Smart City **Wien**

Framework Strategy

City of + Vienna

Smart City **Wien**

Framework Strategy

Our city has been smart for several generations. Far-sighted, intelligent solutions for its daily life have made Vienna the city with the highest quality of life worldwide. This is clearly borne out by its drinking water supply or social housing construction activities. However, to maintain this high quality of life against the background of restricting conditions, it is necessary to strive for constant self-analysis and the development of new and innovative solutions – in brief: to reinvent oneself continuously, especially as climate change and increasingly scarce resources call for novel global approaches.

With the Smart City Wien framework strategy, Vienna is charting its course towards becoming a "smart city". This is a course that differs from the strategies of other cities in one key respect: Vienna will not let anybody down. For Vienna, the integration of the social component into all areas is an essential element of its framework strategy. Climate-related and ecological objectives and the improvement of the everyday realities of its citizens are assigned the same importance in Vienna. Cities are smart if all people living in them have access to the same degree of participation.

The Smart City Wien framework strategy constitutes a milestone in the future development of the Austrian capital – a strategy designed to ensure that all Viennese will continue living in the world's most liveable city even in the coming decades.

Dr. Michael Häupl
Mayor

Mag.ª Maria Vassilakou
Executive City Counsillor for Urban Planning, Traffic & Transport, Climate Protection, Energy and Public Participation

Foreword
The **Smart City Wien**
Initiative

Vienna is a fantastic place to live and work in. The city is growing, and so are its opportunities. This growth is based on several strong factors, beginning with the city's company structure and educational sector and including an intact environment and ample green spaces. On the international scene, Vienna moreover scores with its public transport network, extensive social housing activities and social services that are available and affordable for everyone. All these things are to be further developed, both in quality and to meet the needs of a growing city.

However, we do not want to attain these objectives by further raising the consumption of the resources needed in the future as well. This concerns first of all fossil fuels, which our current lifestyles and economies still manifestly rely on. They are not infinitely available, entail dependencies and contribute significantly to climate change as well as to its immense consequential costs, which we all will have to bear.

Our future will be designed in the cities. Traditionally, cities have been places of major changes and social innovations; they are home to the majority of the world's population and offer great opportunities for a novel way to deal with resources. A smart city is a city that faces the challenges in the wake of decreasing resource consumption combined with rising demands. However, a smart city will also strive for a high degree of social inclusion. In our opinion, a smart city needs to opt for resource preservation while ensuring high quality of life combined with innovation in all fields.

In Europe as well as worldwide, Vienna is considered a forerunner smart city. For many years, we have done many things right – in transport, housing, urban development, environmental protection, supply and waste management services. Across the world, Vienna is respected for its success in the field of social participation and its high standard of services for the public.

The big Smart City Wien Initiative was launched in 2011 under the aegis of Mayor Michael Häupl. Based on a broad stakeholder process and many approaches derived from different areas of action of the Vienna City Administration, the development of the present strategy was begun in 2013. All Executive Policy Groups as well as numerous experts have contributed to this document. At the same time, there is an intense exchange of experience with other European cities that likewise aspire to meet smart city goals.

Thus Vienna's Smart City strategy is characterised by both an internal effect to render existing plans even more ambitious and to inspire new ideas. At the same time, its external effect is to create an international frame of reference for what is happening here and to generate publicity for Vienna's aims.

The present document is a framework strategy: its time horizon extends to 2050, since the necessary and often fundamental changes in the fields of energy, mobility or construction cannot happen overnight. The thematic arc stretches from the future of Vienna as a hub of research and business to the preservation of all-important social achievements. Concrete methods of application must still be developed in many areas – but the direction is clear: Vienna wants to reduce its resource consumption notably. At the same time, the city intends to continue offering all citizens maximum quality of life, safety and security. These challenges can be met if we tackle change actively und make Vienna a place that fosters innovation even more than it does today.

Table of contents

Vienna's strength stems from far-reaching infrastructure-related decisions

These developments have marked Vienna and permit us today to move into the future from the very high level of the present. A few outstanding examples bear ample proof of this:

Social housing construction – both municipal and non-profit – has produced more than 400,000 high-quality dwellings distributed all over the city. This contributes significantly to a good social mix and affordable housing costs for all.

Public transport is highly developed and makes it possible to quickly reach almost all parts of the city. Inexpensive fares and excellent reliability as well as quality ensure high acceptance levels.

Vienna's water is of supreme quality for a metropolis. The outstanding security of supply and high efficiency of drinking water distribution are outcomes of hard work and sustainable investments made by the City of Vienna for over one century. The amount of Euro 30 million is invested annually in Vienna's water pipe network   a boon for all Viennese.

The waste disposal structures of the city, including wastewater purification, waste treatment, waste separation or cogeneration, i.e. combined waste incineration and heat generation, are considered models of good practice by many other cities.

Vienna is a dense city – and at the same time manages to keep its share of green spaces at 50%. Large-scale structural decisions such as the preservation of the Vienna Woods or the creation of Danube Island have combined environmental quality with attractive leisure options and – in the case of the training of the Danube – have protected the city against flooding.

This shows clearly that a strong municipal policy and far-reaching investment decisions are certainly worthwhile.

Introduction: **Smart City Wien** – Guidelines for the future

Cities have always been the engines of processes and changes in society. Likewise, they have always been at the origin of social innovation. Cities provide space and inspiration for new and different developments for individuals of diverse backgrounds and educational attainments and with varying needs. This is a task that requires constant redefinition.

To safeguard a socially and environmentally acceptable development for the future and to protect the national and international competitiveness of the Austrian capital, the long-term Smart City Wien framework strategy lays down ambitious objectives. The strategy focuses on the intention of preserving and further evolving the city as a liveable, socially inclusive and dynamic space for future generations. The Viennese smart city approach is based on sparing resource use in order to massively reduce CO_2 emissions[1] and dependencies in connection with scarce and finite resources. At the same time, Smart City Wien means to uphold and further increase Vienna's high quality of life and social participation. Ultimately, Smart City Wien stands for change based on innovation, active organisation and, where necessary, the development of new forms of public and private service delivery.

The present Smart City Wien framework strategy is directed at all target groups of the city: Vienna's citizens, enterprises, non-profit institutions and, last but not least, the public sector itself. The strategy and the actions deriving from it are moreover to deploy a strong external effect: Vienna positions itself as a responsible and impulse-generating metropolis in Europe and in the world at large.

[1] In the following, the terms "CO_2" and "CO_2 equivalents" are used synonymously for reasons of simplicity. The CO_2 equivalent value describes the greenhouse gas potential of a gas as compared to CO_2 over an observation period of (mostly) 100 years. In 2009, 94% of all greenhouse gas emissions (expressed in CO_2 equivalents) in Vienna were due to CO_2; only 6% resulted from methane, nitrous oxide (laughing gas) and fluorinated (F) gases.

Vienna has chosen the right track and pursues this approach systematically.

Vienna is an extremely liveable city. In the opinion of many, no city boasts higher quality of life. Corresponding international studies[2] underpin this with evidence taken from all areas of life – from infrastructure or green spaces to educational facilities, from services of general interest to good neighbourly relations, gender equality, safety and security in the city.

This superlative quality of life is largely due to the fact that the city has always known how to change and reinvent itself. Examples of this are the big Gründerzeit construction push with its infrastructure facilities and buildings that characterise Vienna to this day, the municipal housing projects of the interwar period, the gentle urban renewal approach since the 1970s and the renewed flourishing of the city after the dismantling of the Iron Curtain in 1989. Vienna has taken far-reaching "smart" decisions already several times in the past (page 10).

Today the federal capital of Austria is about to take the next big step towards change. This concerns the city's contribution to the most far-reaching (and anthropogenic) challenge we are faced with in our time: climate protection is a task for everyone. To attain it, we must largely abandon fossil fuels by means of a long-term, gradual process and substitute them by other, more sustainable forms of energy, conversion technologies and services.

Smart City Wien comprises first and foremost the aim of **resource preservation**. Development and modification processes in the sectors of energy, mobility, infrastructure and building management are to dramatically reduce CO_2 emissions by 2050. For this purpose, it is essential to make much more efficient use of the required input energy. It is the first big task of the present Smart City framework strategy of the City of Vienna to highlight ways and means in which Vienna can contribute to the attainment of the major European climate and energy objectives (for 2020, 2030 and 2050). Potentials towards these goals still exist to a high degree, although Vienna, due to ambitious plans and decades of consistent action, has already achieved much in the fields of climate and environmental protection. However, the responsibility for future generations above all motivates us to continue our pursuit of ambitious goals in the context of the EU energy and climate objectives for the period until 2050.

[2] Inter alia: Mercer "Worldwide Quality of living Survey", Smart City ranking by Boyd Cohen, UN-HABITAT – United Nations Human Settlements Programme "State of the World's Cities 2012/2013".

European energy and climate objectives

20-20-20 targets of the European Council for 2020 (2007)

The European Union has set itself ambitious goals in the fields of energy and climate policy: the "20-20-20 targets" obligate EU Member States to reduce greenhouse gas emissions by at least 20% from 1990 levels by 2020, to improve energy efficiency by 20% and to attain a 20%-share of EU energy consumption produced from renewable resources.

Proposed 2030 goals of the EU

In January 2014, the EU Commission submitted its proposal for the energy and climate goals for 2030, which was seconded by the European Parliament. Accordingly, the EU wide CO_2 emission volume is to be reduced by 40% from 1990 levels by 2030. It is likely that national goals will be proposed to define the CO_2 emissions reduction for each EU Member State. At the same time, the share of renewable energy is to be increased to 27% (proposal by the EP: 30%) across the EU. For energy efficiency, which is to be improved by 20% by 2020, the new goal of 30% by 2030 has been proposed.

2050 objective of the EU heads of state and government

In late October 2009, the EU heads of state and government – together with all other industrial nations – unanimously supported an EU objective to reduce greenhouse gas emissions in the EU by 80 to 95% as compared to 1990. According to scientific findings, this reduction is essential to limit global warming to less than two degrees centigrade ("two-degree objective"), as it is assumed that any value above this threshold will result in uncontrollable consequences of climate change.

If correctly implemented, any success relating to climate protection in the fields of transport, housing and production has direct effects: the cost of energy is reduced, while energy security is improved. The results are more green spaces, cleaner air, more liveable neighbourhoods, shorter distances and easier accessibility plus a more varied and affordable range of public spaces and public services. However, this also means greater codetermination options for Vienna's population. The further increase of the **quality of life** is a second objective that is given as much importance as sparing resource use: in environmental protection or healthcare, Vienna can build on already very high standards. The relevant political decisions were and are significantly derived from the principle of social inclusion. The creation of affordable and attractive housing, the provision of low-cost and resource-conserving mobility and the financing of services of general interest are only a few examples of the implementation of this principle in reality.

But the City of Vienna is also taking very intense efforts to further equal opportunities. The city belongs to women as much as to men, and all social groups are thus called upon to participate in shaping our society. For Vienna, the three central strategies to attain this goal are the advancement of women and their rights, gender mainstreaming and gender budgeting. A key precondition for safeguarding the same opportunities of self-realisation for both women and men lies in their equal participation in social and political decision-making processes. Another special feature of Vienna stems from the fact that gender mainstreaming is made part and parcel of the city's development as a cross-cutting principle.

Many changes can be implemented quickly, while other processes may require decades: what are our means of transport, how do we communicate, what heating systems do we need? We can certainly only imagine part of the possibilities that will be available to us in coming decades. However, we do know that Vienna is able to develop technically, organisationally and socially exemplary solutions. In view of the huge challenges, it is better to advance the necessary changes proactively and benefit from them both economically and as a society. To reduce resource use as planned while maintaining or even improving the quality of life, **innovation** is the third major approach pursued by Vienna's Smart City framework strategy. As a smart city, Vienna boasts a dynamic economy, boosts information and communication technologies, assigns very high priority to education and, last but not least, defines itself as a first-rate research hub. It is a central concern of Vienna to transform challenges into opportunities – for Vienna's enterprises, for its residents' career prospects and for good neighbourly relations between all citizens.

A "smart city" also means social inclusion: Vienna takes account of the needs of all residents!

Any city that utilises the smart city concept as a metaphor for processes of change defines it in its very own way. While some cities focus above all on the implementation of technological possibilities, others aim mainly at the reduction of emission levels. Conversely, Vienna continues its chosen and successful road by following several objectives concomitantly and favours social inclusion even more than in the past. Vienna can only be smart if …

… the needs of many different population groups can be met: Smart City Wien means recognising this diversity. The city and its institutions will continue to make sure that processes of change will be socially balanced, that disadvantages will be compensated as far as possible, and that the high level of social security will be maintained.

… high quality of life is possible also for persons with lower incomes: Smart City Wien means a superlative standard of public services, affordable housing and public transport, spacious and publicly accessible green and leisure spaces, a highly developed healthcare system and many other things. The further development of Vienna equals development for all and is to be perceived as such by all citizens.

… codetermination and participation shape the development of the city: Smart City Wien means creating space for locally fine-tuned solutions and self-initiatives as well as the possibility for citizens of having a say in the development of their city.

… innovations and progress have a social component: finally, Smart City Wien means fostering what is new. While this often involves technological novelties, social innovations too, are increasingly coming to the fore. Contrary to purely technological developments, these are more strongly inspired by the needs of citizens, rest on a broader basis and take particular account of the interaction of different individuals and organisations.

Our ability to master the future can only be safeguarded if the necessary processes of change enjoy wide support. All cities today are facing major challenges. For Vienna, the crucial point lies in the fact that these changes will entail further improvement of the living conditions of all parts of the urban population. The leitmotif of this is Vienna as a social city that supports all persons in their effort to live a good life.

As a smart city, Vienna must also be resilient and hence robust, flexible, adaptive and able to react quickly and in keeping with the challenges when faced with internal and external influences. In this, resilience is strongly dependent on the availability of room to manoeuvre, on the possibilities for self-organisation or for re-organisation of economic and social systems, on social coherence, on the competencies of residents and on a flexible and innovative administration.

The three major sets of goals – resource preservation, quality of life and innovation – are closely interlinked. Vienna wants to maintain its excellent position in the international competition of cities, although it is not enough to hold a top position regarding only one of these sets. Vienna maintains a close dialogue with leading cities in Europe and worldwide on promising approaches. The Viennese approach will be very special!

It is thus the key goal for 2050 of Smart City Wien to offer optimum **quality of life**, combined with highest possible **resource preservation**, for all citizens. This can be achieved through comprehensive **innovations**.

The present framework strategy describes the key goals and principal approaches chosen to attain them. It represents guidelines for the numerous important specialised strategies of the city that define concrete multiyear plans for such areas as urban planning, climate protection, the future of energy supply or Vienna as an innovation hub. In this, the framework strategy poses a twofold challenge: first of all, how can the goals be gradually rendered more and more ambitious despite the demanding practical and financial frame conditions? And, secondly: how can policy and change processes be designed in an even more cross-cutting, multi-sectoral manner?

A cross-cutting concept also underpins the following Smart City Wien 2050 (page 19) vision embraced by the city.

Quality of life
Social inclusion, participation
Healthcare
Environment

Resources
Energy
Mobility
Infrastructure
Buildings

Innovation
Education
Economy
Research, Technology and
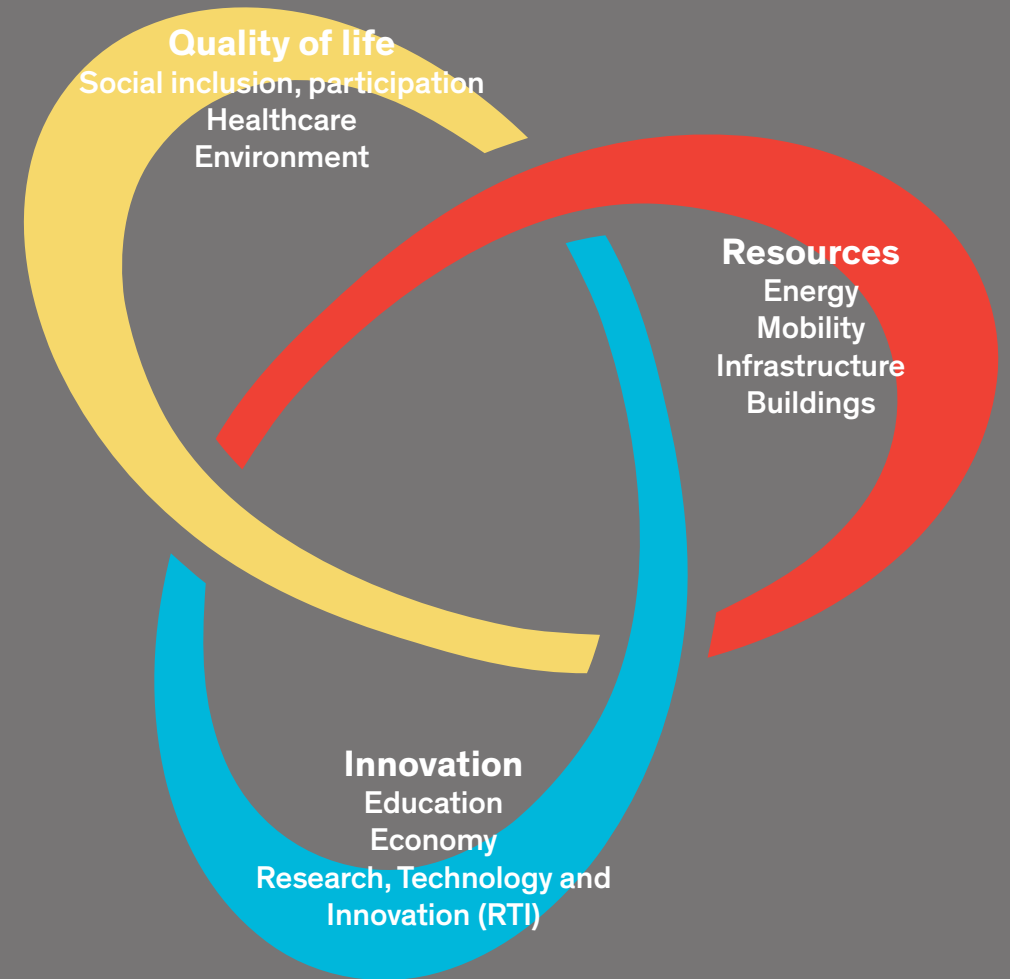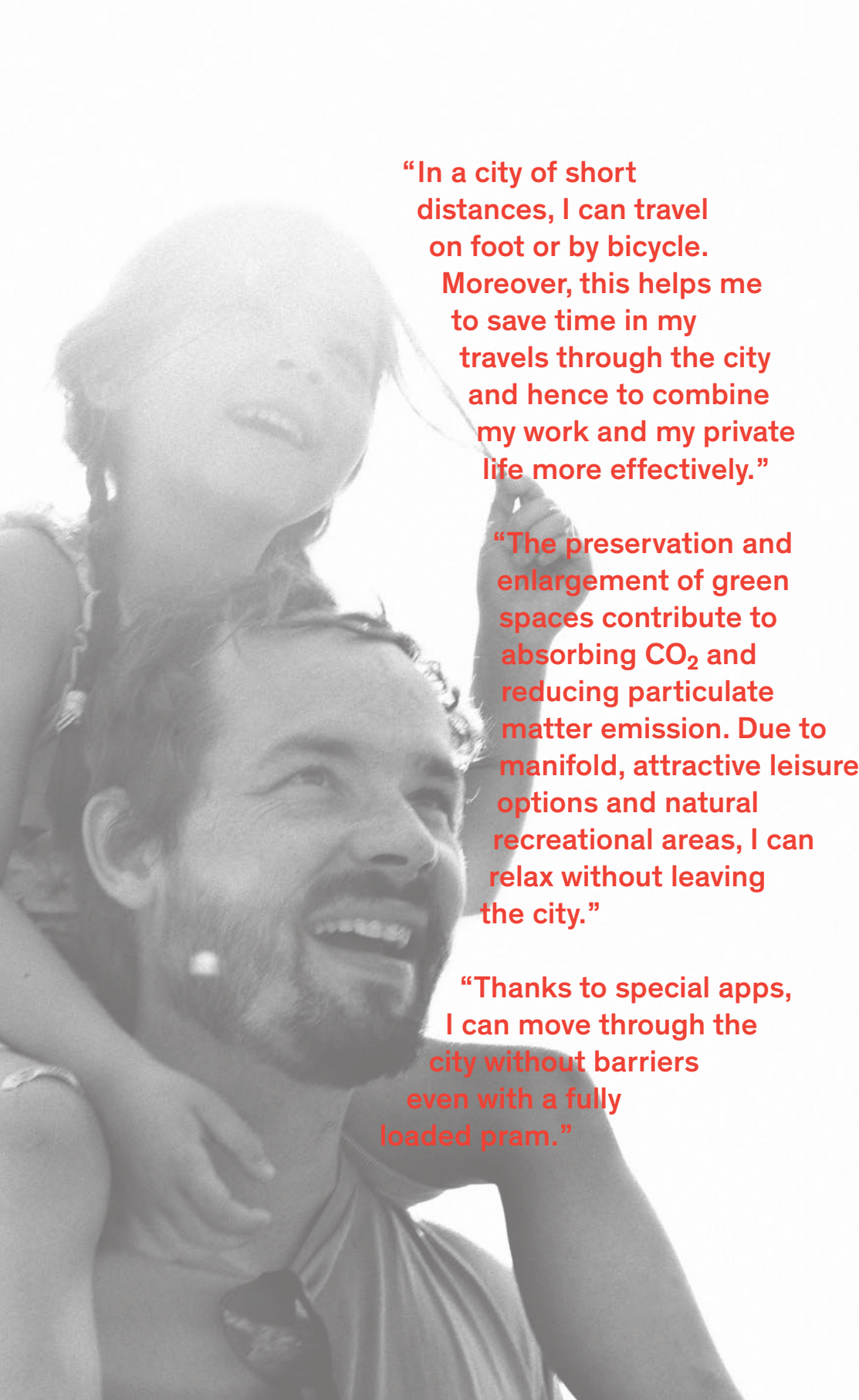Innovation (RTI)

Fig. 1   The Smart City Wien principle*

"In a city of short distances, I can travel on foot or by bicycle. Moreover, this helps me to save time in my travels through the city and hence to combine my work and my private life more effectively."

"The preservation and enlargement of green spaces contribute to absorbing CO_2 and reducing particulate matter emission. Due to manifold, attractive leisure options and natural recreational areas, I can relax without leaving the city."

"Thanks to special apps, I can move through the city without barriers even with a fully loaded pram."

2 The Smart City Wien 2050 vision

In 2050, Vienna is a vibrant metropolis and one of Europe's most attractive cities. This position is based on strategically planned, long-term measures of the city, which over the first half of the 21st century have led to a noticeable improvement in all fields of life: quality of life, sustainability, prosperity as well as quality and quantity of educational options and workplaces. Together with other leading cities of Europe, Vienna generates impulses and impacts European policy.

Vienna is a liveable city for children, young people, women and men, elderly persons, families, entrepreneurs, artists, researchers, persons with special needs – in short: a city that is open to all, no matter how long they have been living here.

Vienna is recognised worldwide for the deeply entrenched yet uncomplicated way in which it accords ample **possibilities of participation and codetermination** to all parts of the population. Citizens take active part in developing their city. There are many ways of participating: everyone has the possibility of voicing, discussing and implementing their own ideas and opinions regarding the city.

In a unique manner, Vienna offers **affordable quality of life** as well as spacious, easily accessible leisure and green spaces "around the corner" and allows for individual recreational activities. Social justice is a key principle and lays the basis for comprehensive services of general interest in Vienna. The urban structure and municipal services of Vienna generate a feeling of safety and security in the city.

Art and culture are crucial drivers of society and constitute an integral element of Smart City Wien 2050.

At any moment, the Viennese population may draw on numerous combined offerings and joint riding options for time-tried and **innovative means of transport** to meet their mobility requirements; these means of transport also open up new economic opportunities and leave ample leeway for creative development. Movement in the city is characterised by resource preservation and respect for public space, which has been gradually recovered by the residents. As a result, Vienna's inhabitants experience quality of life based on low noise levels and clean air in the city – day after day.

The conscious and sparing use of resources coupled with innovative solutions allows for maximum security of supply. For this reason, the further development of district heating, which in Vienna is largely produced from waste heat, is given particular importance. Renewable sources – e.g. from geothermal energy and low-temperature waste heat – must be developed to step up district heating. In addition, Vienna's energy requirements are met to a large degree by renewable sources. The use of state-of-the-art technologies and high environmental and energy awareness underpin the actions of private households, the municipal administration and enterprises in Vienna, with decentralised renewable energy supply in urban quarters suitable for this purpose playing an important role in this context.

Efficient, intelligent networks and useful information systems facilitate life in the city all around.
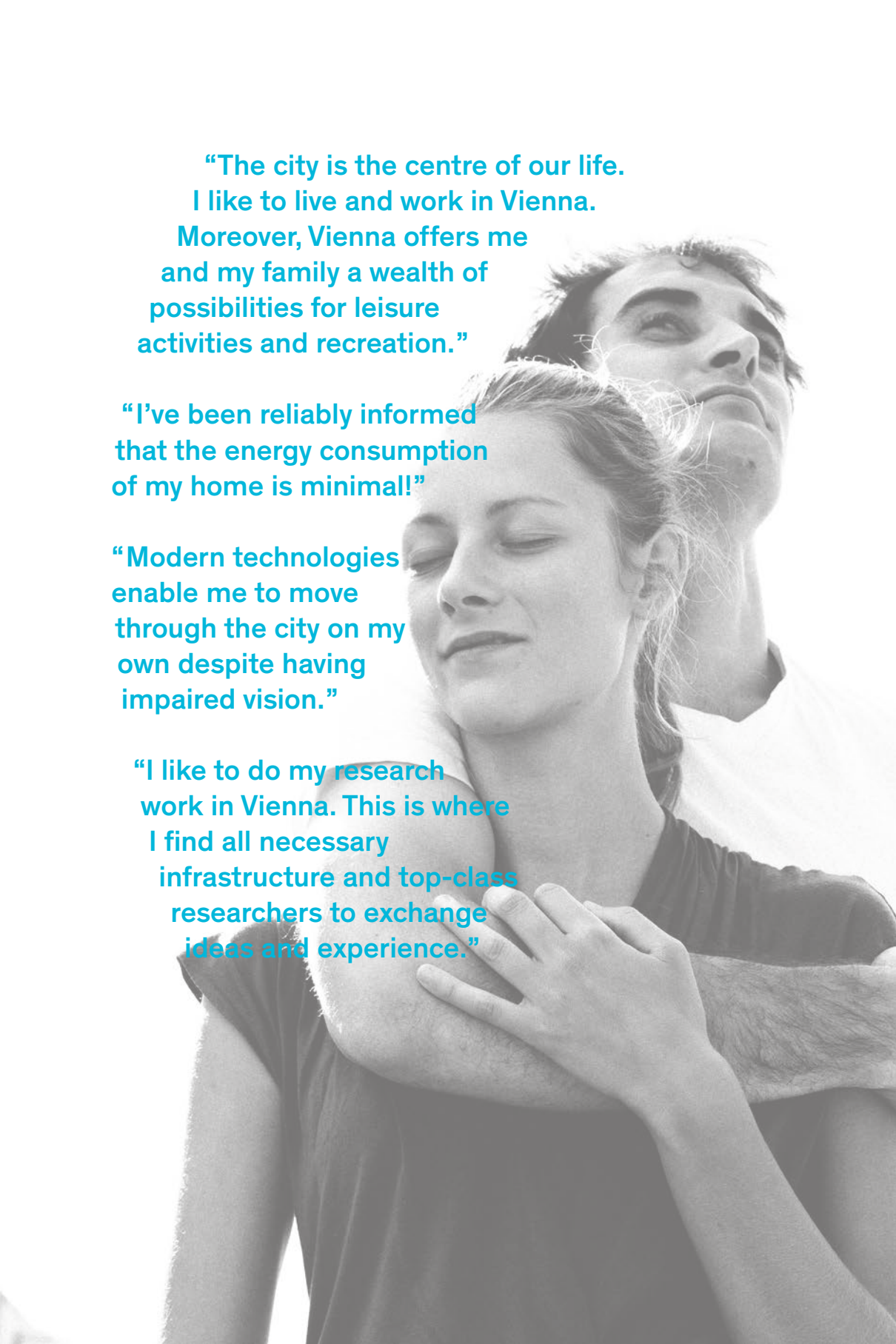
Vienna combines history and tradition with a modern, redesigned urban environment. The "second Gründerzeit" period in the 21st century provides impulses for **striking new developments in the fields of architecture,** design and sustainability. At the same time, the Viennese are proud of their multifaceted neighbourhoods scattered all over the city. These urban subcentres make for short distances regarding supply and services. People enjoy the wide range of available offerings and appreciate the excellent range of goods and services as well as the manifold possibilities to shape their own city, which actively supports their everyday life in multiple ways, thereby safeguarding equal opportunities for all.

"Information and communication technology simplifies my life and enables me to handle transactions anywhere and anytime at my leisure; moreover, I can use ICT to continue my professional education from home."

"The latest research findings generate new technologies and processes for even more sparing energy consumption."
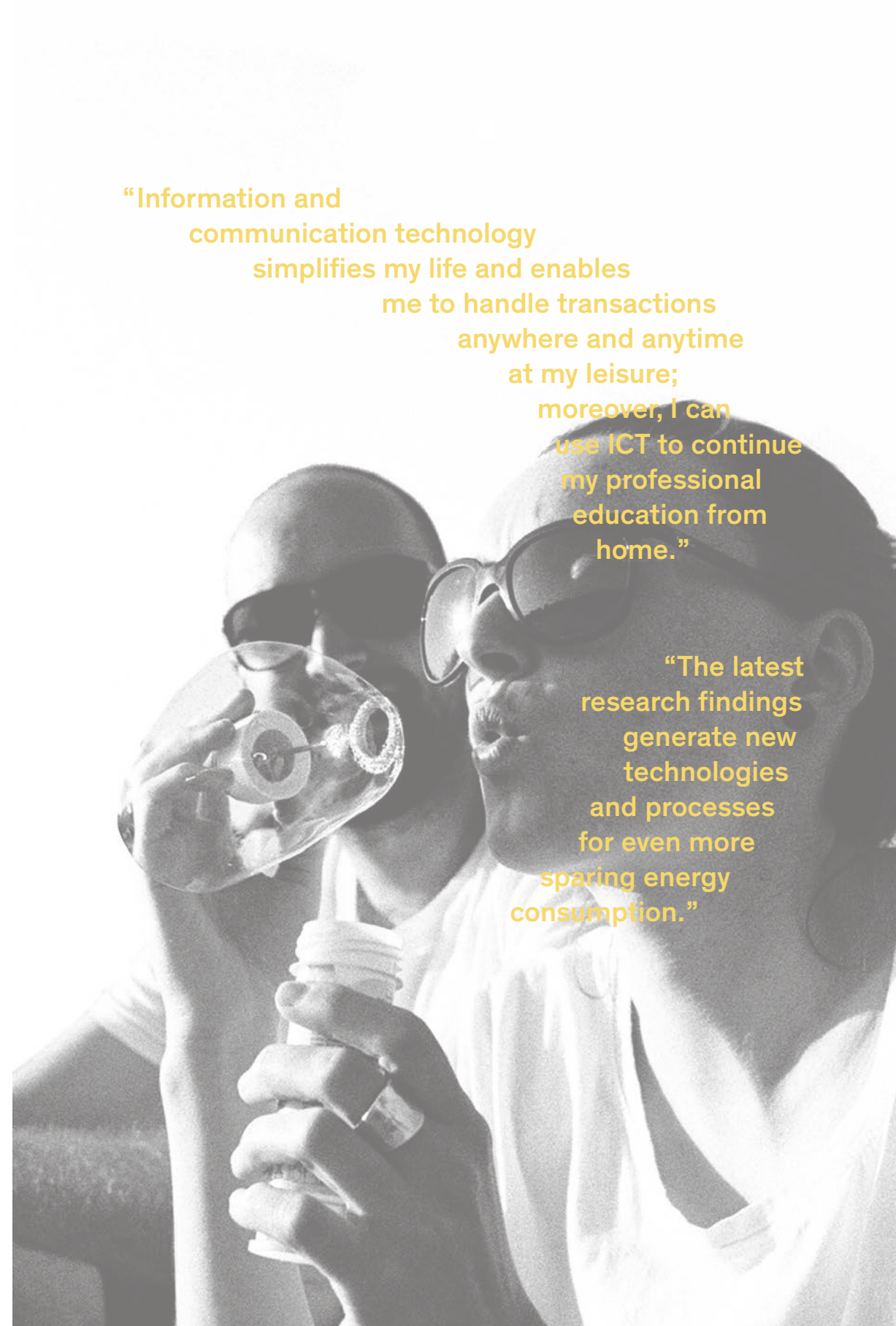
"The city is the centre of our life. I like to live and work in Vienna. Moreover, Vienna offers me and my family a wealth of possibilities for leisure activities and recreation."

"I've been reliably informed that the energy consumption of my home is minimal!"

"Modern technologies enable me to move through the city on my own despite having impaired vision."

"I like to do my research work in Vienna. This is where I find all necessary infrastructure and top-class researchers to exchange ideas and experience."

For students, teachers and researchers, Vienna is a **Central European capital of research and hence** an attractive location and hub. Vienna maintains a lively exchange of knowledge and thought with other important international centres of research. All these developments are based on outstanding educational possibilities.

Vienna's prosperity stems from a **strong economy** that is steeped in the efficiency of the producers of goods and services and their workers. Entrepreneurs develop creative ideas and implement them successfully. Partly also due to the use of cutting-edge information and communication technologies, this opens up a multifaceted work environment that reacts to numerous interests and skills of both women and men and generates a sufficient number of workplaces designed to enable workers to combine career and family. Vienna's economy is thriving and generates a wealth of innovations. Viennese know-how, products and services in such areas as energy, mobility, sustainability, healthcare and many other segments are exported all over the world.

Vienna's population lives in a **smoothly functioning metropolitan region.** This is possible because the environs of the Austrian capital are actively involved and because new forms of co-operation, e.g. in mobility, housing, spatial development and energy supply, are made use of.

Vienna embodies quality of life at the very highest level.

This image of Vienna in 2050 can indeed be attained. The basis for this must be laid today and through decisions that are taken in a spirit of responsibility, day after day, by everyone in Vienna.

3 Vienna: status quo

Vienna enjoys a very good starting point for becoming a smart city. The Austrian capital differs from most other metropolises through its good performance in so many areas: housing, public transport and other infrastructure services (e.g. waste separation, Spring Water Mains), education and universities as well as vast urban green spaces. All this contributes towards high quality of life. In 2011, Vienna took the top place in the first international smart city index[3]. In 2012, Vienna kept a very good place (4th), followed by third place in 2013. Other studies[4] document Vienna's strong and enviable position on the international scene, as the Austrian capital continues to keep its worldwide top rank.

At the end of 2011, it was possible to avoid the production of 3.7 million tonnes of CO_2 since 1990, partly due to the Climate Protection Programme of the City of Vienna (KliP). Internationally, this means a very good position for Vienna. Between 1990 and 2010, the CO_2 emission level[5] in Vienna decreased by 21% per capita and by 10% in absolute figures. This result was inter alia attained by upgrading the district heating network, improving thermal building standards (both in building rehabilitation and new structures; Vienna is the city with the highest number of passive houses) and doubling the share of energy from renewables from 5% in 1993 to 11% in 2011. Above all, however, greenhouse gas reduction was supported by the strong growth of public transport (from 29% in 1993 to 39% in 2013) and bicycle traffic (from 3% in 1993 to 6% in 2011).

Vienna may rely on a dense network of scientific institutions, centres of excellence and university facilities, which include ten state-owned universities with very different profiles, several universities of applied sciences plus a number of private universities and, in particular, many non-university research institutions. Vienna's universities alone generate a value added of Euro 2.3 billion annually.[6] Close to 35% of Austria's R&D spending is invested in Vienna.[7] This trend, which has progressed very dynamically especially over the past decade, has resulted in a specific status assigned to science, research and innovation for urban development.

Vienna is characterised by a strong administration and high social responsibility. Many areas of human life are covered by enterprises and companies of the City of Vienna, e.g. housing (wiener_wohnen - Vienna

3   Boyd Cohen, Global Ranking 2011.
4   Mercer Survey, UN-Habitat, etc.
5   Evaluierung der Umsetzung des Klimaschutzprogramms (KliP II) der Stadt Wien, 2011.
6   Dritter Bericht des Beauftragten der Stadt Wien für Universitäten und Forschung.
7   Data: Statistics Austria 2011

Fund for Housing Construction and Urban Renewal), Vienna Water, the hospital sector and Vienna Public Utilities, which provides mobility and energy services through Wiener Linien, Wien Energie and Wiener Netze. It is definitely the political strategy of Vienna to keep the reins on the infrastructure required to deliver basic services.

The city regularly evaluates its quality of life,[8] a field in which the Austrian capital holds a special position at a European scale. This is not only expressed in annual international rankings but also reflects the opinion of Vienna's population. Surveys show that the manifold urban leisure and cultural activities, the environmental quality – which is high for a metropolis this size –, the ample social facilities and services for the population and the wide range of publicly subsidised housing options are particular assets of Vienna and contribute to its good image overall. A comparison with German and Swiss cities shows moreover that Vienna scores best in related issues concerning e.g. employment and housing opportunities, provision of social and nursing care services, public transport or environmental quality. Although Vienna is compact and Austria's smallest federal province by far, more than 50% of its territory is covered by green spaces. Vienna has launched environmental initiatives at a very early date and continues to pursue this approach. This is reflected in the field of ecology, which aims for close co-operation between science, public administration and business and presents tight collaborations between municipal administration and universities.

But Vienna wants to further fine-tune this balanced development and may rely on a very strong base towards this goal.

[8]   Studies "Leben in Wien" (1994 and 1995), "Leben und Lebensqualität in Wien" (2003), "Wiener Lebensqualitätsstudien" (2008 and 2013).

4 What challenges does Vienna face today?

More than ever before in human history, the 21st century is and will be the "century of cities«. The traditional role of big cities as drivers of scientific, technological, cultural and social innovation will continue to grow. Strong metropolises serve a decisive formative function regarding the main issues of tomorrow. Since time immemorial, cities have been the hubs of innovation, and this trend will increase further. Immigration and growth will continue in huge dimensions in the mega-cities of Asia, Africa and Latin America. As the example of Vienna shows, many European cities, too, present high dynamism that must not merely be mastered but rather should be viewed as an opportunity.

In this context, the Smart City framework strategy should thus be understood as follows: what will Vienna do to tap the opportunities of change and dynamic growth? How can we position ourselves as a venue of innovation and new solutions?

The resource issue is even more strongly contingent on cities, as energy consumption, CO_2 emissions, mobility patterns and hence quality of life of their citizens are at the centre of attention. The advantages related to short distances and spatial compactness are juxtaposed with challenges that result from rising consumption volumes as much as from the difficulty of contributing to changes in established technologies and lifestyles of various population groups.

Vienna boasts a long-standing tradition of resource conservation and protection. Instances of this are the impressively high share of public transport, the ramified district heating network with its cogeneration and waste incineration installations or numerous examples of resource-conserving production in Vienna's industrial plants.

However, Vienna also must cope with specific challenges that stem on the one hand from urban growth and on the other hand from necessary processes of change. Examples in this context comprise the further restructuring of energy systems, the organisation and financing of building rehabilitation including thermal rehabilitation as well as changing demands made on the mobility system, which is marked by a steep increase

in the shares for walking and cycling. Better fine-tuning of processes between city and surrounding region is another challenge for the future.

Although the excellent status quo of Vienna actually renders further improvements somewhat more difficult, the Austrian capital is firmly committed to the EU climate change objectives for 2030 and 2050 and wants to make the best possible contribution towards their attainment. However, it is equally clear that the goals formulated below cannot be fully achieved without corresponding frame conditions laid down by third parties (Federal Republic, EU). This includes the safeguarding of funds for specific climate protection measures in Vienna. Vis-à-vis the Federal

Republic of Austria and the European Union, Vienna will therefore advocate frame conditions that duly support the attainment of these goals.

The interaction of the three dimensions of Smart City Wien shown below – i.e. resources, quality of life and innovation – and the three interlaced superordinate goals allow for balancing the various needs and approaches and avoiding overly costly or biased and hence excessively risky strategies. Chapters 6 to 8 will specify how these objectives of **resource preservation, quality of life** and **innovation** are formulated in greater detail.

The special thing about Vienna's Smart City Framework Strategy lies in the fact that the aspects of **social inclusion** are considered essentialfor all three dimensions.

Fig. 2
The three dimensions of Smart City Wien

Quality of life
Three impulse generators formulate Vienna's specific approach to becoming a smart city. Vienna strives for optimum quality of life combined with the attainment of the necessary resource-related objectives. In this way, Vienna builds on existing strengths in the areas of **social inclusion, healthcare** and **environment.**

Resources
To be able to attain the ambitious goals of Smart City Wien as a resource-conserving forerunner city, politics and administration are committed to setting important steps in the core areas of **energy, mobility, buildings** and **infrastructure.** This comprises issues pertaining to energy systems, energy generation, pre-existing and new city quarters, future means of transport and the use of pioneering information and communication technology. The core areas form the main focus of the strategy, since they are primarily decisive for the question of resource preservation but also have a strong impact on quality of life and innovation.

Innovation
Three other impulse generators are decisive for the field of innovation, which supports and paves the road towards the Smart City Wien targets and is characterised by the intelligent and systematic use of cutting-edge technologies and social innovation. **Education** prepares the ground, and **research, technology** and **innovation** (RTI) produce novel, smart technological and social solutions. Finally, a strong **economy** implements these solutions and provides employment.

5 Overview of objectives and policy areas

Smart City Wien combines the three essential and interlinked basic elements of resources (resource preservation), quality of life and innovation. In this way, it builds on typical strengths of Vienna and includes externally imposed binding goals.

The definition of Smart City Wien:

Smart City Wien defines the development of a city that assigns priority to, and interlinks, the issues of energy, mobility, buildings and infrastructure. In this, the following premises apply:

- radical resource preservation
- development and productive use of innovations/new technologies
- high and socially balanced quality of life

This is to safeguard the city's ability to withstand future challenges in a comprehensive fashion. The elementary trait of Smart City Wien lies in the holistic approach pursued, which comprises novel mechanisms of action and co-ordination in politics and administration as well as a wider leeway of action assigned to citizens.

These objectives are long-term, allow for flexibility to do justice to continuous social change and should be understood as inextricably linked to the existing targets set by different specialised strategies of the City of Vienna (Fig. 3). The framework strategy does not substitute the targets of these specialised strategies but is to act like a magnet, i.e. as a superordinate and thematic framework that is in its turn encapsulated in existing plans, strategies, catalogues of targets and works.

The existing plans, strategies, etc. mostly follow a medium-term horizon, focus on one sector only and often comprise extensive and detailed packages of measures. The Smart City Wien framework strategy is more comprehensive (but not exhaustive), pursues a long-term horizon (2050) and does not offer detailed packages of measures. However, concrete sub-projects with a shorter timeframe will definitely be formulated and implemented – and also serve the purpose of clarifying the very nature of what a "smart city Vienna" might be like. In this way, the Smart City Wien framework strategy lays down an aid to orientation for the next generation of specialised strategies in such areas as climate protection, innovation, urban planning, mobility, etc.

Fig. 3 Interaction of Smart City Wien framework strategy with existing and future strategies

Resources

Objectives Energy:
- Increase of energy efficiency and decrease of final energy consumption per capita in Vienna by 40% by 2050 (compared to 2005).
- At the same time, the per-capita primary energy input should drop from 3,000 watt to 2,000 watt.
- In 2030, over 20%, and in 2050, 50% of Vienna's gross energy consumption will originate from renewable sources.

Objectives Mobility:
- Strengthening of CO_2-free modes (walking and cycling), maintenance of high share of public transport and decrease of motorised individual traffic (MIT) in the city to 20% by 2025, to 15% by 2030, and to markedly less than 15% by 2050.
- By 2030, the largest possible share of MIT is to be shifted to public transport and non-motorised types of traffic or should make use of new propulsion technologies (e.g. electric-powered vehicles).
- By 2050, all motorised individual traffic within the municipal boundaries is to make do without conventional propulsion technologies.
- By 2030, commercial traffic originating and terminating within the municipal boundaries is to be largely CO_2-free.
- Reduction of energy consumption by passenger traffic across municipal boundaries by 10% in 2030.

Objectives Buildings:
- Cost-optimised zero-energy building standards for all new structures, additions and refurbishments from 2018/2020 and further development of heat supply systems towards even better climate protection levels.
- Comprehensive rehabilitation activities entail the reduction of energy consumption of existing buildings for space heating/cooling/water heating by one percent per capita and year.

Objectives Infrastructure:
- Maintenance of the high standards of Vienna's infrastructure facilities.
- In 2020, Vienna is the most progressive European city with respect to open government.
- The next 100 apps in three years.
- Pilot projects with ICT enterprises are to serve as showcases for the city and its economy.
- In three years, Vienna will have a comprehensive WLAN.

Resources

Objective: Per-capita greenhouse gas emissions in Vienna drop by at least 35% by 2030 and by 80% by 2050 (compared to 1990).

Innovation

Objectives Research, Technology and Innovation Strategy (RTI):

- In 2050, Vienna is one of the five biggest European research and innovation hubs.
- By 2030, Vienna attracts additional research units of international corporations.
- In 2030, Vienna is a magnet for international top researchers and students.
- By 2030, the innovation triangle Vienna-Brno-Bratislava is one of the most future-oriented cross-border innovation regions of Europe.

Objectives Economy:

- In 2050, Vienna remains one of the ten European regions with the highest purchasing power based on per-capita GDP.
- Vienna further strengthens its position as the preferred company headquarters city in Central/South-eastern Europe.
- 10,000 persons annually set up an enterprise in Vienna.
- The direct investment flows from and to Vienna have doubled as compared to 2013.
- The share of technology-intensive products in the export volume has increased to 80% by 2050 (as compared to 60% in 2012).

Objectives Education:

- Comprehensive provision of whole-day and integrated schools and further upgrading of high-quality childcare offerings.
- Even after 2020, it will be important for Vienna to make sure that a maximum number of young people will continue their education beyond compulsory schooling and thus attain a higher educational level.
- Even after 2020, it will be important for Vienna to safeguard positiv conditions for acquiring formal school-leaving qualifications through second-chance education and for the recognition of foreign educational attainments by adults.

Innovation
Objective: In 2050, Vienna is an innovation leader due to top-end research, a strong economy and education.

Quality of life
Objective: Vienna maintains its quality of life at the current superlative level and continues to focus on social inclusion in its policy design: as a result, Vienna in 2050 is the city with the highest quality of life and life satisfaction in Europe.

Objectives Social inclusion:
- All people in Vienna enjoy good neighbourly and safe life conditions irrespective of their background, physical and psychological condition, sexual orientation and gender identity. Vienna is a city of diversity that is expressed to the fullest in all areas of life.
- High-quality, affordable housing and an attractive housing environment are made accessible to the largest possible share of the population.
- Active participation at work as well as the performed work must be adequately remunerated and ensure the coverage of all basic needs in life.
- Women are involved in planning, decision-making and implementation processes in keeping with their share in the total population. All persons involved in these processes dispose of gender competence.

Objectives Healthcare:
- Strengthening of health-promoting conditions of life and health literacy of all population groups.
- Safeguarding of medical care at the highest level due to demand-oriented and efficient supply structures and processes (best point of service) for all citizens as well as reduction and shortening of hospital stays.
- To safeguard a strong and socially equitable public healthcare system, the Vienna Hospital Association and its facilities will remain a publicly-owned enterprise. Potentials for greater efficiency must be systematically reviewed and used in all areas.
- "Outpatient over inpatient" is the organisational principle of nursing services – letting persons stay in their own home for as long as possible while offering top-notch nursing quality.
- The inhabitants of "smart Vienna" are happy with the quantity and quality of their leisure time.

Objectives Environment:
- By 2030, the share of green spaces must be kept at over 50%. Especially in a growing city, additional recreational areas must be safeguarded to keep up with the rising population figures.
- In 2020, the savings achieved by municipal waste management have already attained approx. 270,000 tonnes of CO_2 equivalents as a result of further planned measures and improvements.

The inhabitants of Smart City Wien are happy with the quantity and quality of their leisure time.

SMART CITY
RESOURCES

6 Objective: **highest possible resource preservation**

The combustion of fossil fuels in cities and their surroundings causes approx. 70 to 75% of worldwide CO_2 emissions.[9] In developing and emerging countries as well as in highly developed industrial nations, migration towards the cities continues unabated. Cities thus play a key role for the energy turnaround and must undertake intensified efforts to attain ambitious goals. Therefore Vienna pursues the following big objective:

Objective: reducing per-capita greenhouse gas emissions in Vienna by 80% by 2050 (as compared to 1990) [10]

This objective is derived from the recommendations of the UN Intergovernmental Panel on Climate Change to limit anthropogenic global warming in the long term to two degrees centigrade. This objective is also endorsed by the EU and results in the requirement of reducing CO_2 emissions to a sustainable level of approx. one tonne per capita and year. Until 2050, the CO_2 target of 80 to 95% supported by the heads of state and government sets an underlying framework (see page 13). In addition, Vienna has committed itself to a continuous reduction of greenhouse gas emissions in the context of the Climate Alliance.

The 20-20-20 targets of the EU are the first important step towards this goal. As the next step, the CO_2 emission level within the EU is to be reduced by 40% until 2030. To attain this target, the sector covered by emissions trading (ETS) is to contribute a reduction by 43% while the »non-ETS sector« is to generate a reduction by 30% (referred to 2005 values).

It is an advantage of cities that condensed settlement types tend to trigger lower energy requirements for mobility and space heating. Vis-à-vis many other regions, Vienna already in 1990 held a pioneering role with 4.1 tonnes of CO_2 per capita[11] for the energy balance segment comparable

9 Cf. e.g. Bouton et al.: How to Make a City Great, McKinsey&Company; Burdett and Sudjic: Living in the Endless City.

10 This objective, like the energy- and climate-related targets mentioned in the following, can only be attained if Vienna's activities are supported by corresponding conditions established by the Federal Republic of Austria and the EU, which includes the consideration of early actions.

11 AEA 2012: Evaluierung der Umsetzung des Klimaschutzprogramms (KliP II) der Stadt Wien – When calculating Vienna's CO_2 volume, the emissions subject to emissions trading are deducted, as is all fuel consumption that cannot be attributed to Vienna (fuel tourism; fuel purchases attributed to the federal province where the company's HQ is located).

to the »non-ETS sector«. When adopting and implementing the first Climate Protection Programme in 1999, Vienna stepped up its forerunner position and subsequently adopted KLiP II in 2009 as a follow-up programme until 2020. In 2011, Vienna was at 3.1 tonnes of CO_2 per capita, with a primary energy consumption of slightly under 3,000 watt of continuous output per person[12]. As a result, the sustainable, long-term levels for 2050, i.e. not more than one tonne of CO_2 per capita and 2,000 watt per capita[13], seem certainly attainable in Vienna. Vienna finds itself in a markedly better position than comparable ambitious cities in the European or even worldwide context. This can be explained above all by a systematic focus on the expansion of the public transport network, excellent building and rehabilitation standards, the cogeneration of electricity and district heating in modern plants and waste incineration facilities. In addition, the share of renewable energy was more than doubled since the mid-1990s.

This top position is an incentive for Vienna. The track record shows clearly that a lot of innovations and changes are possible in this city and in fact can be implemented in sometimes tough, gradual processes by many actors. Moreover, it should also be noted that, while long-term plans are necessary for resource-related objectives, the actual effects of change are due to concrete actions within foreseeable periods!

Intermediate objective: reduction of per-capita CO_2 emissions in Vienna by at least 35% until 2030 (compared to 1990)

-35%

1990   2030
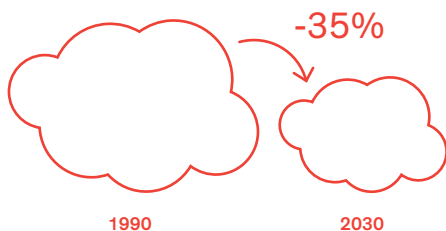
With this reduction target, Vienna responds to the probable EU reduction goal for the non-ETS sector. In this respect, the EU is striving for a reduction of CO_2 emissions by 30% until 2030. As a result, the EU-wide per-capita value of 5.9 tonnes (in 2005) or 5.5 tonnes (in 2010) would decrease to 3.9 tonnes in 2030. Already today, Vienna attains a markedly better value (i.e. 3.1 tonnes per capita) than aimed-for by the EU for 2030 and wants to arrive at approx. 2.6 tonnes per capita in 2030.

Towards this goal, assistance must be provided by corresponding frame conditions to be set by the EU and/or the Federal Republic of Austria. Moreover, the measures contained in KliP 2 must be systematically implemented, followed by an ambitious KliP 3 that should contain Vienna's

12 When determining primary energy consumption per capita – and contrary to the calculation of CO_2 emissions –, none of the energy consumption volumes shown in the energy balance for Vienna are deducted (e.g. fuel tourism, emissions trading) or, conversely, added (e.g. Schwechat Airport, »grey energy« from production attributable to products consumed in Vienna).

13 Cf. 2,000-Watt Society of Zurich: to attain a sustainalbe and just society, the City of Zurich has adopted the 2,000-watt model. According to this model, the known primary energy volume suffices to cover a continuous output of 2,000 watt per person, which corresponds to an annual energy requirement of approx. 17,500 kWh per capita. On its way towards a 2,000-watt society, Zurich wants to attain approx. 2,500 watt of energy consumption and not more than one tonne of CO_2 per person by 2050.

100% gross domestic consumption = 44,309 GWh

| Natural gas 20,537 GWh 46% | Electricity 2,532 GWh 6% | District Heating 413 GWh 1% | Oil 1,561 GWh 4% | RES 4,840 GWh 11% | Coal 1,676 GWh 4% | Fuels 12,751 GWh 29% |

-10.4% Conversion losses

Conversion

-4.3% Non energetic consumption 1.920 GWh

85.2% **Final energy consumption = 37,764 GWh**

| Natural gas 7,923 GWh 21% | Electricity 8,228 GWh 22% | District heating 5,959 GWh 16% | Oil 1,150 GWh 3% | Renewable energy sources 1,734 GWh 5% | Coal 21 GWh 0% | Fuels 12,749 GWh 34% |

85.2% Final energy consumption by sector 37,764 GWh

31% Households 11,874 GWh | 9% Production, Agriculture 3,313 GWh | 23% Services 8,714 GWh | 37% Transport 13,862 GWh

85.2% Final energy consumption by end use

37% Space heating 13,790 GWh | 14% Process heat 5,111 GWh | 50% Power, Lighting 18,863 GWh

-35.6% Conversion losses at final use

11,293 GWh | 3,997 GWh | 6,682 GWh

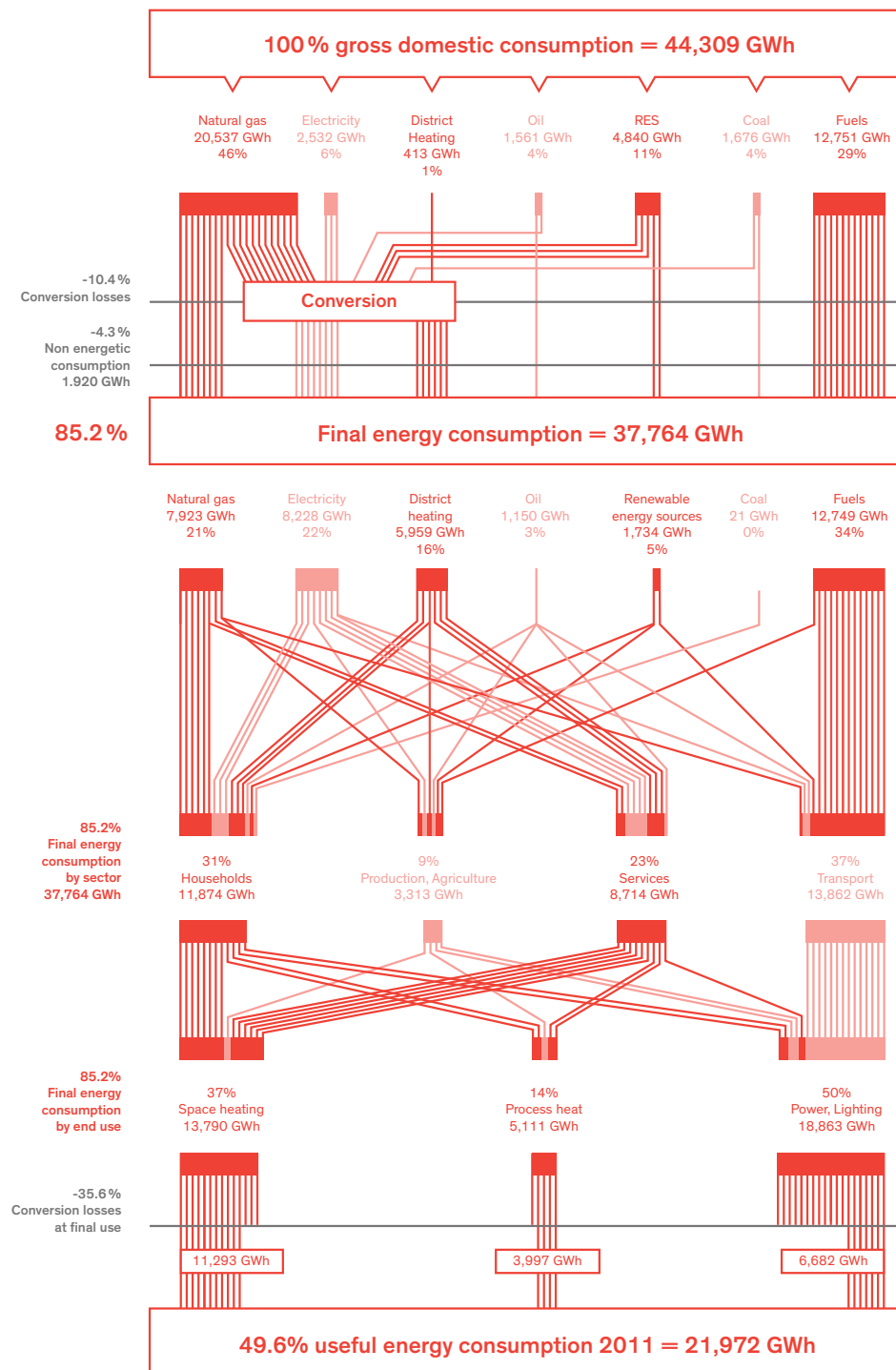**49.6% useful energy consumption 2011 = 21,972 GWh**

Fig. 4 Energy flowchart for Vienna (status of 2012, data of 2011, source: Wien Energie, data by Statistics Austria)

Illustration: Fig. on basis of an illustration by MA20/Typejockeys

climate protection measures for the 2021-2030 period. It is assumed that the growth of renewables and power applications – in particular in transport – will be even more dynamic between 2030 and 2050. In 2050, the supply of urban regions with renewable energy originating in rural areas will be possible on a large scale. By the same token, even stricter energy-saving measures are assumed for the period from 2030 to 2050. These should be supported – possibly in the wake of price hikes for fossil energy sources – both by intensified market penetration of energy-efficient technologies and more energy-conscious behaviour on the part of consumers.

The objective of highest possible resource preservation embedded in the Smart City Wien framework strategy and the related sub-objectives are supported by specialised strategies and above all advanced by means of revisions or updates of these documents over the coming years. These e.g. include the Energy Strategy 2030 of the City of Vienna, the Climate Protection Programme KliP, the Security of Supply Plan including the Renewable Energy Action Plan, the Urban Energy Efficiency Programme, the new Urban Development Plan STEP2025 and the Mobility Concept derived from it.

These objectives are made possible by actions in the core areas of energy, buildings and mobility, since these areas are those with the highest energy consumption (see Fig. 4). Here, too, the importance of energy efficiency measures boosted by regulatory and financial instruments as well as due to changes in behaviour patterns becomes evident. Resource conservation is actively implemented by many people in Vienna as part of their lifestyle and assigned an overall positive image: it is a crucial task of the municipal administration to further anchor and foster these trends by means of strong incentives. The Climate Protection Programme of the City of Vienna has already achieved much in this respect: thus Vienna's greenhouse gas emissions decreased by 10% to 5.5 million tonnes of CO_2 between 1990 and 2010.[14] This was inter alia attained by means of improvements of building shells and energy-efficient technical services for buildings or intensified urban condensation, local shopping options and measures to step up cycling and walking.

The objectives, the strategies taken to achieve them as well as a brief status quo overview of the four core areas will be presented in the following sections.

## 6.1 Efficient energy use and renewable energy sources

CO_2 reduction is achieved by increasing energy efficiency, stepping up the use of waste heat and renewable energy and cutting final energy consumption. The target values for energy consumption reflect the abovementioned long-term target of minus 80% of CO_2 per capita by 2050.

Increase of energy efficiency and decrease of final energy consumption per capita in Vienna by 40% by 2050 (compared to 2005). At the same time, the per-capita primary energy input should drop from 3,000 watt to 2,000 watt.

2005
-40%
2050
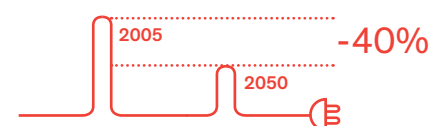
The remaining residual energy will be increasingly provided from renewable sources.

In 2030, over 20%, and in 2050, 50% of Vienna's gross energy consumption will originate from renewable sources[15].

20%   50%

2030   2050
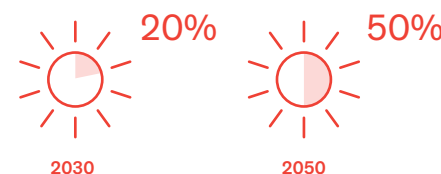
The main emphasis regarding the further development of Vienna's energy system is on the intense use of local renewable sources and waste heat for both heat and electricity generation. The tapping and development of renewable energy sources (e.g. deep geothermics) for the district heating system and the considerable potentials of near-surface geothermics (depths of up to 300 metres) and solar energy are of great importance for the attainment of the above targets.

The importance of the production of renewable energy will continue to grow significantly in rural regions. As a result, a substantial portion of the renewable energy needed by cities will be generated in rural regions. These developments will be taken account of in the city's energy plans. By

14 AEA 2012: Evaluierung der Umsetzung des Klimaschutzprogramms (KliP II) der Stadt Wien – When calculating Vienna's CO_2 volume, the emissions subject to emissions trading are deducted, as is all fuel consumption that cannot be attributed to Vienna (fuel tourism; fuel purchases attributed to the federal province where the company's HQ is located).

15 These do not have to be located on municipal territory.

2050, electricity and gas imports from renewable sources will probably contribute decisively to overall energy supply.

Energy-autonomous wastewater purification

Thanks to an efficient purification plant, the waters of the Danube leave Vienna as clean as they were on arrival. But wastewater purification is very electricity-intensive. For this reason, the main wastewater treatment plant of ebswien already today opts for "SternE", i.e. electricity from renewable sources. A Kaplan turbine and a hydrodynamic screw produce green electricity, as do a wind turbine and a photovoltaics system. With the large-scale EOS project ("Energy Optimisation through Sludge Treatment"), the main wastewater treatment plant will also make optimum use of the energy contained in sewage sludge. As of 2020, ebswien will be able to generate all energy needed for wastewater purification independently from sewage gas, a renewable energy source.

Zero Emission Liesing

The Liesing Mitte project is aimed at positioning an entire urban development zone as a central element of Smart City Wien by involving stakeholders and external experts and at taking concrete steps towards wholly renewable energy as well as massively reduced energy and resource input by at least a factor of 10. A parallel goal lies in enhancing the quality of life in the area, with special consideration of social aspects.

6.2 Resource-conserving mobility

Vienna is growing, and so is the number of trips taken within the city. In the field of mobility, attention is paid to ensure sufficiency as well as efficiency. Both the time required by citizens for everyday mobility and the number of trips taken are subject to only minimal variations. If the mode share of motorised individual traffic remained unaltered, the population growth would also lead to a rising number of car trips by 2025, resulting in its turn in increasing energy demand and pollutant emissions due to traffic as well as in the intensified use of already scarce urban space. This does not tally with the objective of high quality of life for all urban dwellers. Short distances can be easily covered by bike or on foot. Conversely, a shift in traffic that favours walking and cycling can in the long term strengthen urban structures with manifold service, shopping and leisure attractions in the

immediate surroundings. Resource-conserving mobility means combining the claim of high quality of life with short distances. If the use of motorised vehicles is a necessity, these should run on CO_2-free, energy-saving propulsion types and renewable energy sources.

Strengthening of CO_2-free modes (walking and cycling), maintenance of the high share of public transport and decrease of motorised individual traffic (MIT) in the city to 20% by 2025, to 15% by 2030, and to markedly less than 15% by 2050.

| 2025 | 2030 | 2050 |
| 20% | 15% | <15% |
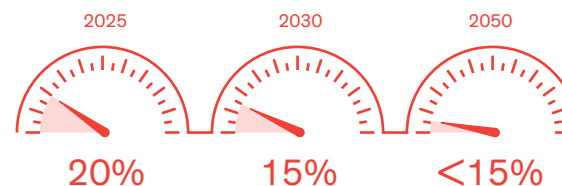
This calls for the timely use of effective measures in the mobility sector. These measures are developed and fine-tuned in terms of sector-bound strategies on the basis of the defined targets. A precondition for attaining the ambitious target for 2030 (MIT at 15%) lies in a marked increase of the share of cycling. Public transport (PT) will invariably remain essential. Public transport consumes only 5 to 6% of all energy used by the mobility sector[16] but delivers roughly the same transport performance in passenger kilometres as MIT. Therefore the energy consumption per passenger kilometre is only about one twentieth for PT as compared to MIT. If CO_2 emissions are compared, PT comes off even better since roughly three fourths of its energy consumption can be covered with hydropower or cogenerated electricity, both of which impact the CO_2 emission output only to a very limited degree. It is therefore planned to further reduce MIT and to substitute fossil fuels with electricity and renewables. The roadmap outlined in the White Paper of the European Commission[17] provides a path-breaking recommendation towards this goal.

By 2030, the largest possible share of MIT is to be shifted to public transport and non-motorised types of traffic or should make use of new propulsion technologies (e.g. electric-powered vehicles).

16 Municipal Department 20 (ed. 2013): Energiebericht der Stadt Wien; Energieverbrauch im öffentlichen Verkehr 1993-2011, acc. to Wiener Linien; p. 70.

17 COM (2011) 144 final: "Halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050"; achieve essentially CO_2-free city logistics in major urban centres by 2030; p.10)

By 2050, all motorised individual traffic within the municipal boundaries is to make do without conventional propulsion technologies.
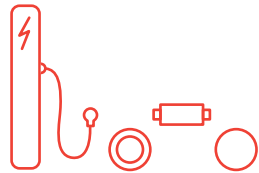
An important role for resource-conserving mobility is moreover to be attributed to urban logistics. Together with the logistics sector, the city will focus on the optimisation of goods and traffic flows by involving electromobility.

By 2030, commercial traffic originating and terminating within the municipal boundaries is to be largely CO_2-free.
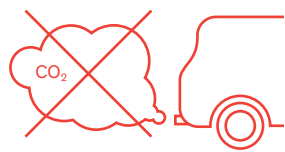
Regarding traffic, it is also very important to adopt a regional view that extends across the municipal boundaries of Vienna, e.g. by means of integrated mobility and regional development with a special focus on commuter flows.

Reduction of energy consumption by passenger traffic across municipal boundaries by 10% in 2030.

The method of measuring and optimising regional traffic via the factor of energy consumption would constitute a novel approach. The intention is to embody this strategy at the regional level on the basis of city/environs mobility partnerships and transnational mobility management. The concept of multimodality and the establishment of mobility hubs can constitute a first step in this direction.

EXAMPLE   **E-mobility on demand**

The Vienna model region, with the "e-mobility on demand" research project at its centre, focuses on a gradual switch towards an integrated, comprehensive transport system. Public transport is thus effectively complemented by electromobility and e-car sharing. The new customer services will be simpler and easier to use. Electric-powered cars are to substitute fossil-powered trips in commercial traffic and ensure mobility in situations where walking, cycling and public transport use is not possible.

6.3 Buildings: built environment and new structures

In 2011, Vienna was composed of 165,000 buildings, 149,000 of which of a residential type, while the rest served service, industrial/commercial or other purposes.[18] Due to demographic change and the related population growth, it is estimated that approx. 120,000 new dwellings will have to be constructed by 2025. To meet the Smart City Wien goals, a new and ambitious framework for new buildings must be thus established. For this reason, energy standards, above all with a view to neighbourhoods and urban quarters in combination with new energy supply systems, must be redefined; likewise, the thematic complex covering buildings, energy and energy systems must be jointly discussed.

Even today, new buildings are planned and built according to very high standards of energy efficiency (low-energy standard and its successors). Energy and heating systems are always included in these considerations as well. According to the EU Energy Performance of Buildings Directive (EPBD) of 2010, the zero-energy standard will be mandatory for all new building types, with cost optimisation being taken account of in defining and updating all related requirements.[19]

Cost-optimised zero-energy building standards for all new structures, additions and refurbishments from 2018/2020 and further development of heat supply systems towards even better climate protection levels.

This demands excellent energy performance of buildings, which in combination with the systematic and optimised use of renewable energy sources and on-site waste heat or district heat entails minimal CO_2 emissions.

In addition to new buildings, great attention is also paid to building rehabilitation. Above all in municipal and co-operative housing construction, great advances were made in this field over the past 20 years. Now the task lies in also tackling challenging segments of the built environment, e.g. with regard to façade structures in need of protection, the situation in dwellings with tenant protection, the selection of energy sources or incentives for commercial or industrial premises, etc.

Comprehensive rehabilitation activities entail the reduction of energy consumption of existing buildings for space heating/cooling/water heating by 1% per capita and year.[20]
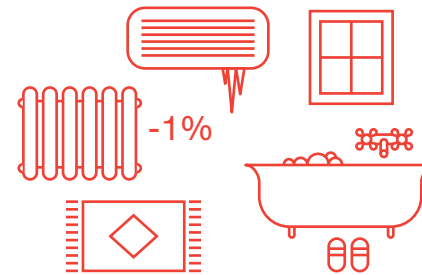
This requires frame conditions that go beyond mere subsidisation, as the experience of recent years has shown that the latter tool does not generate a leverage effect strong enough to permit the attainment of ambitious rehabilitation goals. In the future, rehabilitation rates and qualities will have to be additionally boosted by means of other instruments, e.g. of a regulatory or fiscal policy type. Changes in housing legislation (e.g. tenancy law) or tax law would be useful in this context but are normally a federal competence. In keeping with the National Plan under the EPBD, Vienna will focus on further developing detailed quality requirements for the thermal and energy rehabilitation of buildings (e.g. concerning in-house utilities, heating systems, insulation, etc.). In addition, it is essential for the city to lead by example regarding its own buildings, with special priority assigned to the use of green systems (district heating and renewables) for space and water heating. Moreover, (roof)space potentials are to be systematically drawn upon for tapping solar energy.

EXAMPLE   **Cities as the world's biggest mines**

Cities as treasure troves: urban mining projects, too, are being initiated in Vienna, with Wiener Linien as a case in point. The intention lies in obtaining a better understanding of the building stock of the city and documenting it in order to be able to reuse valuable resources and raw materials ("the city can recycle itself").

6.4 Infrastructure and information and communication technology

Vienna is a city that functions excellently with regard to basic infrastructure facilities such as water supply, wastewater disposal, i.e. sewerage and rainwater management, as well as waste recycling and management.

18   Statistics Austria

19   Cf. EU Directive 2010 (EPBD) and its implementation in Austria in 32 provincial laws.

20   This target value assumes that the Federal Republic of Austria and the EU will provide corresponding, supportive frame conditions.

Maintenance of the high standards of Vienna's infrastructure facilities.

Due to the Spring Water Mains originating in the spring protection zones of Rax, Schneeberg and Hochschwab, Vienna boasts drinking water of outstanding quality and abundance to meet the needs of even a growing population. Since 1873, 95% of Vienna's water supply has been safeguarded by gravity conduits, i.e. without artificial pressure boosts by pumping stations. Vienna's drinking water also contributes significantly to the production of green electricity: at the moment, 15 drinking water power stations generate approx. 65 million kilowatt hours of electricity annually, which corresponds to the power demand of around 20,000 households. Moreover, per-capita water consumption is also slightly on the decrease due to novel, water-conserving technologies.

Issues such as wastewater disposal, waste recycling and waste disposal are dealt with by specialised strategies of the City of Vienna. There e.g. exist targeted efforts for the use of rainwater management or strategies forming part of the Waste Management Plan and the Waste Avoidance Programme for Vienna.[21] An international comparison shows that Vienna's performance standard in this field is extremely high; it was moreover possible to create a positive image for waste avoidance and waste separation in the minds of citizens.

ICT as the "nervous system" of Vienna as a smart city
Information and communication technology is a central driver of innovation and a special asset of Vienna. The city assigns high priority to this sector – from science to business and public services – under the Smart City Wien framework strategy. This pertains to both the generic and infrastructure character of ICT and the role of ICT in shaping many services in an innovative fashion. Here, the most important task lies in the fact that the city views itself as an advanced client, provider and enabler of digital services. In this context, Vienna is committed to the open government principle and the related concepts of participation and transparency, but also to data security. The further development of high-quality e-government services of the City of Vienna is on the way. This concerns important issues such as the Virtual Office or the open government data catalogue, which is currently meeting with great interest on an international scale as well. In this way, innovative applications can be created for the benefit of citizens in such areas as energy, health, culture, environment, transport or housing, thus enhancing the intensity of use by both inhabitants and business.

Services offered by the City of Vienna are to be made more easily available, in particular with the aid of mobile end devices; this also calls for improved WLAN provision. In this context, care is taken to ensure that this offer will be balanced and attractive for different target groups to safeguard equal opportunities.

In 2020, Vienna is the most progressive European city with respect to open government.

The systematic expansion of digital public services taps economic possibilities. This is true of apps developed by individuals as well as of business opportunities for small and big companies, e.g. in the context of innovative pilot projects and applications. In this, ICT should be understood quite broadly as ranging from communication ventures to applications in areas such as health, energy supply or education. Pilot projects are to change processes in exemplary fashion and at the same time help to access efficiency potentials in combination with staff skills. Concurrently, new services are emerging, as are new forms of presenting the city in texts and visuals.
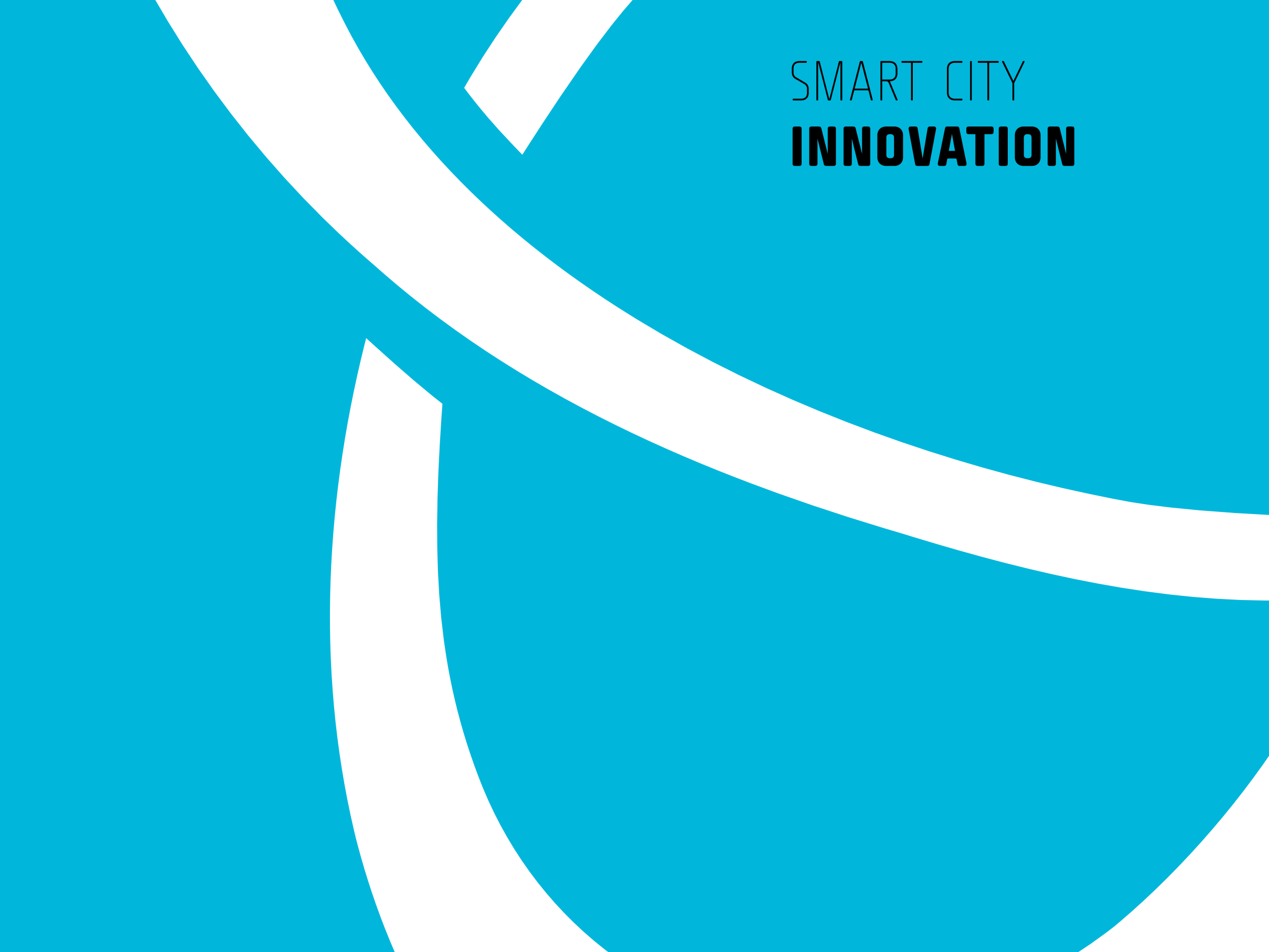
The next 100 apps in three years.

Pilot projects with ICT enterprises are to serve as showcases for the city and its economy.

Furthermore, ICT is a strong component of infrastructure. Communication infrastructure facilities should be viewed as the "neural pathways" of Vienna as a smart city. The new challenges such as big data initiatives – as well as users – need strong on-site infrastructure. Investments in latest-generation glass fibre and radio networks support the economy, users and the public sector.

In three years, Vienna will have a comprehensive WLAN.

Finally, the city will intensify its co-operation with universities, research institutions and universities of applied sciences to further strengthen the ICT competence of Vienna as a business location.

---

21 Planning period: 2013-2018

SMART CITY
INNOVATION

7 Objective: **innovation leader** through cutting-edge research, a strong economy and education

Smart City Wien means making use of innovations early and in a intelligent fashion, developing competencies and potentials and enabling the city to take a dynamic road into the future. The motto of the Smart City Wien campaign – "Vienna has 1.7 million brains. Let's use them!" – is nowhere more applicable than here. It is all about intelligence, creativity and critical analysis. The more diverse a city, the higher its potential for dynamic development. These potentials of society must be made use of, and the inclusion of broad strata of the population is a prerequisite of any successful, innovative city. This calls for opportunities for all to develop according to their possibilities as well as for good education and training options or skill building across the entire population. In its turn, this presupposes a major task of the city, i.e. to provide frame conditions, institutions and supporting services from infant pedagogy at the kindergarten to universities and an innovative economy. Using 1.7 million brains therefore means that top-end innovation must rest on a strong and broad foundation.

Objective: in 2050, Vienna is an innovation leader due to top-end research, a strong economy and education.

Innovation is key for linking resource preservation to high quality of life for all Viennese. This harbours the great opportunity for Viennese enterprises and research institutions to develop new solutions and competencies and in this way to garner respect and revenue across the world. Vienna holds the potential to be a major centre of excellence in the field of municipal services or urban technologies, but also in terms of balancing interests and supporting social innovations. However, many of these ambitious

goals cannot be attained by simply perpetuating time-tried formulas: new forms of service delivery must be developed for Vienna. Conversely, the economy, society and administration must also be ready and able to absorb innovations from all over the world in a timely and intelligent manner. This calls for openness to science, research and innovation at all levels and in a way that is dynamic, reflective and, if possible, participatory. Education, research and, last but not least, a dynamic economy are crucial aspects for the future evolution of Vienna into a truly smart city.

7.1 Research and use of new technologies

Research and new technologies generate added value, ensure high-quality workplaces and help to protect quality of life. At the same time, in order to realise its smart city ambitions, Vienna needs both the ability to absorb research findings from all over the world in a productive manner and the capacity to be a high-ranking research and university location in its own right. With currently in excess of 185,000 students, a strong industrial research and innovation sector and about half of all basic research activities in Austria, Vienna disposes of excellent institutional preconditions. Fields such as life sciences or information and communication technology present a high density of scientific achievements, industrial competencies and numerous new companies that are emerging day after day. Measured by the number of publications, citations, top-end researchers or patents, Vienna is an important research and innovation hub already today, but must still undertake efforts to catch up with the global top batch.

In 2050, Vienna is one of the five biggest European research and innovation hubs.

The next steps along this road will be defined in 2014/2015 with the development of Vienna's research and innovation strategy "Innovative Vienna 2020". Smart City Wien will play a key role in this strategy process. This involves the following relevant issues: Vienna disposes of top-end research equipment infrastructure that is equally used by science, industry and small or medium-sized companies. Research and innovation efforts in the areas of energy, mobility, climate and sustainability – all of which

are particularly relevant for the smart city angle – are fostered, and great attention is paid to social innovation. Vienna places special emphasis on top-end research and the further strengthening of already successful areas; this also helps to enhance its attractiveness for research institutions of international corporations and top-class researchers. The city generates strong incentives to promote the continuous increase in the number of R&D workers and organisations engaged in research. In the context of the task sharing between the Federal Republic of Austria and the federal provinces, Vienna will earmark corresponding resources and pay special attention to know-how transfer directed at the economy and society. The contribution of women to key future-oriented sectors is to be specially promoted.

By 2030, Vienna attracts additional research units of international corporations.

In 2030, Vienna is a magnet for international top researchers and students.
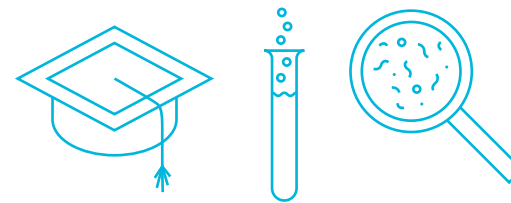
Over the next decades, the »innovation triangle« Vienna-Brno-Bratislava will become an innovation system characterised by strong dynamism and networking, with Vienna acting as the innovation driver of the region.

By 2030, the innovation triangle Vienna-Brno-Bratislava is one of the most future-oriented cross-border innovation regions of Europe.

Vienna systematically pursues the ambition of positioning itself as an innovation leader in public service delivery. The Austrian capital favours living labs in the deployment of innovations so as to further develop and network its public services. The municipal administration and its spinoff enterprises promote technical and social innovations and the use of the latest technologies in their various areas of work so as to both improve public service quality and render administrative processes more efficient.

The city acts as a key customer of innovative products and contributes its know-how actively to regional research and innovation projects.

Delivery of innovative solutions

The city embodies innovation-oriented and resource-conserving public procurement methods clearly in its structures (pre-commercial procurement) and intensifies the "WienWin« programme, which likewise serves as a setting for pilot projects. Equal opportunity aspects are moreover increasingly used as a criterion as well.

7.2 The 21st-century economy originates in the city

Due to their diversity, density and innovative clout, cities are ideal breeding grounds for a strong economy. Only recently, Vienna was mentioned as a prototypical prospering city by the UN[22]. Any prospering city also needs a diversified and varied economic structure, in which different industries and company sizes can survive and grow with success and co-operate with manifold organisations. This diversity entails resilience vis-à-vis critical developments and is to be safeguarded for the future. While the service sector predominates, the city does dispose of an excellent industrial basis with highly resource-conserving production methods, good productivity and strong export orientation. Regarding the consideration of environmental aspects ("green GDP"), too, Vienna may be called exemplary.

In 2050, Vienna remains one of the ten European regions with the highest purchasing power based on per-capita GDP.

In 2050, Vienna continues to enjoy the highest gross regional product per capita of all Austrian cities and towns, i.e. the urban economy presents a very high productivity level. Prosperity goes beyond mere material security; for this reason, Vienna aims for a top position in existing and future alternative methods of measuring prosperity. Vienna offers and enables meaningful work for all. In this, workplaces in Vienna correspond to the criteria of "good work", i.e. employment is for an indeterminate period and fulltime (if requested by the worker); payment corresponds to a

[22] UN-HABITAT study: "State of the World's Cities 2012/2013"
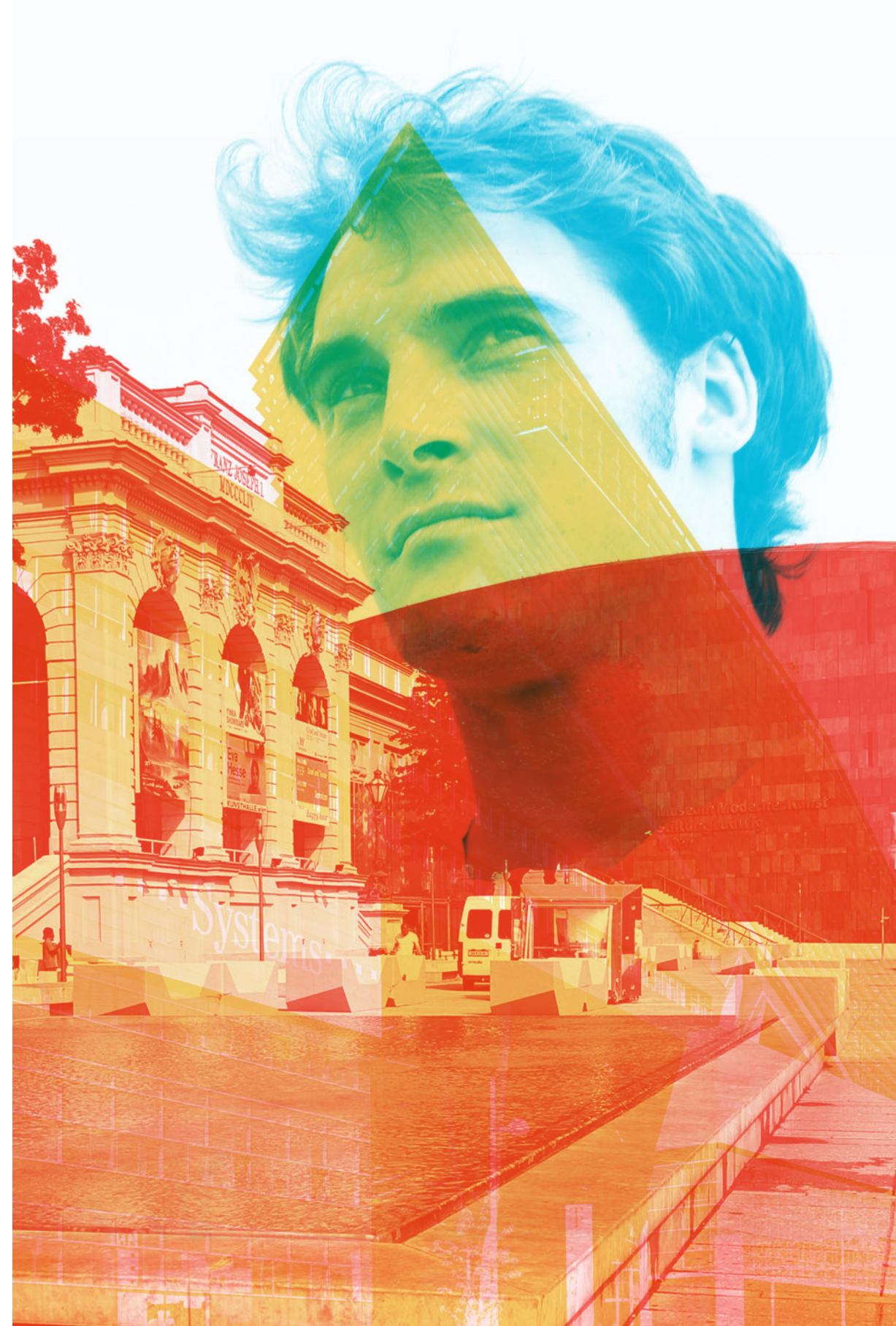
"living wage" standard; collective bargaining regulations are complied with. Access to the labour market is low-threshold and equitable, in particular also for less advantaged parts of Vienna's population. Persons with special needs are integrated into the primary labour market. Women and men contribute equally to generating this prosperity; there are no wage or salary gaps. The possibility of productive participation of all persons in the many embodiments of the labour market makes for a decisive factor of quality of life in this city and an equally decisive contribution of the economy to Vienna as a smart city. The attractiveness of Vienna as a workplace is strong enough to motivate people from all over the world to come to Austria in order to work here. Smart City Wien is a cosmopolitan city all around.

Universities, universities of applied sciences and vocational training make sure that the skills profile of labour supply will largely coincide with labour demand. In this way, the Vienna 2020 Qualification Plan and its revisions play a decisive role in shaping Vienna's labour market.

Vienna is a diversified and competitive economic hub characterised by a high level of co-operation within the city and the surrounding larger region. This region presents a diversified company structure in technology-intensive industries that include both the service and the manufacturing sectors. Enterprises are able to position their know-how and products successfully in the global market. Particularly in technology-intensive industries, both the share of workers and the contribution to value creation overall has increased. Enterprises new to Vienna can draw on a wide range of services and counselling options with state-of-the-art ICT technologies.

Vienna further strengthens its position as the preferred company HQ city in Central/South-eastern Europe.

10,000 persons annually set up an enterprise in Vienna.

The direct investment flows from and to Vienna have doubled as compared to 2013.

The share of technology-intensive products in the export volume has increased to 80% by 2050 (as compared to 60% in 2012).

60% → 2012

80% → 2050
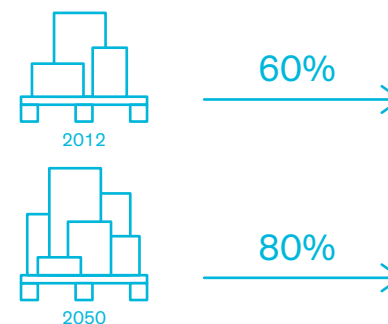
With a highly differentiated subsidy policy, the city ensures that future-oriented enterprises can find their niche in the market and use Vienna as a launching pad to conquer global markets. This also includes comprehensive counselling and assistance during the start-up phase. With counselling services and the provision and development of suitable real estate, the city offers a broad, integrated service range.

7.3 Education and qualification as a basis for Vienna as a smart city

A high level of education signifies equal opportunities and possibilities of participation. Education touches the very core of any smart city: the possibility of changing things either as an individual or as a group and to be able to realise one's professional and private plans underpin each and every structure and system. The instruments to pursue this approach are provided by ample opportunities for education. Qualification and education are likewise central starting-points for prosperity, quality of life and innovation. Therefore nobody must be excluded from educational processes; overcoming the educational disadvantages besetting certain social groups is a declared objective of the city.

In the future, only a strategy of lifelong learning will make it possible to meet the high standards of the modern work environment. The city will take measures to ensure a correspondingly high level of education and training of workers. The Vienna 2020 Qualification Plan serves as a central document towards this purpose.

As a smart city, Vienna is particularly interested in safeguarding that as many children and young people as possible will complete a highly qualified educational and training curriculum. Priority is given to creating a level playing field for all youngsters. For this purpose, the range of crèches and kindergartens will be further enlarged; many (mainly elementary)

schools will be transformed into whole-day schools, and the objective of an integrated school for all children aged 10 to 14 years will be systematically pursued.

Comprehensive provision of whole-day and integrated schools and further upgrading of high-quality childcare offerings.

These objectives in particular serve to boost the educational potentials of children and young people in their school careers and support the improved compatibility of work and family. Another aim is to markedly decrease the number of early school-leavers, i.e. those youngsters aged 18 to 24 years who have not completed upper secondary schooling[23]. The Vienna 2020 Qualification Plan with its clearcut objectives and orientations constitutes a particularly important strategic document, e.g. with the targets of reducing the number of early school-leavers to 8.1% by 2020 (from 11.8% in 2009) and increasing the number of non-apprenticeship-based occupation permits by 2015 as well.

Even after 2020, it will be important for Vienna to make sure that a maximum number of young people will continue their education beyond compulsory schooling and thus attain a higher educational level.

The Vienna 2020 Qualification Plan focuses above all on education, occupational skills and labour market entrance possibilities and offers a strategy to reduce the share of poorly qualified persons. More young people are to obtain formal educational qualifications above the compulsory level in the primary educational system; more adults are to acquire formal school-leaving qualifications through second-chance education. One instrument of the Qualification Plan is the qualification pass (underway in 2014), which serves to document partial qualifications and skills of individuals in order to allow for their further development. Special attention is paid to gender-equitable pedagogy.

---

23 AHS (higher general secondary schools), BHS (higher vocational schools), BMS (intermediate vocational schools), apprenticeships and vocational schools

Even after 2020, it will be important for Vienna to safeguard positive frame conditions for acquiring formal school-leaving qualifications through second-chance education and for the recognition of educational attainments obtained abroad by adults.

EXAMPLE   **Vienna Campus Plus Model**

At the moment, the **Vienna Campus Plus model** (school campus model) is being continued and further developed in nine sites under the "Construction Plan for New Educational Facilities 2012-2023". According to this model, kindergartens, schools and leisure education are concentrated in one location. This co-operation is to ensure the optimised use of all resources. These educational centres offer integrated teaching and ancillary spaces to include children with special needs, enabling them to fully participate in the educational process on an equal footing. The implementation of the Vienna campus plus model entails the construction of energy-efficient buildings whose spatial configuration also allows for a variety of multiple uses and efficient logistics. Gender aspects are specifically taken aboard during the planning and design of the buildings.

SMART CITY
QUALITY OF LIFE

8 Objective: ensure top-level quality of life

International rankings and studies emphasise that Vienna presents particularly high quality of life and an equally high degree of social participation. This is a key location factor and plays a central role for urban development. Quality of life is a multidimensional phenomenon and the sum total of numerous influencing variables. In addition to socioeconomic parameters and material living conditions, further key dimensions serve to define it: thus the individual's life satisfaction interacts with his or her career and educational attainments, with the quality of the environment and nature, with safety and security, with social participation, leisure quality and culture as well as with openness and diversity of gender roles; finally, physical, psychological and social health, too, is important. In this context, it is essential to continue the Viennese approach of social inclusion, which ensures the participation of all.

Objective: Vienna maintains its quality of life at the current superlative level and continues to focus on social inclusion in its policy design: as a result, Vienna in 2050 is the city with the highest quality of life and life satisfaction in Europe.

In addition to objective factors, the subjective level is of great significance here. As a result, it is imperative to look at individual statements and assessments to obtain a clear picture. As a smart city, Vienna takes account of the different urban living environments and realities of women and men. Comprehensive equality of a political, social and economic kind is a key element to ensure quality of life.

8.1 Social inclusion

Social inclusion stands for an open society and solidarity, good neighbourly relations, mutual respect and acceptance. Social pluralism and diversity are viewed as an opportunity. This calls for a corresponding design of the social safety net – it must be as tightly knit as necessary and as individual as possible.

In this, all residents of the city are united by a common language. Social and political participation of all population groups[24] – in particular of migrants – is promoted, as are learning German and plurilingualism. Recognition and nostrification mechanisms for qualifications obtained abroad by newcomers to Vienna should be optimised. The high level of cultural events and access to these for all citizens constitute another, equally important aspect. Special attention is paid to the potentials of youngsters from families with a migration background.

All people in Vienna enjoy good neighbourly and safe life conditions irrespective of their background, physical and psychological condition, sexual orientation and gender identity. Vienna is a city of diversity that is expressed to the fullest in all areas of life.

With regard to affordability, special emphasis is placed on housing and housing costs.[25] Particular attention should be paid above all to persons at risk of poverty or persons unable to pay energy bills due to straitened circumstances. Moreover, the housing environment, e.g. attractive public spaces, shopping and service provision "around the corner", access to cultural and educational facilities and easy accessibility, should be given priority here.

High-quality, affordable housing and an attractive housing environment are made accessible to the largest possible share of the population.

In addition to possibilities for individual development and the fostering of social contacts and social skills, active participation in the world of employment must be adequately remunerated to safeguard economic participation and a "living wage", i.e. coverage of all basic needs in life.

Active participation at work as well as the performed work must be adequately remunerated and ensure the coverage of all basic needs in life.

To ensure that all residents of the city will be able to realise their life plans, the equitable participation of women and men in social and political decision-making processes is a declared key goal of the Smart City Wien framework strategy. The know-how and experience of both sexes are needed to safeguard a truly humane city.

Women are involved in planning, decision-making and implementation processes in keeping with their share in the total population. All persons involved in these processes dispose of gender competence.

Female and male city-dwellers have a different (subjective) sense of security. Thus public spaces should be rendered attractive for women – and hence voluntarily used by them – as well.

EXAMPLE   **Vienna belongs equally to both women and men**

To attain gender-specific equality of opportunities, the City of Vienna decided to conduct a gender equality monitoring along 15 selected thematic areas and based on approx. 120 selected indicators. Systematic and continuous data monitoring is to draw attention to relevant developments in the gender equality process and demands necessary corrections where required. In due course, this will foster the further development of specific actions for women so as to gradually eliminate the existing gender gaps in various fields.

---

24 At all levels: education, work and career, culture, social affairs and health, safety and security, housing and spatial context, barrier-free design, identification

25 Housing costs = rent, service charges, heating, energy and maintenance (minus any housing or rent allowances) + payment of interest on loans for the creation or rehabilitation of housing space. Housing costs are deemed unreasonable if the amount paid for housing minus allowances (if any) exceeds one fourth of the disposable annual income.

8.2 Health as a prerequisite

Physical but above all psychosocial health is an essential factor for the individual's wellbeing and life satisfaction. All Viennese residents should enjoy maximum quality of life and life satisfaction on a daily basis, irrespective of their sex, background and age.

Health-promoting conditions of life must be further strengthened, e.g. sustainable safeguarding of high-quality natural resources (air, water and soil) or healthy nutrition with high-quality foodstuffs. Preventive measures must be rendered as effective as possible. This calls for the fostering of the health literacy of all population groups to prevent diseases and disorders triggered by health-impairing lifestyles. A health-promoting environment should be instituted, safeguarded and nurtured for all age groups and life circumstances, from infancy to adulthood, from kindergartens and schools to health promotion at the workplace.[26] To ensure the healthy development of children and adolescents, awareness of healthy nutrition modes and physical exercise must be stimulated already in kindergartens and schools. Physical exercise in daily life, e.g. walking or cycling, must be rendered attractive by corresponding design in an everyday context and requires promotion to stimulate interest.

Strengthening of health-promoting conditions of life and health literacy of all population groups.

Security of service provision requires equal opportunities regarding access to medical services for all citizens of Vienna and correspondingly presupposes the sustainable safeguarding of solidarity-based funding for the public healthcare sector.

Efficiency means demand-oriented treatment and care process management across all care levels[27] with a focus on the "best point of service".[28] Future structures and care processes in the healthcare system deliver better quality of medical care for patients and the proper medical service, provided at any time, in the right place and by suitably qualified medical professionals.

26 See Viennese measures relating to the concept of the Provincial Health Promotion Fund

27 See Health Target Control of Federal Target Control Contract; primary care, outpatient specialised care and inpatient care

28 This safeguards that the correct service is delivered at the right moment and in the right place by providing optimum medical and nursing quality in the macro-economically most cost-efficient manner.

Safeguarding of medical care at the highest level due to demand-oriented and efficient supply structures and processes (best point of service) for all citizens as well as reduction and shortening of hospital stays.

Efficiency and strategic focuses in medical care are necessary contributions to enable long-term security of service delivery according to the principles of solidarity. The Vienna 2030 Hospitals Concept pursues the goal of concentrating medical services to improve their quality and ensure optimum use of existing resources in order to prepare Vienna's hospital system for future financial and quality-related challenges.

To safeguard a strong and socially equitable public healthcare system, the Vienna Hospital Association and its facilities will remain a publicly-owned enterprise.

Potentials for greater efficiency must be systematically reviewed and used in all areas.

Moreover, demographic change and an ageing society pose rising demands regarding nursing care for the elderly in geriatric centres and nursing homes.

"Outpatient over inpatient" is the organisational principle of nursing services – letting persons stay in their own home for as long as possible while offering top-notch nursing quality. "Work/life balance" is a concept that assigns greater importance to time and leisure activities when assessing quality of life. As a smart city, Vienna contributes to optimising the everyday life of its residents and fosters innovative solutions to promote flexibility of site and control over time, i.e. quick and efficient processes on the one hand and deceleration on the other hand.[29]

## The inhabitants of Smart City Wien are happy with the quantity and quality of their leisure time.

29 This refers to accessibility, tightly knit structures of service provision, removal of barriers, avoidance of motorised individual traffic, multimodality, e-government, etc.

Investments in health

The Vienna 2030 Hospitals Concept aims to concentrate services at seven central hospital organisations in order to enhance the quality of service delivery. Other goals are modernisation, efficiency and process improvement – for this purpose, extensive investments for the benefit of hospital structures will be implemented until 2030. At the same time, the City of Vienna is responding to the increasing demands regarding nursing care for the elderly in geriatric centres and nursing homes with the objective of favouring structures near clients' homes and promoting outpatient care and assistance in order to help these individuals to remain in their own homes for as long as possible while enjoying maximum quality of life.

8.3 Vienna as an environmental model city

The share of green makes up half of Vienna's municipal territory. As a "green lung", these areas contribute significantly to Vienna's high quality of life. The city depends on the functioning of the ecosystems that surround and permeate it. Spacious and attractive green and open spaces within the municipal territory must be safeguarded even in a growing city; they must be easily reachable by eco-friendly means and should be barrier-free and publicly accessible. This is a key contribution to quality of life and life satisfaction.
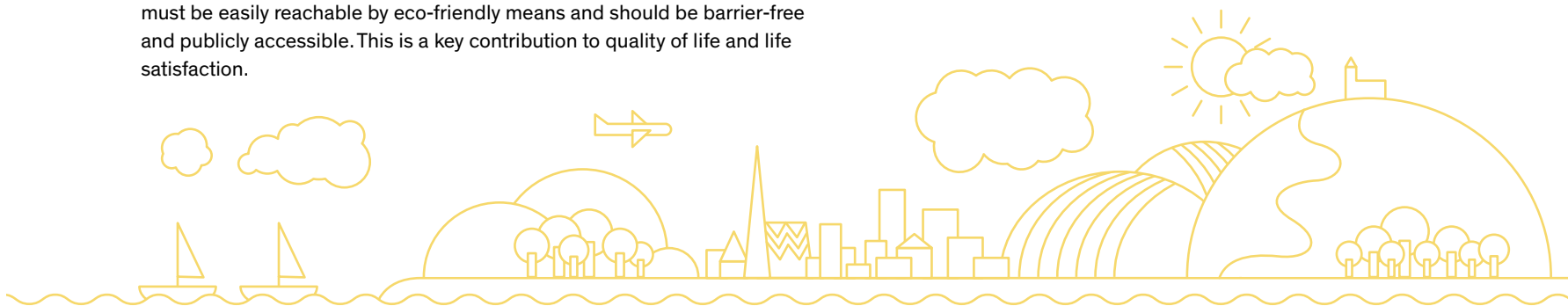
By 2030, the share of green spaces must be kept at over 50%. Especially in a growing city, additional recreational areas must be safeguarded to keep up with the rising population figures.

This calls on the one hand for the preservation and networking of large-scale protection zones, such as the extension of the Vienna Woods in the north-eastern part of the city. On the other hand, it also calls for a dense network of local green and open spaces and smaller vertical and horizontal gardens. Further measures to stabilise inner-city temperatures include the planting of trees in the city, façade and roof gardens, new buildings with greened flat roofs and neighbourhood gardens. Current guidance values for green space provision are being updated by adding such factors as accessibility, efficiency of supply and other qualities. A high share of green spaces is another key element in the city's efforts to safeguard biodiversity.

Air pollutant and noise emissions negatively impact human health and quality of life and cause huge economic costs, which must be minimised by forward-thinking planning as well as by early avoidance and protection measures. The City of Vienna realised its responsibility already at an early date and thus has developed comprehensive measures that are reflected in the measured values, which are largely gratifying. For example, the three packages of measures implemented by the City of Vienna to combat particulate matter made it possible in the past two years to comply with the European limit values. This approach is systematically pursued. Close co-operation with other relevant decision-makers, in particular the Federal Republic of Austria and the EU, is a key pillar towards this goal. On the basis of the EU Environmental Noise Directive, the City of Vienna has joined forces with the Federal Republic[30] to develop action plans, which contain numerous already successfully implemented measures to curb noise for the benefit of Vienna's population.

Traffic in Vienna is the main causal agent of noise and air pollutants. Smart urban development should create the spatial-planning and structural preconditions to motivate the population to switch voluntarily to eco- and climate-friendly mobility types.

Another objective must be to protect the soil because of its manifold ecological functions. Soil is a habitat, pollutant filter, infiltration body and CO_2 storage medium of the planet's biogenesis and contributes positively to the microclimate. Resource-conserving and efficient urban

[30]   Federal Ministries, ASFINAG, Austrian Federal Railways (ÖBB)

expansion, i.e. minimal land consumption due to compact designs, the favouring of internal condensation and brownfield development are to curb soil sealing.

A notable part of Vienna's green spaces is used for agriculture: horticulture, viticulture and field crops. This is unique for a metropolis of this size. The municipal administration and the city government have for many years been promoting environmentally friendly, ecologically oriented methods of organic and genetically unmodified production.

Vienna's waste management system contributes not only essentially to making the Austrian capital a very clean city; it is also strongly oriented towards the Smart City Wien objectives and due to cutting-edge technology saves 550,000 tonnes of CO_2 equivalents annually, which is more than it actually causes through waste management (i.e. 420,000 tonnes of CO_2 equivalents[31]). In this way, it actually over-accomplishes the objective of a zero-emission city. This is achieved by producing district heat from residual waste incineration, the fermentation of kitchen waste in Vienna's biogas plant, waste separation and waste recycling as well as the use of compost for organic farming.

In 2020, municipal waste management attains approx. 270,000 tonnes of CO_2 equivalents by savings as a result of further measures and improvements.

A garden at the doorstep

More and more often, Vienna's citizens, too, like to take up a spade to create gems of shared, self-determined cultivation – it's called "urban farming". Over recent decades, new forms of urban farming have sprung up across the world, e.g. the community garden movement. The great benefits of this gardening culture lie in fostering social encounters and a sense of community, thereby creating the substrate for more intense commitment on behalf of the neighbourhood (called "Grätzl" in the Viennese dialect).

Ecological production and ecological consumption

Exemplary programmes, such as the Vienna EcoBusinessPlan and "ÖkoKaufWien", lead to significant reductions of the negative environmental impact of production and consumption. The former supports Viennese enterprises in the development of environmental and sustainability measures. More than 1,000 enterprises have taken part in this programme so far and saved over Euro 120 million in operating costs by means of approx. 15,000 measures for the benefit of the environment. The effect on the environment is

31 Study "Klimarelevanz der kommunalen Wiener Abfallwirtschaft" by denkstatt, commissioned by Municipal Departments 22 and 48 and Wien Energie Fernwärme. For the waste management system, this results in a savings surplus of 130,000 tonnes of CO_2 equivalents: this quantity corresponds to the emissions of electricity generation for 130,000 households or the emissions of 60,000 cars travelling 15,000 km each.

equally impressive: inter alia, waste production was curbed by 123,570 tonnes, which equals 1.53 times the capacity of Vienna's Ernst Happel Stadium; moreover, 1.04 TWh of energy was saved, corresponding to the annual consumption of 208,000 Viennese households; the emission of carbon dioxide was curbed by 305,000 tonnes, which can be equated with the volume of 51,300 hot-air balloons; 93.4 million transportation kilometres were likewise rendered unnecessary, corresponding to 2,330 trips around the equator. Furthermore, drinking water consumption was reduced by 2.573,500 cubic metres, equal to the volume of 830 Olympic-sized swimming pools.

"ÖkoKaufWien" is a programme for sustainable public procurement and covers everything from detergents and office supplies to services and construction works.

9 Links between the individual objectives

Being a smart city also means nurturing constant evolution and creating space for new developments. These new developments – be they services, forms of social encounter, business concepts, mobility types or expressions of culture – cannot always be contained in pre-appropriated spaces and certainly do not respect cut-and-dried competencies and rules of procedure. Some novelties and changes produce their added value quickly and at several levels, e.g. by conserving resources and improving the quality of life. Others may initially strain existing structures. This routinely puts the management of a smoothly functioning city to the test and requires it to prove its adaptability. First of all, this calls for openness and the willingness to question time-tried procedures from all actors involved. Past successes can only be projected into the future if this willingness is a given.

The special effect of the framework strategy should and will find its expression in the development of stronger links between the individual thematic areas and objectives:

- First of all, the multiple benefits of activities are rendered more clearly visible: thus high quality of life is often a result of resource-conserving changes, and innovations – ideally "invented here" – frequently reduce resource input.
- Moreover, potentials relating to all three objectives – resource preservation, quality of life and innovation – can only be tapped if tasks are viewed in a cross-cutting manner and limits of responsibility are overcome. If properly supported, local action is often able to break down such boundaries. A lack of co-operation entails high costs in terms of inconsistencies, duplications of effort or gaps.

- In addition, exemplary and awareness-creating measures in the field of the City of Vienna's activities as an entrepreneur under private law contribute significantly to stimulating awareness among the population, which is a key actor of the Smart City Wien Initiative. This includes the use of renewable energy sources in buildings, car pools or innovative pilot projects to demonstrate the positive attitude of the city towards new developments and innovations.

But not all interactions are solely positive. As a rule, Vienna is attuned to identifying such developments: both administration and citizenry keep a wary eye on potential innovations for potentially harmful side effects. As a smart city, however, Vienna invests as much energy in spotting positive effects and mutual benefits.

Already today, there exist many examples of activities that are "net contributors" to the smart city concept. Some are listed here.
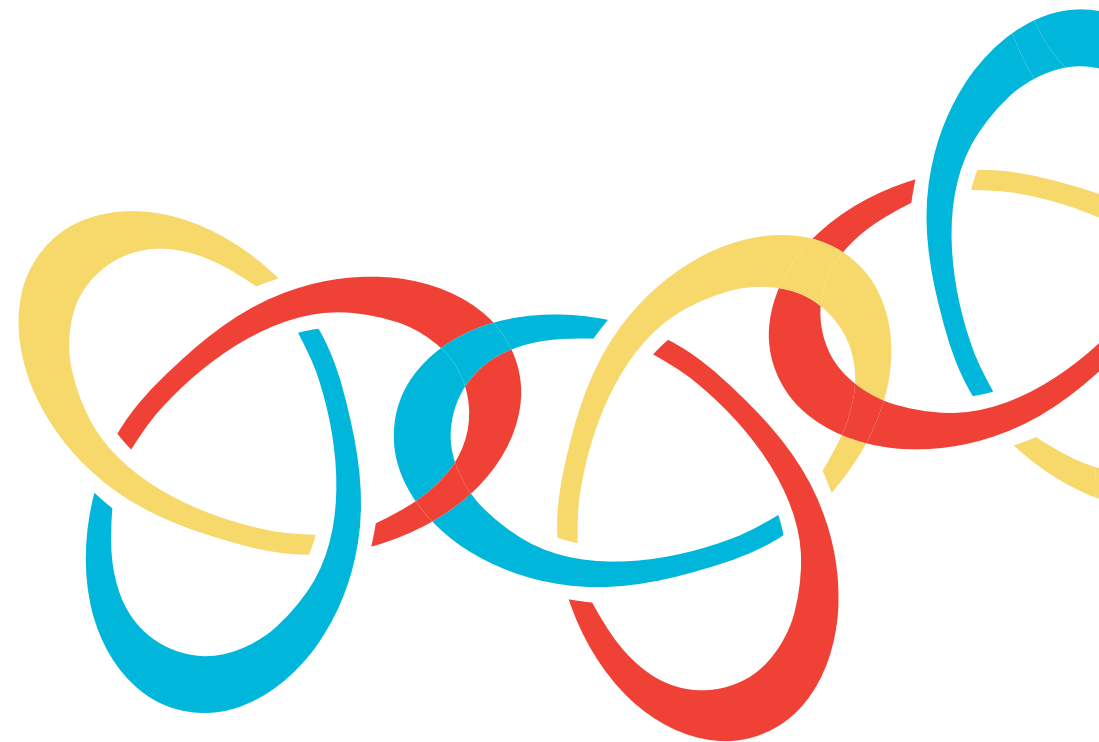
Strengthening of sub-centres and neighbourhoods

The strengthening or establishment of sub-centres that offer a wealth of shops and services, short distances, lively open spaces and multifunctionality is to proceed in urban areas that so far lack such centres. Thus even a growing city should be able to safeguard short distances between housing and schools. The average share of 90% of primary school places close to pupils' homes is to be maintained. Other social infrastructure facilities, too, should be in close proximity and offer easy access for all users. Multiple forms of use of public spaces including work, housing and social activities must be fostered even more than today for reasons of efficiency and capacity use and also to promote a good mix.

Sustainability at the local level: from pilot district to urban quarter

In co-operation with the Municipal District Office of the 22nd district Donaustadt, sustainability was systematically implemented by monitoring the development of this specially selected district. This successful pilot project will be gradually extended to the entire city. The planned project identifies/initiates urban activities and places considered suitable for rendering sustainability "palpable". The corresponding places/activities will be concentrated – similar to the "Sustainable Donaustadt" map – and complemented by other activities to create even greater visibility.

Temporary use of sites for cultural purposes

Vacant houses and shop premises offer the possibility of putting them to temporary use for artistic and cultural projects, which entails benefits for urban development. Over the coming years, the concrete objective lies in attracting a greater number of cultural institutions to urban expansion areas. The co-ordination project "einfach-mehrfach" of the City of Vienna initiates, supports and promotes projects for multiple and temporary use in all municipal districts and functions as an instrument of internal and external structural support. This implementation model also comprises aspects of authentic requisition (statement of needs) and participation, promotes self-organisation and co-operates with universities on a permanent basis.

aspern – Vienna's Urban Lakeside

In the 22nd municipal district of Vienna, north-east of the city centre, aspern – Vienna's Urban Lakeside is emerging in several stages until 2028 as one of Europe's biggest urban development projects. Numerous exemplary initiatives are being implemented and often interlinked, e.g. in the fields of mobility, urban planning, innovation or energy, with the objective of creating a new, multifunctional and attractive part of Vienna with housing, offices and a commercial, science, research and education quarter grounded in the latest findings in energy efficiency, building standards and forms of use. One example is Smart City Research GmbH & Co KG (ASCR), a company established by the City of Vienna together with Siemens AG with the remit of researching and implementing energy efficiency solutions on the basis of real-life buildings in Vienna's urban development zones over the coming years.

Energy consumption in hospitals

With regard to their energy consumption, hospitals are considered "cities within the city". Big hospitals need as much energy as small towns – for medical equipment, lighting, heating, cooling or ventilation. Their contribution to the resource preservation objective e.g. lies in the intensified use of energy contracting, the production of their own energy, the use of renewables or electromobility.

Networked spatial, mobility and energy planning

More comprehensive solutions are necessary to meet future challenges. In order to network all aspects of spatial, mobility and energy planning already in early phases, integration at urban quarter and neighbourhood level in a joint process to identify optimal infrastructure solutions offers the possibility to consolidate Vienna's standing as a smart city. Networking and novel structures and processes must hence be conceived of as spatial (at the urban quarter and neighbourhood level) and in time (consider/involve all stakeholders already in early phases).

New building for Wien Museum Karlsplatz

The City of Vienna will construct a future-oriented new building in Karlsplatz square (the current site of the museum) to house the Wien Museum. The new project will make use of the already existing structure. With this decision, Vienna is setting a clear signal of urban renewal, revitalisation, conversion, addition and condensation. The new building will correspond to all criteria of an ecologically sustainable and energy-efficient, 21st-century building typology.

Culture mediation

In the next few years, the numerous existing mediation programmes in the cultural field – e.g. the "Wiener Kulturpass" (culture pass for persons with low incomes) or the "Go for Culture" initiative – are to be complemented with others. In this way, innovative ideas include large strata of the population and whet their interest in cultural events.

Energy balance of educational establishments

On the basis of cost/benefit analyses, the energy balance of educational establishments and municipal office buildings should be improved by means of energetic refurbishment of the existing building stock and energy-efficient construction and operation methods for new educational infrastructure buildings to promote the Smart City Wien objectives.

Fig. 5 Examples of activities that contribute in multiple ways to the Smart City Wien initiative
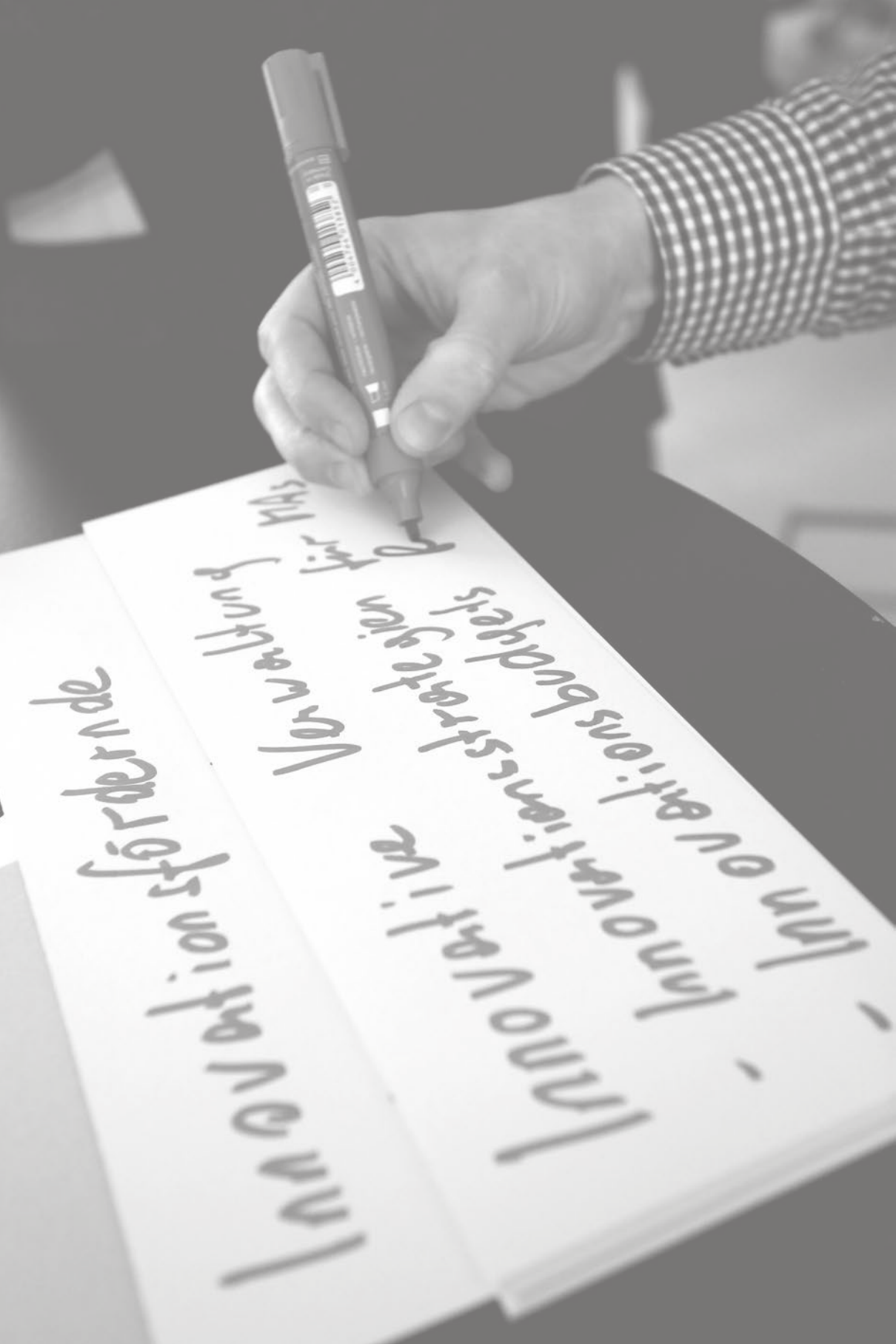
10 Governance

Vienna's objective to be a smart city and the implementation of the framework strategy confront the Austrian capital with special challenges. Many objectives cannot be tackled through individual activities or competencies but require superordinate thematic management. The strong innovation orientation that is a hallmark of the smart city concept not only affects Vienna as a hub of research, education and business but also generates new instruments and approaches that govern the way in which the municipal administration and its enterprises design processes and, above all, render services. For the city and its residents, this means that service quality remains very high, and the ways of service delivery will evolve constantly, with special account taken of the different needs of users (gender and diversity).

The smart city approach has two primary levels of implementation: on the one hand, it concerns the political level and hence the privilege of setting political priorities and defining policies in view of increasing complexity coupled with tight resources. On the other hand, the smart city concept poses challenges for the operative level, also because many tasks can only be handled by cutting across individual organisational units. For the staff members and organisational units of the City of Vienna, this calls for even tighter co-operation within and outside the municipal administration. This "outside" harbours a particularly important aspect, i.e. the necessity of further intensifying the consultation processes with the Federal Provinces of Lower Austria and Burgenland, for example regarding mobility and regional development issues, on the basis of existing structures like PGO and SUM.

Perhaps the most essential task of the Smart City Wien framework strategy lies in the additional assistance it can provide for the numerous specialised strategies underway in Vienna. In this way, these planning documents, which usually reflect a time horizon of seven to ten years and deal with future-oriented questions of energy supply, climate protection, urban planning, occupational qualifications or research/innovation pick up greater momentum to define and pursue ambitious objectives and measures.

Towards this purpose, the City of Vienna will in the course of the coming years take the following steps in the areas specified on the next pages.

10.1 Co-ordination and co-operation, establishment of lighthouse projects

Smart City Wien means change and the tackling of larger thematic areas going beyond narrow departmental confines. Already existing examples include the SMILE mobility card of Vienna Public Utilities, ÖBB (Austrian Federal Railways) and municipal actors; ongoing Smart City calls of the Vienna Business Agency or the URBEM-DK co-operation between the Vienna University of Technology and Vienna Public Utilities in the context of a doctorate course on energy and mobility modelling.

To allow for interdepartmental strategic and "smart" control that also includes municipal enterprises, a suitable organisational model needs to be developed.

This might e.g. contain the following elements and implementation steps:

- Regular Smart City Wien steering rounds chaired by the Chief Executive Director of the City of Vienna with the assistance of a scientific advisory board.
- A Smart City Wien Agency as the central co-ordination point for all internal and external stakeholders. It should cover the areas of co-ordination, stakeholder management, inquiry management and communication and would record, evaluate and initiate projects on behalf of all relevant partners within and outside the City of Vienna. The objective lies in the interdisciplinary promotion of networking between municipal administration, research, business and industry.
- Setting-up of larger innovation projects while taking account of a broad base of different departments, municipal enterprises and third parties to cope with major challenges.
  - → For ventures of this kind, it is suggested to appoint project area managers who at the same time serve as "faces" and testimonials of Smart City Wien.
  - → These ventures would facilitate access to corresponding European innovation platforms and their funding in the Grand Challenges context of the Horizon 2020 framework programme.

- → Examples of such thematic project areas might include mobility management or ambient assisted living (the latter of the Vienna Social Fund).
- → Individual larger lighthouse projects with an innovative character will contribute to the attainment of key Smart City objectives.
- → These projects will follow gender and diversity aspects.
- Strengthening Vienna's co-operation on smart city issues with universities and research institutions: setting up long-term collaborations, support in the recruitment of additional key personnel at Viennese universities and research institutions, "urban issues" as study content, research topics and testing grounds for social innovations.

10.2 Strengthening the participation possibilities of citizens and experts

Smart City Wien means creating a wider leeway for action for all Viennese. Codetermination and modern management go together, both in direct interpersonal contact and via the Internet.

Exemplary implementation steps:

- Large-scale rollout of open government as a principle and driver of innovation.
- Regular Smart City Wien stakeholder forums.
- Development of formats that transport Smart City Wien issues to kindergartens, schools and other educational establishments: a major initiative makes topics like energy efficiency, low-impact mobility, virtual worlds or coexistence in a city without poverty part of the syllabus and enables children and young people to build their own smart Vienna: "100,000 kids design their very own smart city".

10.3 Human resource development, training and recruitment

Smart City Wien projects offer a possibility for employees of the Vienna City Administration and its enterprises to learn about new things and test novel forms of co-operation. For this reason, questions relating to human resource development, training, recruitment and knowledge management are at the centre of the Smart City Wien Initiative.

Exemplary implementation steps:
- Further implementation of the knowledge management strategy of the City of Vienna. The objective lies in making optimum use of networking and further developing the store of knowledge accumulated by staff members. A tool for self-analysis ("Self Check") enables municipal departments to meet their most urgent needs with suitable methods and to align their work with the overall strategy of the Vienna City Administration ("Strategy House"). At the same time, a strategic unit is set up and a community of practice is initiated to safeguard the coverage of cross-cutting thematic knowledge.
- Further development of the diversity-oriented human resource management methods of the City of Vienna as well as of equality between women and men in human resource management.

10.4 Information and brand management for Smart City Wien

The Smart City Wien Initiative is designed to focus important steps towards change for the coming decades. A strong and broad-based communication strategy is to give vibrant life to this concept. This will only be possible for the Vienna City Administration through constant exchange and dialogue with the population as well as with numerous other partners. In this way, Vienna can be positioned as a strong brand in the international competition between cities.

Exemplary implementation steps:
- Continuation of the Smart City Wien campaign launched in 2013 with concrete projects and testimonials.
- Establishment of a Smart City Wien award with three categories – resource preservation, innovation and quality of life – for exemplary projects; in co-operation with external partner organisations.
- Stronger involvement of enterprises that support the City of Vienna in its strategy with their Smart City (Wien) projects. Applies both to external effects and co-funding.

10.5 Alliances, lobbying and consultation processes

With regard to innovation, energy and climate issues, cities are more and more at the centre of interest and policy design. Through co-operation, cities can give more weight to their concerns, e.g. the safeguarding of the principles of public services and services of general interest or the eligibility for subsidies in important areas.

Exemplary implementation steps:
- Intensification of city alliances in Austria but above all with other European metropolises to formulate demands useful to attain Smart City objectives.
  - → Active conducting of a debate with other cities and regions on how infrastructure investments could again be accorded a special role in the calculation of government debt ratios.[32]
- Development and implementation of three joint projects with the Federal Ministry for Transport, Innovation and Technology (BMVIT) based on the "Memorandum of Understanding between the City and Vienna and BMVIT" over the next three years.
- Systematic defence of the interests of Vienna and other big cities (lobbying, services of general interest, subsidies) on the European level.
- Canvassing of 20 patrons from the corporate sector, associations and civil society for important Smart City Wien projects over the next three years in combination with joint PR work and – where possible – financial contributions of these patrons. In general, relevant stakeholders outside the municipal administration are integrated into the processes on a long-term and binding basis.

[32] The terms "investment-related government debt concept" or "golden rule" refer to methods of calculating the government debt ratio that do not count investments as augmenting the government debt level.

- Setting-up of a joint strategy development process for issues crossing the municipal boundaries by means of the Smart City Region Platform in the context of PGO. This is to result in concrete key projects in such areas as mobility and regional development.

11 Monitoring

For the implementation of the Smart City Wien objectives, a coherent monitoring and reporting process with a limited number of core indicators is to be established. The set of core indicators comprises status, target and policy indicators. For this purpose the established objectives and intermediate objectives with defined time axes are drawn upon. The degree to which the objectives of the Smart City framework strategy are met is measured by means of the core indicators assigned to each key objective. Detailed indicators are limited to the individual specialised strategies in the context of a fine-tuned process.

This includes the development of an ongoing process with
- an analysis of indicators
- the development of packages of measures and a definition of responsibilities
- decisions regarding the implementation of these packages
- continuous reporting and adaptation of the strategy, i.e. a definition of who may take necessary improvement measures, and what sort of measures these might be
- the implementation of these measures with suitable implementation monitoring

At regular, brief intervals, the status of implementation is determined. This can be done by means of mandatory, scheduled and shorter data assessments at certain moments in the form of a status report and by means of an analysis and interpretation of outcomes in strategic reports compiled at longer intervals. This makes it possible to monitor progress; it also allows for the fine-tuning and adjustment of objectives.

The monitoring process involves all departments in a cross-cutting fashion. To take account of target groups, it also evaluates process data in a gender- and diversity-specific style.

12 International level and models to follow

Cities are faced with many challenges of a social, technological and ecological kind. In the international context, the smart city concept is above all couched in terms of resource conservation and CO_2 reduction. At the moment in Europe alone, cities account for 70 % of total energy consumption. Moreover, the global urbanisation trend is continuing. While Smart City Wien also includes quality of life and social aspects, the international discourse on CO_2-related questions is still necessary.

If Europe wants to develop an innovative low-carbon economy and society, metropolises will therefore play the central role. The European Union is aware of this coherence and has already taken the first essential steps towards finding joint solutions. Thus the European Commission launched the "European Smart Cities and Communities" initiative, whose main goal is to network European cities and to promote future co-operation projects in order to jointly identify solutions for urban challenges and increase the energy efficiency of European cities. Moreover, the European Union is continuously adapting its established funding schemes and implementing new possibilities for improved co-operation to achieve the transformation into smart cities.

In keeping with the ambition to take an international pioneering role in the context of a future-oriented innovative smart city, the Smart City Wien Initiative has participated in European networks and joint funding projects with international partners from the get-go. Ongoing exchange and proactive involvement in European networks – e.g. the EU Smart Cities and Communities stakeholder platform, the Eurocities network, the Covenant of Mayors and many others – safeguard constant information flow and exchange with other European cities. Thus Vienna already today takes a solid role in the field of smart cities and urban technologies, which is reflected in a great number of international inquiries. Established networks and contacts entail co-operation in joint European research projects.

The Smart City Wien framework strategy and its preparatory process are embedded in European projects and parallel activities. Examples of these are TRANSFORM[33] and EU-GUGLE as part of the Seventh EU Framework Programme for Research, Transform+[34] and the INTERREG IV C project CLUE[35]. These projects allow for the generation of comprehensive and broad-based new knowledge. Through all these activities, Vienna maintains continuous contacts with other forerunner cities such as Amsterdam, Copenhagen, Hamburg and Stockholm. In the future, too, a great deal of attention will be paid to this international level and to corresponding co-operation projects.

33 Transformation Agenda for Low Carbon Cities
34 National project of the Climate and Energy Fund of FFG (Austrian Research Promotion Agency) to complement TRANSFORM
35 Climate Neutral Urban Districts in Europe

13 The strategy process

Under the aegis of Mayor Michael Häupl, the City of Vienna launched the Smart City Wien Initiative in 2011. Smart City Wien builds on existing approaches to environmental and climate policy, concentrates the available resources and makes sure that the collaboration between all actors will facilitate a joint focus on superordinate goals.

A crucial starting-point was provided by a broad-based stakeholder process initiated in 2011 with the project "smart city wien"[36] funded by the programme "Smart Energy Demo – FIT for SET" of the Climate and Energy Fund and continuously updated ever since.

The regularly organised forums – conceived as platforms for the exchange of ideas and opinions regarding successes, current developments and future challenges for actors, decision-makers and experts from municipal administration, research, business and industry – are an important element of the initiative and generate impulses for further project developments and participations.

In spring 2013, the Smart City Wien steering group chaired by Chief Executive Director Erich Hechtner decided to have a Smart City Wien framework strategy developed to support the further transformation of Vienna into a smart city and to identify the fundamental objectives necessary towards this goal. Municipal Department 18 (MA 18) – Urban Development and Planning was charged with heading the development of this Smart City Wien framework strategy. In a participatory process involving numerous group discussions, thematic workshops and interviews with more than 100 experts, the main topics of the framework strategy were then rendered concrete, leading to the formulation of objectives.

The Smart City Wien framework strategy should be viewed as a long-term umbrella strategy that spans the entire period until 2050 and encompasses all areas of municipal administration and urban policy in Vienna. Combined with other existing and future documents, plans and pro-

grammes, it defines a productive and structuring thematic framework. In addition to a vision that must be always kept in mind as well, phased objectives, concrete strategies and exemplary activities, instruments and projects are to lay the ground for co-ordinated political action, with a special focus on thematic areas of vital importance for Vienna.

On 24 July 2013, Mayor Michael Häupl and Federal Minister Doris Bures signed a memorandum of understanding (MOU) between Vienna and the Federal Republic of Austria to advance the smart city cause. The objective lies in initiating projects via a joint steering group and to obtain funding at a European level in order to support the implementation of the Smart City Wien framework strategy and the further transformation of Vienna into a smart city.

After a political consultation process, the Smart City Wien framework strategy was adopted by the Vienna City Council on 25 June 2014.

[36] Project "smart city wien" with vision for 2050, Roadmap for 2020 and Beyond, Action Plan 2012-15

I. List of abbreviations

CO_2	Carbon dioxide
EnEffG	Federal Energy Efficiency Act ("Bundes-Energieeffizienzgesetz ")
EnStrat	Vienna Energy Strategy ("Energiestrategie Wien")
EP	European Parliament
EPBD	EU Energy Performance of Buildings Directive
ICT	Information and communication technology
KliP	Climate Protection Programme ("Klimaschutzprogramm")
MIT	Motorised individual traffic
MPV	Transport Master Plan ("Masterplan Verkehr")
PT	Public transport
PGO	Eastern Austrian Planning Association ("Planungsgemeinschaft Ost")
RAP_VIE	Renewable Action Plan Vienna
RTI	Research, Technology and Innovation
SCW FS	Smart City Wien Framework Strategy
SEP	Urban Energy Efficiency Programme ("Städtisches Energieeffizienz Programm")
SMEs	Small and medium-sized enterprises
STEP	Urban Development Plan ("Stadtentwicklungsplan")
SUM	City-Environs Management ("Stadt-Umland-Management")
t	Tonnes

II. List of illustrations

Fig. 1
"The Smart City Wien principle"

Fig. 2
The three dimensions of Smart City Wien

Fig. 3
Interaction of Smart City Wien framework strategy
with existing and future strategies

Fig. 4
Energy flowchart for Vienna (status of 2012, data of 2011,
source: Wien Energie, data by Statistics Austria)

Fig. 5
Examples of activities that contribute in multiple ways to the
Smart City Wien initiative

III. List of references and bibliography

Beauftragter der Stadt Wien für Universitäten und Forschung (Commissioner of the City of Vienna for Universities and Research), Wissen schafft Wert – Hochschulen und Forschung als wichtiger Standortfaktor, Dritter Bericht des Beauftragten der Stadt Wien für Universitäten und Forschung (Third Report of the Commissioner of the City of Vienna for Universities and Research), Vienna, 2013, http://www.universitaetsbeauftragter-wien.at/wp-content/uploads/2013/12/VdB_Report2013_final_.pdf

Bundesministerium für Gesundheit (Federal Ministry of Health), Rahmen-Gesundheitsziele – Richtungsweisende Vorschläge für ein gesünderes Österreich (Framework Health Targets), Vienna 2012, http://www.bmg.gv.at/cms/home/attachments/5/5/3/CH1435/CMS1394200255665/bericht_rgz3_redaktionsteam.pdf

Bundesministerium für Wirtschaft, Familie und Jugend (Federal Ministry of Economy, Family and Youth), Bundesgesetz über die Steigerung der Energieeffizienz bei Unternehmen und dem Bund (Federal Energy Efficiency Act – EnEffG), Vienna 2013, http://www.ris.bka.gv.at/Dokumente/RegV REGV_COO_2026_100_2_855453/REGV_COO_2026_100_2_855453.pdf

Bürgerschaft der freien Hansestadt Hamburg (Parliament of the Free and Hanseatic City of Hamburg), Hamburger Masterplan Klimaschutz (Hamburg Master Plan for Climate Protection), 2013, http://www.coolbricks.eu/fileadmin/Redaktion/Dokumente/Publications/masterplan-klimaschutz.pdf

Cohen B., The Top 10 Smartest European Cities, 2012, http://www.fastcoexist.com/1680856/the-top-10-smartest-european-cities

Mercer LLC, Worldwide Quality of living Survey, 2012, http://www.mercer.com/articles/quality-of-living-survey-report-2011

UN-HABITAT, State of the World's Cities 2012/13, Prosperity of Cities, 2012, http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3387

UN Intergovernmental Panel on Climate Change (IPCC), Stern Review on the Economics of Climate Change 2006, 2013

European Council, Conclusions of the Presidency, 7224/1/07, REV 1, CONCL 1, Brussels 2007, http://register.consilium.europa.eu/doc/srv?l=EN&f=ST 7224 2007 REV 1

Germanwatch, Klima und Klimaschutz in Hamburg: Informationen, Projekte und Adressen rund um die Klimaexpedition, 2007, http://germanwatch.org/klima/hh07.pdf

Siemens AG, Sustainable Urban Infrastructure, Ausgabe München – Wege in eine CO2-freie Zukunft, 2009, https://www.cee.siemens.com/web/at/de/corporate/portal/Nachhaltigkeit/Documents/munich_de.pdf

Institute for Ecological Economy Research, Energiekonzept 2020 – Energie für Berlin, 2011, https://www.berlin.de/imperia/md/content/sen-wirtschaft/energie/energiekonzept.pdf?start&ts=1302593601&file=energiekonzept.pdf

European Commission, Horizon 2020, The EU Framework Programme for Research and Innovation, http://ec.europa.eu/programmes/horizon2020/

European Commission, Energy Roadmap 2050, Brussels 2011, http://ec.europa.eu/energy/energy2020/roadmap/doc/roadmap2050_ia_20120430_en.pdf

Vision 2050, Roadmap for 2020 and Beyond, Action Plan for 2012-15, Smart Energy Demo – FIT 4 SET, Climate and Energy Fund, Vienna, Wien 2010-2012

Shannon Bouton et al., How to Make a City Great, McKinsey & Company

Ricky Burdett, Deyan Sudjic, Living in the Endless City. The Urban Age Project, New York, 2011, p.17

European Commission, Roadmap for moving to a competitive low carbon economy in 2050, 2011, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0112:FIN:EN:PDF

European Commission, Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system, 2011, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0144:FIN:EN:PDF

European Parliament, Directive on the energy performance of buildings (recast), 2010, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF

Federal Ministry of Agriculture, Forestry, Environment and Water Management, Energiestrategie Österreich (Austrian Energy Strategy), 2010, http://www.energiestrategie.at/images/stories/pdf/longversion/energiestrategie_oesterreich.pdf

City of Vienna, Municipal Department 18 – Urban Development and Planning, Transport Master Plan Vienna 2003, Vienna 2003

City of Vienna, Municipal Department 18 – Urban Development and Planning, Urban Development Plan 2005, Vienna 2005; update: Urban Development Plan 2025, in preparation

City of Vienna, Municipal Department 20 – Energy Planning, Renewable Action Plan Vienna, Vienna 2011

City of Vienna, Municipal Department 20 (2013): Energiebericht der Stadt Wien (Energy Report of the City of Vienna); Energieverbrauch im öffentlichen Verkehr 1993-2011

City of Vienna, Municipal Department 20, Energie! voraus, Energiebericht der Stadt Wien (Energy Report of the City of Vienna); Vienna 2013 (2011 data), http://www.wien.gv.at/stadtentwicklung/energieplanung/pdf/energiebericht2011.pdf

City of Vienna, Municipal Department 48 – Waste Management, Street Cleaning and Vehicle Fleet, Wiener Abfallvermeidungsprogramm und Wiener Abfallwirtschaftsplan (Waste Avoidance Programme and Waste Management Plan, 2013-2018 planning period), 2012, http://www.wien.gv.at/umwelt/ma48/service/pdf/awp-avp-2013-2018.pdf

City of Vienna, Energiestrategie 2030 (Energy Strategy 2030), in preparation

City of Vienna, Municipal Department 22, Vienna Climate Protection Programme (KliP I), Vienna 1999, http://www.wien.gv.at/umwelt/klimaschutz/pdf/klip.pdf

City of Vienna, Vienna Climate Protection Programme, 2010-2020 update (KliP II), 2009, http://www.wien.gv.at/umwelt/klimaschutz/pdf/klip2-lang.pdf

City of Vienna, Urban Energy Efficiency Programme (SEP), Vienna 2006, http://www.wien.gv.at/stadtentwicklung/energieplanung/sep/

City of Vienna, Security of Supply Plan, in preparation

Wien Energie, Energy Flowchart for Vienna, Vienna, 2012, http://www.wien.gv.at/stadtentwicklung/energieplanung/pdf/energiebericht2010.pdf

Statistics Austria, Stock of Buildings and Dwellings, 2011 (also in English), http://www.statistik.at/web_de/statistiken/wohnen_und_gebaeude/bestand_an_gebaeuden_und_wohnungen/index.html

City of Vienna et al., Vienna 2020 Qualification Plan, 2013, http://www.waff.at/html/index.aspx?page_url=Qualifikationsplan&mid=358

Statistics Austria, Early School Leavers, 2012 (also in English), www.statistik.at/web_de/statistiken/bildung_und_kultur/formales_bildungswesen/fruehe_schulabgaenger/index.html

Statistics Austria, How's Austria? (also in English), 2012, www.statistik.at/web_de/statistiken/wie_gehts_oesterreich/

Statistics Austria, Time Use (also in English), 2008/09, www.statistik.at/web_de/statistiken/soziales/zeitverwendung/zeitwohlstand/index.html

United Nations Human Settlements Programme (UN-Habitat), State of the World's Cities 2012/2013 – Prosperity of Cities, 2013, http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3387

City of Vienna, Municipal Department 22 – Environmental Protection, Klimarelevanz der kommunalen Wiener Abfallwirtschaft (Climate Relevance of Vienna's Municipal Waste Management), Vienna 2012, http://www.wien.gv.at/umweltschutz/pool/pdf/klimarelevanz-2012.pdf

City of Vienna, Municipal Department 24 – Health Care and Social Welfare Planning, Vienna Social Welfare Report 2010, Vienna 2010, http://www.wien.gv.at/gesundheit/einrichtungen/planung/pdf/sozialbericht-2010.pdf

OECD Publishing, OECD Economic Surveys, 2013, http://www.keepeek.com/Digital-Asset-Management/oecd/economics/oecd-economic-surveys-austria-2013/austria-s-well-being-goes-beyond-gdp_eco_surveys-aut-2013-4-en#page6

City of Vienna, Municipal Department 18 – Urban Development and Planning, Wiener Lebensqualitätsstudien - Sozialwissenschaftliche Grundlagenforschung für Wien 2008 (Vienna Quality of Life Studies, Sociological Basic Research for Vienna 2008 – Summary Report), Vienna 2009, http://www.wien.gv.at/stadtentwicklung/studien/pdf/b008123.pdf

The Economist Intelligence Unit Limited, Global Liveability Report, 2013, www.eiu.com/site_info.asp?info_name=The_Global_Liveability_Report

Wiener Stadtwerke Holding AG (Vienna Public Utilities), Herausforderung Energiearmut und der Beitrag der Wiener Stadtwerke – Ursachen und Auswirkungen von Energiearmut und die Arbeitsweise der Wien Energie Ombudsstelle für soziale Härtefälle (The Challenge of Energy Poverty and the Contribution of Vienna Public Utilities), Vienna 2013

Further reading
CLUE, Climate Neutral Urban Districts in Europe, 2013, http://www.clue-project.eu/

EU-GUGLE, Sustainable Renovation Models for Smarter Cities, 2013, http://eu-gugle.eu/

Fachstelle 2000-Watt-Gesellschaft, 2000-Watt-Gesellschaft, 2013 (2,000-Watt Society), http://www.2000watt.ch/

Klimabündnis Österreich GmbH, Klimabündnis Österreich (Climate Alliance Austria), www.klimabuendnis.at/

The New Economics Foundation (NEF), Happy Planet Index HPI, 2013, www.happyplanetindex.org/

TRANSFORM, Transformation Agenda for Low Carbon Cities, 2013, http://urbantransform.eu/

TRANSFORM+, 2013, http://www.transform-plus.at/

IV. Process actors

Chief Executive Office of the City of Vienna – Steering Group for Smart City Wien:
Erich Hechtner (Chief Executive Office); chair
Dieter Groschopf (wiener_wohnen – Vienna Fund
  for Housing Construction and Urban Renewal)
Marc Hall (Vienna Public Utilities)
Veronika Haunold (TINA Vienna)
Gerhard Hirczi (VBA – Vienna Business Agency)
Ina Homeier (Municipal Department 18)
Brigitte Jilka (Chief Executive Office – Executive Group
  for Construction and Technology)
Stefan Leeb (Chief Executive Office – Communication)
Thomas Madreiter (Chief Executive Office – Executive Group
  for Construction and Technology)
Wolfgang Müller (Chief Executive Office – Executive Group
  for Organisation and Security)
Michael Stampfer (WWTF – Vienna Science
  and Technology Fund)
Ilse Stockinger (Vienna Public Utilities)
Oliver Stribl (Municipal Department 53)
Andreas Trisko (Municipal Department 18)
Angelika Winkler (Municipal Department 18)

Chief Executive Office of the City of Vienna – Smart City expert advisory board:
Brigitte Bach (AIT – Austrian Institute of Technology)
Robert Horbaty (ENCO, Zurich)
Andreas Knie (InnoZ, Berlin)
Verena Madner (Vienna University of Economics and Business)
Rudolf Scheuvens (Vienna University of Technology)

Project leader:
Ina Homeier (Municipal Department 18)

Process monitoring:
Donia Lasinger (WWTF – Vienna Science and Technology Fund)
Michael Stampfer (WWTF – Vienna Science
  and Technology Fund)

Thematic process monitoring (working group):
Elvira Franta (Municipal Department 53)
Stefan Gara (ETA)
Stephan Hartmann (Municipal Department 18)
Pia Hlava (Municipal Department 18)
Thomas Kreitmayer (Municipal Department 20)
Anna Mayerthaler (Vienna Public Utilities)
Kurt Mittringer (Municipal Department 18)
Manfred Mühlberger (ETA)
Volkmar Pamer (Municipal Department 21)
Eva Persy (Municipal Department 22)
Elke Plate (Senate of Berlin, exchange in the context
  of Leonardo Programme)
Volker Schaffler (TINA Vienna)
Christof Schremmer (ÖIR – Austrian Institute
  for Spatial Planning)
Katharina Söpper (Municipal Department 18)
Ilse Stockinger (Vienna Public Utilities)
Monika Sturm (ASCR)
Lara Tiede (Municipal Department 18)
Dominic Weiss (TINA Vienna)

Interview partners and process contributors:
Ursula Adam (WAFF – Vienna Employment Promotion Fund)
Thomas Bednar (Vienna University of Technology)
Agnes Berlakovich (Municipal Department 24)
Eva Buchinger (AIT – Austrian Institute of Technology)
Karin Büchl-Krammerstätter (Municipal Department 22)
Office of the Executive Policy Group for Integration, Women's
  Issues, Consumer Protection and Personnel

Michael Cerveny (TINA Vienna)
Gabriele Domschitz (Vienna Public Utilities)
Dieter Drexel (IV – Federation of Austrian Industries)
Andreas Eigenbauer (Chief Executive Office – Executive
  Office for Strategic Energy Policy)
Andrea Faast (Vienna Economic Chamber)
Susanne Fabian (Municipal Department 21)
Roland Fischer (IFF University of Klagenfurt)
Christine Fohler-Norek (Chief Executive Office – Executive Office
  for the Co-ordination of Climate Protection Measures)
Wolfgang Förster (Municipal Department 50)
Julia Frank (Municipal Department 18)
Harald Frey (Vienna University of Technology)
Regine Gerike (University of Natural Resources
  and Life Sciences Vienna)
Michael Gervautz (Imagination Computer Services GesmbH)
Rudolf Giffinger (Vienna University of Technology)
Birgit Ginzler (TINA Vienna)
Dietmar Griebler (Municipal Department 5)
Simon Guy (University of Manchester)
Christian Habernig (Municipal Department 14)
Dieter Häusler (Municipal Department 18)
Rainer Hauswirth (Executive Policy Group for Education,
  Youth, Information and Sports)
Klemens Himpele (Municipal Department 23)
Roland Hierzinger (AEA – Austrian Energy Agency)
Josef Hochgerner (ZSI – Centre for Social Innovation)
Claus Hofer (Technology Agency of Vienna)
Johannes Höhrhan (IV – Federation of Austrian Industries)
Daniela Kain (Climate and Energy Fund)
Gerti Kappel (Vienna University of Technology)
Thomas Keller (Chief Executive Office – Executive Group
  for Construction and Technology)
Norbert Kettner (Vienna Tourist Board)
Gunda Kirchner (AEA – Austrian Energy Agency)
Roland König (Executive Policy Group for Public Health
  and Social Affairs)
Isabella Kossina (Vienna Public Utilities)
Leopold Liechtenstein (IV – Federation of Austrian Industries)
Daniel Löcker (Executive Policy Group for Cultural Affairs
  and Science)
Jutta Löffler (Executive Policy Group of Finance, Economic Affairs
  and Vienna Public Utilities)
Wolfgang Loibl (AIT – Austrian Institute of Technology)
Wolfgang Lutz (Vienna University of Economics and Business,
  IIASA)
Markus Marterbauer (Chamber of Labour)
Isabelle Meran-Waldstein (IV – Federation of Austrian Industries)
Johann Mittheisz (Chief Executive Office – Executive Group for
  Organisation and Security)
Gerhard Mörtl (Municipal Department 5)
Gerald Murauer (Siemens)
Hans-Martin Neumann (AIT – Austrian Institute of Technology)
Franz Oberndorfer (Head of the Executive Office of the Mayor)
Sigrid Oblak (Wien Holding)
Andrea Paukovits (Executive Policy Group for the Environment)
Ferdinand Pay (Executive Policy Group of Finance,
  Economic Affairs and Vienna Public Utilities)
Gabriele Payr (Vienna Public Utilities)
Margit Peter (Municipal Department 22)
Christian Pöhn (Municipal Department 39)
Wolfgang Polt (Joanneum Research)
Regina Prehofer (Vienna University of Economics and Business)
Clemens Rainer (denkstatt)
Michael Rauhofer (FTW – Telecommunications Research
  Center Vienna)
Beatrix Rauscher (Municipal Department 18)
Helmut Rechberger (Vienna University of Technology)
Herbert Ritter (Municipal Department 20)
Edith Rudy (Executive Policy Group for Education, Youth, Infor
  mation and Sports)
Martin Russ (AustriaTech)
Ingolf Schädler (BMVIT – Federal

Ministry for Transport, Innovation and Technology)
Gerhard Schmid (TINA Vienna)
Waltraud Schmid (TINA Vienna)
Martina Schmied (Head of the Executive Group for Personnel
  and Internal Auditing of the City of Vienna)
Andrea Schnattinger (Ombudsperson for Environmental
  Protection)
Josef Michael Schopf (Vienna University of Technology)
Monika Schuh (IV – Federation of Austrian Industries)
Hans-Günther Schwarz (BMVIT – Federal
  Ministry for Transport, Innovation and Technology)
Sigrid Semlitsch (Executive Policy Group of Finance,
  Economic Affairs and Vienna Public Utilities)
Mahshid Sotoudeh (ÖAW – Institute for Technology Assessment)
Christiane Spiel (Vienna University)
Christine Spieß (Project leader for aspern - Vienna's
  Urban Lakeside)
Sonja Starnberger (EIW – Energy Institute for Business)
Bernhard Steger (Executive Policy Group for Urban Planning,
  Traffic & Transport, Climate Protection, Energy and
  Public Participation)
Lukas Stockinger (TINA Vienna)
Gregor Stratil-Sauer (Municipal Department 18)
Monika Stumpf-Fekete (Vienna University)
Gregory Telepak (Municipal Department 18)
Gregor Thenius (AEA – Austrian Energy Agency)
Andrea Trattnig (Executive Policy Group for Education,
  Youth, Information and Sports)
Michaela Trojan (wiener_wohnen – Vienna Fund for
  Housing Construction and Urban Renewal)
Gabriele Trummer (Executive Policy Group for Public Health
  and Social Affairs)
Bernd Vogl (Municipal Department 20)
Andrea Wagner (Executive Policy Group for Housing,
  Housing Construction and Urban Renewal)
Wolfgang Wais (Vienna Public Utilities)
Christine Wanzenböck (Municipal Department 23)
Matthias Watzak-Helmer (TINA Vienna)
Norbert Weidinger (Chief Executive Office – Executive Group
  for Organisation and Security)
Peter Wieser (Municipal Department 23)
Gregor Wiltschko (raum & kommunikation GmbH)
Beate Wimmer-Puchinger (Vienna Commissioner for
  Women's Health)
Christian Wurm (Municipal Department 23)
Thomas Zemen (FTW – Telecommunications Research
  Center Vienna)
Axel Zuschmann (Ecker & Partner)

Forums:
Smart City Wien stakeholder forums
  (29 April 2013, 26 November 2013)
Press and Information Services (Municipal Department 53),
  workshop "Smart City Wien" for department heads
  (14 June 2013)
KliP workshop in Litschau
  (2-4 October 2013)
Intake workshop in the context of the EU-supported
  TRANSFORM project (17-18 September 2013)
IT company round
  (25 September 2013)
Mobility workshop
  (24 July 2013, 6 August 2013, 30 October 2013,
  10 February 2014)
Thematic focus groups
  (26 August 2013, 28 August 2013, 30 September 2013,
  21 October 2013)

V. Glossary

20 -20-20 targets of the European Council for 2020
The European Union has set itself ambitious energy- and climate-policy objectives. Until 2020, these 20-20-20 targets obligate EU Member States to reduce greenhouse gas emissions by at least 20% vis-à-vis 1990, to improve their energy efficiency by 20% and to raise the share of EU energy consumption produced from renewable resources to 20%.

2,000-Watt Society of Zurich
With the initiative of the "2,000-Watt Society", the City of Zurich is leading the way to an energy-efficient, sustainable city of the future. Concretely, this means that Zurich:
· is committed to sustainable development,
· will reduce its energy consumption to 2,000 watt per person,
· will reduce its CO_2 production to one tonne per person and year by 2050,
· promotes renewable energy sources and energy efficiency,
· and will not renew its participation in nuclear power plants.
In this way, Zurich wants to contribute to climate protection. As a 2,000-watt society, Zurich is better prepared for times of scarce and costly energy resources.

A ir pollutant emission
Air pollutant emission is the primarily anthropogenic release of certain substances into the atmosphere and stratosphere. This is mainly caused by traffic and industry. The increasing volume of air pollutant emissions directly impacts humans and the environment.

Ambient Assisted Living (AAL)
Age-appropriate assistance systems for a self-determined life comprise technical systems to support persons in need of assistance in their everyday lives. The objective lies in preserving and promoting independent lifestyles of persons including the very aged and in improving the quality of assistance, support and domestic services. The techniques and technologies are user-centred – i.e. focus on the client – and are integrated into this person's immediate living environment. Thus technology adapts to the client's needs and not vice versa.

B est point of service
To ensure a highly efficient healthcare system, this term describes demand-oriented treatment and care process management across all care levels. This safeguards that the correct service is delivered at the right moment and in the right place by providing optimum medical and nursing quality in the macro-economically most cost-efficient manner.

C ampus sites/Vienna Campus Model
The Vienna Campus Model concentrates kindergartens, schools and leisure education in one location. This co-operation is to ensure optimised use of all resources: all rooms of the building(s) are available for the teaching of all children. Joint projects make it possible to learn together as well as from each other. Smoother transitions between the different age groups and the combination of study and leisure activities are clear advantages of this model.

Climate neutrality
This term defines the reduction and compensation of greenhouse gas emissions as well as processes or certain conditions that do not lastingly change or impair the global climate. Often various products, too, are called or advertised as "climate-neutral". The most consistent form of climate-neutral energy use is the exploitation of greenhouse gas-free energy sources such as sunlight, wind and hydroelectricity.

Climate Protection Programme (KliP)
The current Climate Protection Programme (KliP II) of the City of Vienna, which was adopted by the City Council in 2009, defines climate protection targets to be attained by 2020 and stipulates a corresponding package of measures. The update of KliP I (1990) comprises a total of 385 individual measures in various fields of action: energy supply, energy use, mobility and urban structure, procurement, waste management, agriculture and forestry, nature conservation and public relations.

CLUE (Climate Neutral Urban Districts in Europe)
This INTERREG IV C project scheduled from January 2012 to December 2014 tackles the challenges sustainable cities and urban quarters aiming for an improved CO_2 balance are facing. A key objective lies in increasing local and regional capacities to develop political concepts for the implementation and assessment of new solutions and technologies. The consortium co-ordinated by the City of Stockholm comprises nine local and regional authorities as well as three universities from a total of nine European countries.

CO_2
Carbon dioxide, the most important greenhouse gas, mainly results from the incineration of the fossil fuels carbon, petroleum and natural gas. Throughout the Smart City Wien framework strategy, the term "CO_2" is used synonymously with "CO_2 equivalents" for reasons of simplicity.

CO_2 equivalent
The greenhouse gas effect of different greenhouse gases, e.g. methane, nitrous oxide (laughing gas) or fluorinated (F) gases, varies. The CO_2 equivalent value describes the greenhouse gas potential of a gas across an observation period of usually 100 years as compared to CO_2. The quantity in tonnes of the gas in question thus emitted is multiplied by the factor by which the greenhouse gas effect of the gas exceeds that of CO_2. The outcome is the emission volume in tonnes of CO_2 equivalents. Due to the uniform presentation of the environmental effects thus caused, the emissions of different greenhouse gases can be added up. In Vienna, 94% of all greenhouse gas emissions (expressed in CO_2 equivalents) in 2009 were due to CO_2; methane, laughing gas and F gases accounted for only 6%.

Cogeneration
Cogeneration (or combined heat and power – CHP) is the simultaneous production of power and heat, with power normally used directly to generate electric energy. As a rule, the heat generated is used for heating purposes by either feeding it into a heating grid or directly on-site. The combined use of power and heat results in high overall efficiency, which entails primary energy savings. In Austria, a great part of thermal power production is done in CHP plants.

D octorate course URBEM-DK
Wiener Stadtwerke Holding AG (Vienna Public Utilities) and Vienna University of Technology have jointly instituted a doctorate course entitled "Urban Energy and Mobility Systems" (URBEM-DK). The goal is the research and development of scenarios for the path to a "sustainable, supply-secure, affordable and liveable city", using the example of Vienna with an integrated and inter-disciplinary approach. Starting with the 2013/2014 winter semester, 10 university graduates will receive a three-year position at Vienna University of Technology to enable them to complete their doctoral theses.

Domestic traffic/transport
This term defines traffic and transport within the borders of a state or confederation of states.

Drinking water power plant
The principle of drinking water power plants is based on the exploitation of the difference in elevation between spring and reservoir and the water quickly flowing through the nozzle to generate electricity. Thus the drinking water turbine serves the function of a pressure-reducing valve and produces additional electric energy from the desired pressure reduction. Before the construction of drinking water power plants, the high gravitational pressure in Vienna had to be reduced mechanically (hydraulic surge control valves = Clayton valves) in order to obtain optimum pressure in the pipe network. This method has no effect whatsoever on drinking water quality.

E arly school leavers
According to the definition of the EU, early school leavers are people aged 18-24 years who are no longer in education or training and have no higher secondary education (no attainments above ISCED level 3c). Adapted to the Austrian situation, young people do not count as early school leavers if they, before leaving the educational system, have at least completed an apprenticeship or a multiyear vocational school, while the completion of a lower secondary school, a polytechnic secondary school or a one-year vocational middle school (e.g. one-year domestic-science schools) is not sufficient.

e-car sharing
On an average, private motorised vehicles are used only one hour per day and are parked, mostly in public space, for the remaining 23. To promote a more efficient use of cars and parking space, several initiatives have sprung up in Austria over the past few years to offer either commercial or privately organised car sharing services. At the moment, car sharing services are mainly located in cities; a comprehensive range of different forms of car sharing and appropriate vehicles will certainly impact the future of mobility. e-car sharing describes car sharing services based on electrically powered vehicles for individual traffic.

EcoBusinessPlan Vienna
EcoBusinessPlan Vienna is the environmental service package of the City of Vienna for enterprises in the Austrian capital. Established in 1998 by Municipal Department 22 – Environmental Protection, EcoBusinessPlan Vienna supports companies in their implementation of eco-relevant measures in day-to-day work and contributes to the reduction of operating costs.

Eco-friendly means of transport
These are all means of transport whose pollutant and noise emissions and land consumption do not damage the environment: walking, cycling (including public bike rental such as the "Citybike" system), public transport (suburban trains, Underground, trams, buses) and, in the wider sense, taxis, car sharing or car pools; combinations of these means of transport are also included.

e-government
"e-government" (or electronic government) is synonymous with modern, efficient administrative methods. Concretely, it stands for the use of information and communication technology (ICT) by public administrations in combination with organisational changes and new skills in order to improve public services and democratic processes and facilitate the design and delivery of public policies.

Electromobility
This term defines the use of electric-powered vehicles to meet different individual mobility needs and is hence a cross-cutting issue that extends across traffic/transport, infrastructure, technology, energy and environment.

Energy Efficiency Act of 2013
The Energy Efficiency Act of the Federal Republic of Austria was adopted by the Council of Ministers but failed to obtain the required two-thirds majority in Parliament. It comprised the following key aspects:
· increase of the share of renewable energy sources in total energy consumption, power generation and the traffic/transport sector
· saving energy by stepping up cogeneration, increasing energy intensity, energy checks for households and thermal rehabilitation

· active climate protection by means of energy, environmental, location and transport policies

Energy Roadmap 2050 of the European Commission
To attain the target of reducing emissions by over 80% by 2050, the European Commission presented the Energy Roadmap 2050 in December 2011. The Roadmap explains how this target can be achieved without impairing security of energy supply and competitiveness. Starting from the analysis of several scenarios, the effects of a CO_2-free energy system and the political framework necessary to attain this goal are described in this paper. Member States should take the necessary energy policy decisions on this basis and be able to create a stable business environment for private investments.

EU-GUGLE
It is the objective of the EU-GUGLE project, conducted in six pilot cities, to demonstrate the feasibility of nearly-zero energy building renovation models in view of triggering large-scale, Europe-wide replication in smart cities and communities by 2020. Taking on the challenge of sustainable renovation in urban areas, the cities of Vienna (AT), Aachen (DE), Milan (IT), Sestao (ES), Tampere (FI) and Bratislava (SK) are committed to renovating a total of 226,000 sq m of living space during the five years of the project, with the objective of achieving 40 to 80% of primary energy savings per pilot district while increasing the share of renewable energy sources by 25% by 2018. Gothenburg (SE) and Gaziantep (TR) will take part in the five-year project as associated cities and will be expected to start smart renovation activities during the project's lifetime.

European Union Emissions Trading System (EU ETS)
EU ETS, the EU-wide greenhouse gas emissions trading system, has been in place since 2005. A certificate must be obtained for every tonne of CO_2 emitted. Since the number of certificates is fixed across the EU and reduced year by year, this system will in the long term lead to the reduction of emissions without stipulating a specific emission target for individual market players. The set reduction in the number of available certificates has engendered a functioning market in certificates. The CO_2 price created by supply and demand reveals which measures for CO_2 reduction are more efficient than paying for certificates.

EU White Paper on Transport
White Papers published by the European Commission contain proposals for common action in a given area. In part, they tie in with Green Papers, which initiate a consultation process at the European level. A White Paper can only evolve into a concrete action programme if it meets with a positive response by the Council. The White Paper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" (White Paper on Transport) was submitted in 2011. Against the background of the EU climate and energy efficiency targets, one of its main objectives is the reduction of greenhouse gas emissions due to transport by approx. 60% by 2050 (compared to 1990 values).

F orerunner cities
This term describes a group of cities that are considered European or worldwide pioneers with regard to a (more or less specific) area of application.

G ender budgeting
The basic concept behind gender budgeting is to analyse the effects of administrative actions and budget policy in particular with regard to the distribution and earmarking of public funds for women and men and, if necessary, to take corrective measures.

Gender gaps
in sociology and political economics, gender gaps define differences between women and men.

Gender mainstreaming

Gender mainstreaming is a concept to denote a gender-equitable society with equal social structures, starting points and framework conditions. Gender equality is no longer a peripheral issue but a matter-of-fact element of all processes and measures. Women and men are thus not viewed as a uniform, homogeneous group; rather, their respective social, ethnic or age-related differences are taken account of.

Gentle urban renewal

"Gentle urban renewal" is a successful Viennese model. The primary aspects of gentle urban renewal, which was introduced in Vienna nearly 40 years ago, have always been affordable housing based on financial incentives, social sustainability and a comprehensive strategy of renewal of the "core city". The positive trends of the architectural, social and economic development of Vienna's urban renewal areas – above all within the perimeter of the suburban boulevard, the Gürtel – are evident. Targeted rehabilitation and new construction measures upgrade and rejuvenate neighbourhoods and quarters. The experts of Gebietsbetreuung Stadterneuerung (Area Management Office, GB*) serve as the hub for all renewal processes, but also for all questions relating to housing, the housing environment and good neighbourly relations within neighbourhoods. As of today, 320,000 dwellings have been rehabilitated through gentle urban renewal.

Governance

In our time, traditional forms of government are no longer sufficient to ensure effective use of the volume and variety of information as well as of the creativity of society. For this reason, administrations open up and complement hierarchic types of control with co-operative action together with other social groups, e.g. citizens, business circles and other local or regional authorities.

Gross final energy

This term defines the energy remaining after the loss-entailing conversion of raw energy. This energy may take the form of e.g. electricity, district heat, process gases or fossil fuels. Gross final energy is defined as final energy plus network distribution losses plus the energy demand of power plants.

Gross regional product

The gross regional product is the regional equivalent of the gross domestic product (GDP). It is usually calculated nominally (in market prices of the year in question) and serves on the one hand to analyse regional economic development and on the other hand to establish comparisons with other federal provinces. To calculate the gross regional product, the national subsidies and taxes on products are allocated to the individual federal provinces in keeping with their shares in regional gross value creation, resulting in the GRP.

Grätzl

"Grätzl" is a Viennese dialect word for an urban neighbourhood that usually comprises a few blocks and is considered the smallest urban "unit". Such neighbourhoods are defined by their differences as compared to adjoining zones or a special, unique atmosphere; there are no official delimitations or territorial boundaries.

Gründerzeit

This term encompasses the period from post-1850 to 1914, when the Austro-Hungarian monarchy was economically modernised over several phases, leading to the industrialisation of numerous regions and the construction of railway lines throughout the Empire. Many buildings for educational and cultural purposes were erected in this era; cityscapes and city dimensions changed quickly over a short period.

Horizon 2020

Is an EU subsidy programme for research and innovation that is organised by the European Commission. Close to Euro 80 billion are earmarked by the EU from 2014 to 2020 for research and innovation purposes. The funding and subsidy instruments target everything from basic research to innovative product development. Individual researchers, enterprises and collaborations between science and industry are crucial target groups of Horizon 2020. Excellent research, highly competitive research and industry locations, more innovative products and services as well as simplified regulations are the essential objectives pursued by this new programme for research and innovation.

Housing costs

This stands for the average monthly costs of a dwelling (rent or loan repayments/annuities for owner-occupied flats plus service charges as well as all heating, garage/parking lot costs, if any; always including value-added tax).

ICT Strategy

The ICT Strategy 2007 is aligned alongside the Business Strategy of the City of Vienna and wants to optimise the economic value added of ICT services and products for the implementation of the overall strategy. The ICT Strategy describes the key objectives, measures and processes to effectively and efficiently support the attainment of business goals on the part of the City of Vienna by means of ICT. It is the strategic guideline for ICT use and diversification by all municipal departments.

Information and communication technology (ICT)

Information and communication technology may be used for three types of applications: the transmission of information through space (from point A to point B, i.e. "communication"), the transmission of information in time (from moment 1 to moment 2, i.e. "storage"), and the structured transformation of information in space and time, based on an algorithm (i.e. "computer calculations").

Objectives of Vienna's ICT strategy

In the context of administrative reform, e-government enables citizens and business circles to use services of the City of Vienna simply and easily by drawing on state-of-the-art information and communication technology (ICT).
Towards this purpose, "ICT" embodies the following three principles:
"I" stands for information: the Virtual Office of the City of Vienna provides support through customised information.
"C" stands for communication: citizens and business circles can communicate with the City of Vienna via contact and feedback forms. Contact forms can be found at the bottom of every wien.at web page. Feedback forms are available on every information page of the Virtual Office of the City of Vienna.
"T" stands for transaction: the Virtual Office also offers the possibility of submitting online applications.

Innovation

Innovations are planned and controlled changes or new developments of a social system as a result of new ideas or techniques. Moreover, the term encompasses the implementation of novel, progressive solutions to specific problems, the introduction of new products or the application of novel procedures. The majority of innovations results from novel combinations of previously already known procedures, products or systems.

Lifelong learning

The document "LLL:2020 – Strategie zum lebensbegleitenden Lernen in Österreich" (Strategy for Lifelong Learning in Austria) was adopted by the Austrian federal government in July 2011. Ten action lines detail visions, the status quo and individual projects and measures. The action lines emphasise that lifelong learning comprises a great variety of forms of learning throughout all life phases. In addition to aspects of elementary and youth education, informal learning processes and learning in old age are likewise covered.

Life sciences

Life sciences comprise those fields of science that involve the scientific study of living organisms, such as bioscience, medicine and many others.

Lighthouse project

An exemplary project that in addition to its underlying purpose also entails a signal effect for numerous follow-up ventures. This is contingent on the success and public profile of the project.

Living lab

Living labs embody a research concept – often collocated in a user-centred, territorial context (e.g. a city or region) – that examines the integration of research and innovative processes within the scope of a public-private partnership.

Memorandum of understanding (concluded between the City of Vienna and the Federal Ministry for Transport, Innovation and Technology – BMVIT)

Mayor Michael Häupl and Federal Minister Doris Bures signed a Smart City memorandum of understanding (MOU) concluded between Vienna and the Federal Republic of Austria represented by BMVIT. The objective lies in initiating projects via a joint steering group and to obtain funding at a European level.

Metropolitan region

A metropolitan region is an area comprising at least one big city of international importance, serving a variety of high-level centralised functions, and the region surrounding it. As a rule, such a region encompasses, in addition to the urban agglomeration, further core settlements as well as rural zones that are closely linked to the regional centre, e.g. by commuter traffic flows. As central nuclei of co-operation and competition, metropolitan regions are hubs of international networking. Metropolitan regions may have up to 20 million inhabitants, may be transboundary, are politically defined in a variety of ways and usually lack institutions of their own.

Multimodality

In the traffic sector, multimodality applies if more than one means of transport is or can be used to cover a distance or to transport goods; for travelling from and to work, a person may e.g. use either a bicycle or a car, or merchandise may be brought to its destination by a combination of navigation and railway.

Multiple use

Purpose of the strategic project "einfach-mehrfach" (simple-multiple) of the City of Vienna, which was commissioned in 1998. The concept of multiple use mainly refers to municipal infrastructure facilities like schools, above all with regard to the opening of green/open spaces (or sports grounds) for the neighbourhood.

Noise emissions

Noise emissions are sounds that impair the physical, psychological and social wellbeing of humans. The perception of noise varies greatly from person to person, and noise exposure can have manifold physical and psychological effects. Noise effects are grouped into effects on hearing and effects on the organism as a whole.

ÖkoKauf Wien"

In 1998, the City of Vienna initiated the "ÖkoKauf Wien" programme to promote climate protection. The objective lies in aligning the procurement of goods, products and services in all fields of municipal administration more strongly with ecological principles. According to a decree issued by the Chief Executive Director of the City of Vienna, all outcomes of "ÖkoKauf Wien" (catalogues of criteria, position papers, studies, sample folders) must be bindingly applied.

Open data

Offers possibilities of data use at many different levels. Enterprises and citizens can develop new applications and services based on the available data material. The participation of citizens in political decision-making processes is likewise fostered by open data. Science and research benefit equally from simplified data exchange. https://open.wien.at/site/open-data/

Open government

The term "open government data" describes the idea that public data collected by administrative bodies should be rendered freely accessible. These data should be provided to the population in machine-readable format to permit their automated dissemination. Open standards for interfaces and software ensure greater transparency, participation and collaboration. In addition to technical interfaces, the administration must also create a legal framework. Examples of such public data include geodata, traffic data, environmental data, budget data or statistical data. Personal data are not rendered public.

Participation

In this context, the term defines the participation of a person or group in decision-making processes or courses of action taking place within superordinate structures or organisations.

PGO (Planungsgemeinschaft Ost)

This is a joint organisation of the Federal Provinces of Vienna, Lower Austria and Burgenland to consult and agree on relevant spatial planning issues. Its scope of work comprises the development of joint spatial planning objectives, the thematic co-ordination and scheduling of plans impacting regional space, the representation of joint interests and the implementation of research projects of importance for regional planning in the three federal provinces. In addition to a political decision-making body and a body co-ordinating the three provincial administrations, PGO also operates a joint office to implement its work programme.

Pre-commercial procurement

Pre-commercial procurement (PCP) is an attractive (because unbureaucratic and flexible) instrument for enterprises to competitively develop new ideas and solutions for public procurement purposes. Public bodies benefit from this, as their problems are solved; moreover, PCP serves as a viable instrument for demand-oriented innovation policy.

Primary energy

This term defines the raw energy that has not yet been converted into useful energy. Final energy results from the loss-entailing conversion of raw energy. Raw energy may be available in many different forms, e.g. sunlight, wind, biomass, fossil materials or nuclear power.

Protection zones

It is not only that one third of the municipal territory of Vienna is covered by protection zones – rather, the city also boasts part of a national park, nature reserves, protected landscapes and landscape elements, ecological development zones, protected biotopes, the protected zone of the Vienna Green Belt and parkland. Moreover, parts of Vienna's westernmost districts were declared the Vienna Woods Biosphere Park. The landscape of the Vienna Woods has been under protection since 1905 on the basis of the Vienna Green Belt Decision as well as due to a protection zone category assigned to it under the Building Code for Vienna (Sww category), which practically equals a total construction ban, and the Nature Conservation Act. STEP05 shows these restrictions in its mission statement for green spaces in Vienna.

Quality of life

Quality of life is the basically subjective perception of an individual regarding his or her position in life in relation to the culture and value systems of his or her life environment and focuses on that person's goals, expectations, standards and concerns. However, key traits of quality of life also involve political, social, economic and environmental aspects. This is compounded by factors such as personal security, health, education and transport options as well as other public services.

Rainwater management

Rainwater management offers the possibility of retaining water precipitated on built-up and sealed areas within the natural water cycle and thus relieving sewers. This can have a positive effect on temperature, air quality and climate.

Renewable Action Plan (RAP_VIE)

The Plan aims to strengthen the use of regenerative energy sources in and for Vienna. This is important for both existing and new buildings, but also plays a key role in mobility. The major potentials in urban areas lie in the generation of power and heat from solar energy, in the use of ambient and waste heat and, in the long term, in the tapping of deep geothermics. In the field of traffic and transport, the switch to alternative powertrain types, above all electromobility from renewable sources, is most crucial alongside the promotion of eco-friendly means of transport. Commuter and goods traffic, too, play a significant role in this context. Wind and hydropower supply Vienna with energy mainly harnessed in the region or in other federal provinces. The Action Plan defines measures to cover these areas.

Renewable energy sources

This term defines energy sources that are constantly renewed or replenished and hence are permanently available. Renewable energy sources e.g. include sunlight, wind, hydroelectricity, biomass, geothermal heat and waste. Renewable energy sources are CO_2-neutral; thus their use does not negatively impact the climate. Even with renewable energy sources, sustainable use is only safeguarded if the consumption rate does not exceed the renewal rate.

Research and development spending

R&D (= research and (experimental) development) stands for creative activities conducted systematically by using scientific methods in order to improve the state of knowledge and develop new applications of this knowledge. Statistics Austria regularly conducts surveys on R&D in Austria by interviewing enterprises and university institutions as well as public institutions engaging in R&D (Federal Republic, federal provinces, municipalities, chambers, …) about their research and development activities and spending on staff, ongoing administrative expenses and investments directly linked to these activities.

Research, Technology and Innovation Strategy (or Research and Innovation Strategy "Innovative Vienna 2020")

With this strategy, the City of Vienna has set itself the task to join the ranks of the leading European metropolises of research, technology and innovation (RTI). Vienna's RTI strategy adopted in 2007 comprises five action areas that supply answers to five central challenges for Vienna as an RTI location.
Human resources: smart brains for Vienna
Thematic focuses: visible and relevant
Research and the city: communication, learning and publicity
A breeding ground of research and innovation: enabling new developments
A research and innovation location in Europe: Vienna as an international network hub

Resilience

This word describes the ability of a system to deal with change. Resilience strategies may be inter alia preventive (providently accumulated resistance to withstand negative external influences), adaptive (ability to return quickly to the original situation) or innovative (active use of advantages resulting from changing environmental conditions).

Resource preservation

The use of natural resources and the competition for scarce resources such as freshwater, land and raw materials (see Resources below) are intensifying all over the world. Thus a key challenge lies in ensuring the sustainable and conservation-oriented use of limited resources.

Resources

Resources are natural stores or sources of something needed for a specific purpose, in particular for feeding humans and economic production.

Security of supply

Security of supply is the steady and long-term safeguarding of basic human needs. These include water supply, clean air, provision for old age, basic income, healthcare, etc. In energy policy, this term describes environmentally compatible, efficient energy supply. The umbrella term "security of supply" also incorporates the quality of supply, which in general is structured into reliability of supply, voltage quality, operative security of supply and commercial quality (services).

Services of general interest

This term describes the judicious and reliable provision of public goods and services that entail a special responsibility for the community at large. These comprise e.g. energy, water, waste and wastewater disposal, education, culture, medical services or public transport. They are characterised by a guarantee of equal, universal access, security and continuity of provision and – where the State is the provider – by democratic scrutiny and public accountability. In Austria, the definition and type of provision of services of general interest typically entail a high degree of municipal autonomy.

Showcase

This defines a project or programme that serves to convey innovative aspects in a clearcut, exemplary and instructive manner.

Smart City Wien stakeholder forum

The core element of the Smart City Wien initiative is a long-term stakeholder process, in whose context all interest groups within and outside the municipal administration are organised in both general purpose and thematically specialised advisory groups.

SMILE mobility card

SMILE (Smart Mobility Info and Ticketing System Leading the Way for Effective E-Mobility Services) is the prototype of an Austria-wide multimodal mobility platform that is to provide all public and individual mobility services for customers. It is the objective of this joint research project of Vienna Public Utilities, Wiener Linien and Austrian Federal Railways (ÖBB) to develop a platform that shows the various possibilities of travelling from A to B. With open and uniform interfaces, the mobility platform is designed to enable other mobility service providers (e-car sharing, e-bike rental, car parks, charging stations, etc.) and other, likeminded projects to easily hook up with this system. The cooperation of the two biggest mobility service providers ÖBB and Wiener Linien lays the ground for a future, nationwide smart mobility platform.

Social housing

This term defines state-subsidised housing construction in particular for social groups that are unable to cover their housing needs at market conditions. With the Viennese model of housing subsidisation, the City of Vienna ensures the creation and safeguarding of high-quality, demand-oriented and environmentally compatible dwellings. Manifold measures moreover guarantee that housing will remain affordable for persons with medium or lower incomes.

Social inclusion

The idea of inclusion aims for a society steeped in human rights, appreciation and respect, which grants the same, full rights of individual development and participation to all its members, irrespective of abilities, gender, sexual orientation, social or ethnic background, etc. Inclusion strives to eliminate all processes of exclusion and fights marginalisation risks such as poverty and discrimination.

Stakeholders

These are all persons or groups that have a justified, vested interest in the course or outcome of a process of project.

Sustainability

Sustainable use of the environment equals the conservation of the natural capital (like groundwater, habitats and rare species). It stipulates that the use of renewable resources and energy carriers should not exceed their replenishment. Non-renewable resources should not be consumed faster than they can be substituted by enduring, renewable ones. Sustainable use of the environment also means that pollutant emission must not exceed the ability of air, water and soil to bind and break down these pollutants. The needs of our time must be met so that later generations will not have to suffer the consequences.

Testimonial

This word drawn from the advertising industry describes concrete praise and/or satisfaction for/with a product, service, idea, project or institution on the part of a person known and respected as competent in the field in question. It can also mean "experience report".

TRANSFORM

"Transformation Agenda for Low Carbon Cities" is a project under the Seventh Framework Programme for Research of the European Commission with a length of 30 months and a financial volume of approx. Euro 7.5 million. By means of implementation-oriented strategy development, the TRANSFORM project is to support cities in their transformation into smart cities. For this purpose, comprehensive strategies and transformation agendas for the entire city are developed; on the basis of selected urban quarters of the partner cities – called smart urban labs – these are embedded in a context corresponding to the special requirements of these neighbourhoods to derive individually fine-tuned, concrete implementation plans.

Transform+

The "Transform+" project is subsidised by the Climate and Energy Fund of the Austrian Research Promotion Agency and is scheduled to run from March 2013 to February 2016. It is the objective of the project to prepare and support the Austrian contributions for the EU project TRANSFORM thematically and operatively. Moreover, the outcomes are edited for an exchange of experience with the partner cities. This includes the organisation of a citywide stakeholder process, the development and adaptation of the database for decision-supporting models and the work on implementation plans and pilot projects for the model urban quarters "Liesing-Gross Erlaa" and "aspern - Vienna's Urban Lakeside" (smart urban labs). In this context, strategy development proceeds in a targeted fashion for planning processes that concern urban planning, housing construction, transport and energy system development. International exchange and feedbacks within the TRANSFORM project generate process impulses such as the goal-focused networking of relevant actors, the concentration of know-how and experience, the joint formulation of sustainable strategies and the tapping of interdisciplinarity and synergy effects.

Transport Master Plan (MPV)

The Transport Master Plan Vienna 2003 pays great attention to Vienna's role in a new Europe: Vienna as a TEN node, Vienna as a potential main beneficiary of EU enlargement, Vienna as a metropolis of technology and an economic hub. The quality of life in the Austrian capital is to be kept as high as it is, and this can be strongly impacted by smart and sustainable mobility. For this reason, eco-friendly means of transport (public transport, cycling, walking) are further promoted, resulting in a modern and future-oriented transport concept for the next two decades.

Umbrella strategy

An umbrella strategy is a superordinate strategy based on different individual strategies and/or combining them under one heading (the "umbrella").

Urban Development Plan 2025 (STEP2025)

The Urban Development Plan serves as a guideline for all matters of the city which have spatial effects and therefore need to be co-ordinated. It is prepared every ten years. In 2014 the Vienna City Council enacted the current version: STEP2025. The predicted population growth as well as new ways of co-operation and participation bring about novel urban development tasks: the focus lies on the mobility system, green infrastructure, and building compact and attractive urban quarters that combine space for living, work, and leisure. STEP2025 will be supported and substantiated by subsequent strategies for implementation.

Urban Energy Efficiency Programme (SEP)

SEP I was adopted in 2006 by the Vienna City Council and comprises guidelines for consumption-side energy policy until 2015. Municipal Department 27 was charged with drafting the programme, which describes two scenarios (business-as-usual and energy-saving scenarios) and links them to an analysis of the energy situation and background data. The energy-saving scenario assumes an energy consumption growth of 7% between 2003 and 2015. Another part of the programme includes numerous measures in the fields of buildings, rehabilitation, electric appliances and plants, heating systems and air conditioners, illumination and transport – all this concerning private individuals, businesses, industry and the public sector. An update of the programme as SEP II is currently under discussion.

Urban mining

Urban mining refers to the identification of anthropogenic "deposits", the quantification of the secondary raw materials contained in them, feasibility considerations against the background of available technical recovery options and current and predicted revenue as well as, last but not least, the commercial treatment and recycling of the reusable materials identified and the integral management of anthropogenic deposits. In this context, humans are not only viewed as consumers but also as producers of valuable resources.

Urban technologies

This term covers products and services in such thematic areas as telecommunications, transport and mobility, energy and environment, supply and disposal, construction and housing as well as conservation. Urban technologies are a focal point of Vienna's urban research activities and of the Technology Agency of the City of Vienna.

Vienna Charter

The Vienna Charter was launched in March 2012 and constituted a hitherto unique citizen participation project in Europe. Pursuing the objective of jointly shaping good neighbourly relations in Vienna, a total of 8,500 Viennese citizens conducted discussions in 651 groups to voice their ideas. The Charter process was initiated by the City of Vienna and implemented together with over 325 partner organisations. The preamble to the Charter reads, "Vienna is home: for women and men, for young and old, for those who were born here and for those who moved to the city, for people with different worldviews, beliefs and needs. To get along well, we need to respect each other. Respect means accepting other people the way they are – as we ourselves wish to be accepted and respected. Human rights are our common basis."

Vienna Spring Water Mains

Vienna's mountain spring water is tapped in the Styrian and Lower Austrian Alps and transported to Vienna by means of the First and Second Spring Water Mains without the use of pumping stations, based solely on gravity. The drinking water of the Second Vienna Spring Water Main originates in the Styrian Hochschwab massif and covers a distance of approx. 180 kilometres before reaching the Austrian capital.

WienWin

The "WienWin" initiative is a database for innovative products and services of Viennese entrepreneurs. This clearly structured overview of Vienna's potential for innovation offers municipal project managers and enterprises of the City of Vienna an optimum understanding of the situation as well as detailed information about innovations from the Austrian capital. This innovation pool should be seen as a network of future-oriented projects of the City of Vienna.

Work/life balance

Working life and private life should present an even balance without interfering with each other; ideally, they should be mutually supportive.

Zero-energy building standard

This standard refers to the construction of exclusively (nearly) zero-energy buildings, which was imposed by the EU for the construction of new public buildings starting from 2018 and for all buildings starting from 2020. Zero-energy buildings are characterised by very low energy requirements, with a considerable share of these requirements to be produced by means of renewable energy sources on-site (or close by). This standard is to be met either through stricter stipulations for the building shell (very low heating demand) or by means of the intensified use of renewable energy sources.