugat in 2015 is a creative city, a meeting place for people and businesses, knowledge institutions and universities to create synergies that will allow the generation of new ideas that inspire experimentation and innovation. These can be transformed into reality, with the most daring ideas being transformed into value for the city and country.

Entrepreneurship, a magnet for people, organisations and companies that promote innovation and research without fear of the effects of change on citizens while businesses can prosper with a global approach to services, a highly skilled and qualified labour force and optimum territorial infrastructure. This creates socially responsibility, an accessible city that is inclusive, safe and has an attractive environment. A city in which people regardless of age, origin and social status find their space for participation and coexistence. The urban quality leader active in maintaining public spaces and providing services for citizens by reducing their carbon footprint in line with its commitment to the sustainability of the planet. Projection International will be recognised internationally for its contribution as a model for quality of life and wealth generation.
High-quality environment for well-being in Sant Cugat 2050

1. Citizens engage in urban planning, use and maintenance
   In 2050, citizens of Sant Cugat value engagement in the planning, use and maintenance of their living environment. They are empowered by the democratic processes and smart information systems.

   Strategic ambitions
   - In 2050 the citizens of Sant Cugat are 100% smart citizens.
   - In 250 the Sant Cugat urban space (design, use and maintenance) is driven by the citizens, using the advise of seniors and innovative minds of students, who are empowered by democratic administrative processes and using information systems to take evidence based decisions.
   - In 2050 the citizens of Sant Cugat feel responsible for the urban space, in the sense of sharing, water use and maintenance of the greenery.

2. High-quality, healthy living environment
   In 2050, citizens of Sant Cugat value engagement in the planning, use and maintenance of their living environment. They are empowered by the democratic processes and smart information systems.

   Strategic ambitions
   - In 2050 the city of Sant Cugat offers an healthy environment with mobility solutions that avoid air pollution and noise, and enable the creation of multifunctional use in urban spaces.
   - In 2050 all mobility in Sant Cugat is low carbon (mobility in general).
   - In 2050 the citizens of Sant Cugat enjoy a city free of noise and stress, a healthy, clean and green environment that consists of an ecological system that maintains itself with a minimum level of intervention. The ecosystem connects green areas and contributes to a good living (micro-) climate with a balance between ‘controlled’ parts and real nature, allowing a mixed use of urban space and nature.

3. Circular systems for water, waste, energy and food
   In 2050, the eco-strategic city of Sant Cugat values a circular system for water, waste, energy and food. The system matches local supply and demand by efficient management for maximum re-use of resources.

   Strategic ambitions
   - In 2050 Sant Cugat is an eco-strategic city, where all needs (e.g. local food, water and energy) are available within a 0-kilometer range and the urban landscape is of high quality (e.g. by distribution of the greenery and trees).
   - In 2050 all Sant Cugat municipal services are managed through the city control centre, enabling more efficiency and quality and adaptation to the real needs of the people and the town.
   - In 2050 sustainable energy production will be decentralised and will cover the demand, also re-use of water and organic waste to achieve circular systems, through enabling functional solutions and new business models (to foster closed loops).
Common and specific ambitions

During the Joint Ambition Workshop on 19 October 2015 in Palermo the cities shared and discussed their ambitions for Smart Urban Spaces.

One of the elements of the discussion was to identify the aspects of the ambitions that are common to all cities, and those that are specific for one or more cities only.

The results of this discussion is used to update the description of the focus area for further use in the R4E project.

Common aspects

- Citizen engagement
- Stakeholder involvement (business, university, citizens, administration)
- Sustainable transport for achieving healthy living environment
- Environmental resources for circular systems (water)
- Liveable urban spaces (social and environmental)

Specific aspects

- Reorganising the functionality of the city centre to make it more liveable (Forlì)
- Use of open data: city control centre for efficient management of the city (Sant Cugat)
- Use of technology to improve the circularity of water and waste (Eindhoven)

Joint ambition for Smart Urban Spaces

The Smart Urban Spaces theme focuses on sustainable energy solutions for public spaces, where multiple functions and activities physically come together. The ambition of the cities is to create liveable urban spaces by engaged citizens and involvement of all stakeholders. Circular systems contribute to smart use of resources. Sustainable transportation solutions enable the achievement of a healthy living environment.
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APPENDICES

Appendices are published as separate reports.

A - Ambitions of Eindhoven
B - Ambitions of Forli
C - Ambitions of Istanbul
D - Ambitions of Murcia
E - Ambitions of Newcastle
F - Ambitions of Palermo
G - Ambitions of Sant Cugat
H - Ambitions of Tallinn
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This report contains the results of the Ambition Setting (WP1) activities. For this purpose Ambition Workshops were held in each partner city. The goal of these workshops is to define the strategic ambitions for energy related themes in general and for the selected focus areas Smart Buildings, Smart Mobility and Smart Urban Spaces specifically. Workshops were conducted with policy makers, strategy departments, integral project managers, department managers and external stakeholders and strategic partners to gain a deep understanding of the ambitions and specific context of the city. Furthermore a Joint Ambition Workshop was held in Palermo to share the ambitions and enable cross-city learning.

This report is the deliverable of WP1 of the Roadmaps for Energy (R4E) project. The R4E partners work together to develop a new type of energy strategy through visions and roadmaps for the 8 partners cities, in co-creation with local stakeholders. The project supports the development of visioning and roadmapping capacities within the municipalities to spur future development and implementation of innovative energy solutions.

AMBITION SETTING

D1.1 Report - Specific ambitions of the R4E partner cities