



Monitoring Report 2017

Smart City Wien
Framework Strategy

MONITORING REPORT 2017

Smart City Wien Framework Strategy



Europäische Union Investitionen in Wachstum & Beschäftigung. Österreich.

CREDITS

Owner and publisher

Municipal Department MA 18 – Urban Development and Planning
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Responsible for the content:

Smart City Wien Project Unit at Municipal Department MA 18

Project leader:

Ina Homeier
Smart City Wien Project Unit at Municipal Department MA 18

Editorial team:

Ina Homeier, Eva Pangerl, Julia Tollmann, Kalojan Daskalow
Municipal Department MA 18

Johannes Lutter, Herbert Bartik, Michael Cerveny, Johannes Hofinger,
Pamela Mühlmann, Matthias Watzak-Helmer
UIV – Urban Innovation Vienna GmbH

Manfred Mühlberger
ETA Umweltmanagement

Content review & editing:

Smart City Wien Project Unit at Municipal Department MA 18

Technical coordination:

Willibald Böck
Municipal Department MA 18

Translation, Revision and copy-editing English version:

Angela Parker, ad hoc

Layout and graphic design:

saintstephens, Vienna

Photo of children:

Julian Mullan

Photo of city:

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FOREWORD

Dear reader,

The Smart City Wien Framework Strategy is a forward-looking strategy instrument that will enable Vienna to find answers to the challenges of climate change while also offering an opportunity for the city to position itself on the international stage. The use of modern technologies is not the only yardstick for measuring the success of the process, the City of Vienna having opted for an integrated approach: in this context, smart means ensuring maximum quality of life for all inhabitants while maximising conservation of resources through the use of innovative technologies and processes. To this end, the Framework Strategy comprises objectives in the fields of energy consumption, transport and building technology, for instance, as well as in education and innovation policy.

Numerous rankings, most recently the award from the respected consultancy firm Roland Berger, demonstrate that Vienna is on the right path with this integrated, socially balanced approach.

Strategies, however, are never complete without adequate monitoring. Objectives need to be verified on the basis of facts and evidence in order to control the direction of travel and take the right decisions at the right time. And here again Vienna is taking new, innovative steps. The monitoring process is comprehensive in design and encompasses all the City of Vienna's policy areas. Special indicators have been defined for each thematic field and set of objectives, allowing precise definition of the status quo. The essential focus here is on ensuring a high degree of transparency and making successes visible, while at the same time flagging up areas where adjustments are required in order to attain the self-defined objectives.

The Smart City Wien Framework Strategy aims at nothing less than ensuring a good life in the city for generations to come, and this is the message we want to get across. At the end of the day, a strategy can only be successful if everyone pulls together – the municipal administration, businesses, the science & research community and, last but not least, civil society. The monitoring process provides a basis on which to build this awareness.

In this spirit we would like to express our heartfelt thanks to everyone involved and wish them every success with the ongoing implementation of the project.



Dr. Michael Häupl
Mayor



Mag.ª Maria Vassilakou
Deputy Mayor

Executive City Councillor
for Urban Planning,
Traffic & Transport,
Climate Protection,
Energy and Public
Participation



Dr. Erich Hechtner
Chief Executive Director



EDITORIAL

NEW REPORTING FORMAT

In June 2014, Vienna City Council adopted the “Smart City Wien Framework Strategy” and tasked the municipal administration with its implementation. It was also stipulated that the Framework Strategy would undergo periodic monitoring in order to verify its effectiveness and the attainment of the objectives, and to update the Framework Strategy in line with requirements.

The first such monitoring of the Smart City Wien Framework Strategy was carried out in 2017. The monitoring process focused on two areas: an evaluation of the attainment of objectives for all individual objectives defined in the Framework Strategy (Part 3 of this Report) and a subsequent overall assessment of the monitoring results and the system of objectives used in the Framework Strategy (Part 4).

The Monitoring Report 2017 is the first of its kind. In the interest of continuous transparent monitoring of the Smart City Wien Initiative, the attainment of objectives is to be reviewed at regular intervals in future in order to illustrate the successful implementation of the Strategy over time and flag up any need for action as soon as possible. The monitoring procedure and methodology, together with conclusions for future monitoring processes are summarized in Part 5 of this report.

The graphic design of the Report reflects the colour scheme of the Smart City Wien Framework Strategy and its three central dimensions: the section on the monitoring results from the **“Resources” dimension uses red graphics**; the **“Innovation” dimension is in blue**, and the **“Quality of Life” dimension in yellow**. The sections of the Report that refer to the overall strategy use a neutral grey. A  symbol indicates cross-references to both the present publication and to external sources. Technical terms are explained in a glossary at the end of the Report.

This report and its key statements and findings are based on the expertise, evaluations and assessments of experts from Vienna's municipal administration, institutions and enterprises as well as external specialists, who together have evaluated the attainment of objectives and contributed to the monitoring process in a number of different ways: either with their wide-ranging databases, through their well-founded, in many cases critical professional contributions in the course of the dialogue process, or with their suggestions on how to optimise the monitoring process itself. We would like to take this opportunity to express our sincere thanks to them all.



MAIN FINDINGS AND
RECOMMENDATIONS

WHAT MAKES A CITY A SMART CITY?

Vienna's response to this question differs considerably from the approaches taken by other cities and regularly secures it top positions in international rankings. Few cities boast such a comprehensive Smart City Strategy as Vienna's, encompassing all relevant policy fields. And Vienna is again setting new standards with the broadly based monitoring process first implemented in 2017.

The results of the SCWFS monitoring process are designed to serve the municipal administration and policy-makers as a performance management tool and support the city and its enterprises in jointly implementing the Framework Strategy in a focused manner. In addition, the results also constitute the basis for the further development and consolidation of the monitoring process, as well as for updating the Smart City Wien Framework Strategy with the aim of keeping this long-term strategic concept in step with the latest developments.

OVERVIEW OF THE MAIN FINDINGS AND CONCLUSIONS

1. Successful SCWFS monitoring process: from pilot to routine practice

The monitoring process for the Smart City Wien Framework Strategy was carried out for the first time in 2017, and its design proved fit for purpose. The evaluations of individual objectives and the analysis of the overall strategy delivered significant results that demonstrate the importance of monitoring for the targeted implementation and further development of the SCWFS monitoring process. A total of 120 people from municipal institutions and associated organizations and enterprises took part in the monitoring process.



The planned evaluation of the monitoring process shall form the basis for its organisational anchoring and future design. This includes appropriate intervals, procedures, responsibilities, knowledge and data management, improved IT tools, indicators and measurement methods, and, where necessary, the integration of external analyses.

2. Exchange of information and know-how: involve relevant actors and make data centrally accessible

The monitoring process showed the added value and necessity of professional dialogue and exchange of up-to-date data beyond the respective municipal institution and administrative group, which in many cases does not yet happen with the required intensity during "normal operations". The monitoring process specifically builds on the existing databases and well-established reporting systems of the competent institutions, incorporating both the quantitative parameters and the qualitative assessments in a newly created online tool.

However, it also became apparent that accessing such data is difficult and time-consuming, inter alia because there is no central data management system integrating all the City's various reports and data. This also hinders coordination and cooperation between different municipal organisational units. Notwithstanding the wide participation in the monitoring process, it also became evident that it will be necessary to involve further institutions.



Swift establishment of a central data platform covering the entire municipal administration and ensuring proper access to it is an urgent prerequisite for the exchange of information and know-how, as well as for efficient cooperation. Increased efforts should be made to involve all the key municipal institutions in the implementation of the SCWFS.

3. Attainment of objectives: current status shows good performance, concerted action still required

Overall, the analysis of the degree of attainment of the individual objectives of the Smart City Wien Framework Strategy based on the defined indicators shows a positive picture: Vienna is fully or largely on track for attainment of 34 of the 51 objectives. The city's water supply, waste water management and waste management infrastructures are guaranteed in the long run, for instance; strict energy standards have been introduced for new buildings and building refurbishment, and green spaces still account for over 50% of Vienna's entire municipal territory.

Looking to the future, however, the picture must be relativized to some extent:

- » The reduction in per capita greenhouse gas emissions and energy consumption is only partly the result of actual progress (e.g. modal shift, higher building standards, larger share of renewable energies). A significant proportion can be attributed to structural or statistical effects, such as strong population growth or Vienna-specific calculation methods.
- » The positive trends of the past few years in the field of mobility, such as the rise in the share of ecomobility (walking/cycling/public transport) are currently stagnating. Also, although the share of electric vehicles in public transport and individual traffic is clearly increasing, in absolute terms it is nevertheless still quite low.
- » For new builds, building refurbishment and infrastructure, the very long investment cycles must be taken into consideration. This means that ambitious, target-oriented energy standards must be defined now if the long-term objectives are to be attained.
- » Vienna's economy is registering increasing numbers of company relocations and start-ups, but in other areas the economic momentum is not keeping pace with population growth.
- » Despite the positive overall assessment, some problematic trends can be identified with respect to the Quality of Life objectives, such as social disadvantages for certain population groups, the growing challenge of providing affordable housing and adequate green space, and so on.



The Smart City Wien Initiative must stay focused on the medium to long-term objectives – to attain objectives with a time horizon of 2030 and/or 2050, measures have to be taken now!

4. Milestones partly achieved: set ambitious new CO₂ reduction targets

Vienna's CO₂ reduction target for 2030 (35% reduction in per capita emissions compared to 1990 levels) was almost fully achieved just one year after the SCWFS was adopted. This is explained inter alia by the fact that only a certain proportion of Vienna's CO₂ emissions and a relative per capita value are taken into account in the calculation. In order to attain the climate objectives, however, a drastic reduction in absolute CO₂ emissions is necessary, and here progress to date has been much less pronounced.¹ Last but not least, in the light of the Paris Agreement, the UN Sustainable Development Goals² and the targets set by other major European cities, Vienna too must regularly adjust its objectives to reflect both progress achieved as well as new requirements.



If Vienna is to retain its pioneering role with its Smart City Wien Framework Strategy and in climate protection and keep pace with other leading European cities such as Amsterdam, Stockholm, Berlin or Paris, new ambitious CO₂ reduction targets must be defined.

5. Identify interrelationships: ensure coherent alignment of objectives

Monitoring has clearly shown that the individual objectives in the three dimensions – Resources, Innovation and Quality of Life – still make few direct references to the respective other dimensions or to the overall intention of the SCWFS. Accordingly, both the indicators and evaluations in the monitoring process and the proposed and realised implementation measures only relate to the respective individual objective. The contribution to the headline goal of maximum resource conservation, in particular, is often pushed into the background.



Whenever the Framework Strategy is reviewed and revised, all individual objectives should be more clearly aligned to the headline goals of the SCWFS – especially resource conservation – in order to ensure that the respective thematic fields make an optimum contribution to achieving the headline goals.

6. Identify conflicting objectives, discuss and prioritise

In the course of the monitoring process conflicts between the individual objectives became apparent which are currently not explicitly addressed in the Framework Strategy and which may hinder the development of ambitious measures: growth versus conservation of resources, housing versus green spaces, affordable housing versus high ecological standards, greening of roof surfaces versus solar collectors.



When the SCWFS is reviewed and revised, the identified conflicts between objectives should be explicitly pointed out and discussed. Synergies and potentials arising from interrelationships between objectives can be amplified by the SCWFS and its integrated approach.

¹ Depending on the calculation method, current emissions are 5% or 20% below the baseline value in 1990.

² As from 2018, the UN intends to additionally include indirect CO₂ emissions when evaluating the attainment of the Sustainable Development Goals (2030 Agenda for Sustainable Development).

7. Identify and address new thematic fields and define relevant objectives

The monitoring process has also flagged up thematic fields which have been insufficiently highlighted in the SCWFS so far and/or which have not yet been linked to concrete objectives. e.g. adjustment to climate change, social innovation, digitalisation or the necessity of a joint approach for the entire metropolitan region (cf. “Smart Region”).



These new key areas should be explicitly anchored in the SCWFS together with appropriately defined objectives.

8. The SCWFS as an umbrella strategy: define the strategic framework

The underlying intention of the SCWFS is to create an umbrella strategy for a large number of municipal programmes and focus their impact towards the headline goals of the Smart City Wien initiative. Certain sectoral strategies and thematic concepts already cover SCWFS objectives and define them more precisely, while others make little or no reference; in some cases the SCWFS cites sectoral programmes instead of being their guideline.



A comprehensive analysis can show to what extent the SCWFS is already reflected in sectoral policies and strategy documents. Any future revision of the SCWFS should define the objectives to act as an umbrella strategy, i.e. in such a way that they provide a strategic framework for detailed specification and operationalisation in sectoral strategies and programmes.

CONCLUSION

The results of the monitoring process provide a transparent overview of the attainment of objectives in the various thematic fields of the Smart City Wien Framework Strategy – they highlight progress achieved as well as the areas in which special efforts will be required in the coming years if the defined objectives are to be attained.

At the same time, three years after the adoption of the Framework Strategy, the monitoring process allows a first meaningful picture of how it is working. The SCWFS has proved to be an effective instrument with which to anchor the Smart City agenda in all of the city's policy areas and different fields of activity.

With regard to current developments and international commitments, however (cf. EU energy and climate targets, Paris Agreement on Climate Action, UN Sustainable Development Goals), the monitoring process also demonstrates the necessity of reviewing and revising the SCWFS in the near future and sharpening up the system of objectives where necessary, but without questioning the long-term intentions.





THE SMART CITY WIEN
FRAMEWORK STRATEGY

THE SMART CITY WIEN INITIATIVE

Under the aegis of Mayor Dr. Michael Häupl, the City of Vienna launched the Smart City Wien Initiative in 2011 in order to find timely, intelligent and effective responses to climate change and the drastically increasing scarcity of natural resources as well as meeting the European Union's ambitious climate and energy targets. The "Smart City Wien Framework Strategy" (SCWFS) was subsequently elaborated as a comprehensive, long-term strategic orientation framework and adopted in 2014 by the City Council.

"The Smart City Wien Framework Strategy has triggered a more active debate about climate change and the related innovation questions as well as deepening Vienna's general sensitivity for environmental issues."

Thomas Madreiter, Director of Urban Planning Group, City of Vienna



A FOCUS ON PEOPLE

The special thing about Vienna's Smart City concept, compared with similar projects in other countries, is its integrated approach. Modern technologies are not seen as the sole "universal remedy" for urban challenges; much rather, the focus is on people and their everyday lives, the quality of life in the city in all its varied aspects. Technical solutions can and should provide support and make a contribution, but they are no substitute for detailed consideration and integration of social aspects, potentials and innovations. Social inclusion is the key factor governing all thematic fields of the Smart City Wien initiative. This wide-ranging approach earned Vienna first place in the "Smart City Index" published by the prestigious consultancy company Roland Berger in early 2017.³

The definition of Smart City Wien⁴:

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

- » Radical conservation of resources
- » High quality of life with a good social balance
- » Development and productive use of innovations/new technologies

This approach aims to provide a comprehensive guarantee for the future sustainability of the city.

AN INTEGRATED APPROACH: THE THREE DIMENSIONS OF SMART CITY WIEN

The Smart City Wien Initiative pursues the goal of interlinking existing strategies and programmes and networking the different actors to develop consensus-based, overarching objectives for joint attainment. This includes novel mechanisms for action and coordination of policy-making and administration as well as a widening of the scope for public involvement and action. Smart City Wien is based on an integrated approach.

³ Roland Berger, Smart City Index 2017; rolandberger.com.

⁴ Smart City Wien Framework Strategy, p.30

It combines key fields of activity in urban development such as the design of the living environment, energy supply and mobility, economy and society, organisation of and cooperation with the municipal administration and policy-makers, and safeguarding of the environment and quality of life.



“The Smart City Wien Framework Strategy stands for social inclusion on all three levels – Quality of Life, Resource Conservation and Innovation.”

Dagmar Hoyer, Vienna Fund for Housing Construction and Urban Renewal (Wohnfonds Wien)

The Smart City Wien Framework Strategy brings together three central basic and mutually dependent elements: maximum quality of life for all inhabitants while maximising resource conservation through innovation in all fields.⁵

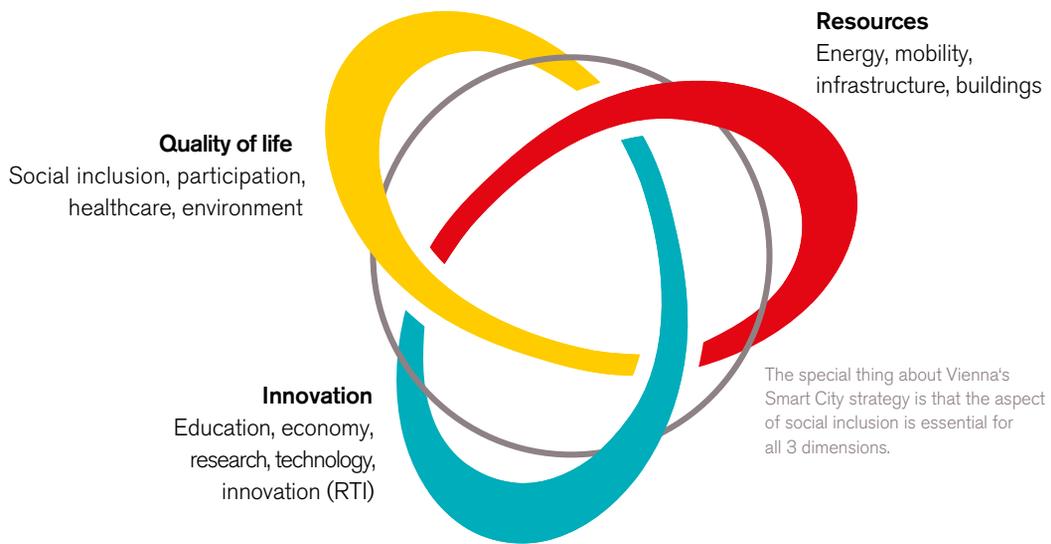


Figure 1:
The Smart City Wien principle.

Source:
Smart City Wien Framework Strategy, p.28



First and foremost, Smart City Wien is about striving to conserve resources. Processes of development and change in the sectors of energy, mobility, infrastructure and building management are to dramatically reduce CO₂ emissions by 2050. This requires a much more efficient use of the energy needed. The primary task of the Smart City Wien Framework Strategy is to show ways in which Vienna can contribute to meeting the European climate and energy targets (for 2020, 2030 and 2050).



In order to reduce consumption of resources to the desired extent while continuing to enhance quality of life, the second major thrust of Vienna's Smart City Framework Strategy is innovation. Smart City Wien aims to be economically dynamic, it prioritises and promotes information and communication technologies, attaches very high importance to education and, last but not least, sees itself as a first-class research hub. Linked to this is the key objective of understanding and using the current challenges as opportunities for Vienna's standing as a city, for enterprises and research institutions, as well as for individual job perspectives.



Equal in relevance to the conservation of resources is the third dimension of further enhancing the quality of life: political decisions in all policy areas are substantially guided by the principle of social inclusion. The provision of affordable housing of a liveable standard, facilitating inexpensive, resource-efficient mobility options and the financing of public services are just a few examples of the practical application of this principle.

⁵ Smart City Wien Framework Strategy, p.16

OBJECTIVES IN TEN THEMATIC FIELDS OF ACTIVITY

As a framework strategy, the SCWFS encompasses all topics of relevance for the city's future. Its intention is to offer a joint strategic package for all relevant policy areas, a stable orientation framework for a large number of medium and short-term sectoral concepts and activities, and a common platform for dialogue and cooperation among the various institutions and actors. In this spirit, and against the background of international targets and agreements, the Smart City Wien Framework Strategy defines concrete quantitative and qualitative objectives in a total of ten thematic fields ranging from energy and mobility to healthcare and social inclusion. In doing so it builds on the city's existing programmes and activities and makes use of their well-established structures, while on the other hand the SCWFS system of objectives also offers a reference framework for newly created sectoral strategies and thematic concepts.

Strengths of the SCW Framework Strategy

The monitoring process served as a tool for critical reflection on the success of SCWFS implementation to date. However, in the course of the process repeated mention was made of the necessity and significance of the SCWFS as an orientation for Vienna's future. In a survey, key stakeholders highlighted the following strengths of the umbrella strategy for special mention:

A focus on people

One special feature of the Framework Strategy is that people and social inclusion are the focus, and that emphasis is not (only) placed on technical solutions.

Integrated, multidimensional approach

The SCWFS' multidimensional approach allows an integrated perspective on and management of social issues – which otherwise are frequently not considered in a joined-up way.

Cross-institutional, cross-divisional concept

Working together across departments and disciplines promotes network-building and cooperation within policy-making and the administration.

International recognition

The SCWFS is an international role model for climate action and positions Vienna as a competitive Smart City.

Awareness of need for radical change

The SCWFS creates awareness of climate and environmental issues and the associated need for a fundamental and radical change of direction.

Addresses all stakeholders in the city

The SCWFS has triggered a more active debate on decarbonisation in all areas and at all levels of the city.

Reflection on own work

The SCWFS allows actors to reflect on the consequences of their own achievements and projects against the Smart City background.



MONITORING AS A
MULTIDIMENSIONAL
PERFORMANCE
MANAGEMENT TOOL

WHAT GETS MEASURED GETS DONE

Complex long-term framework strategies that lay down principles for action and strategies at a high level harbour the danger that they will fade into the background or fall off the radar in the daily practice of sectoral implementation work, or that steps and measures with a long-term effect will be deferred. When it adopted the Smart City Wien Framework Strategy, therefore, Vienna City Council stipulated that the municipal administration was to verify attainment of the objectives at regular intervals.

"In order to ensure the implementation of the Smart City Wien Framework Strategy, the municipal administration is tasked with initiating appropriate measures for its realisation and subjecting these to periodic monitoring. The Smart City Wien Framework Strategy shall be evaluated and updated in accordance with the requirements."

Excerpt from the City Council resolution on the Smart City Wien Framework Strategy, June 2014



In order for this monitoring process to be fully effective, it must be integrated into the strategic performance management cycle for the Smart City Wien Framework Strategy. This is associated with a series of expectations that go some way beyond the simple monitoring of target parameters⁶:

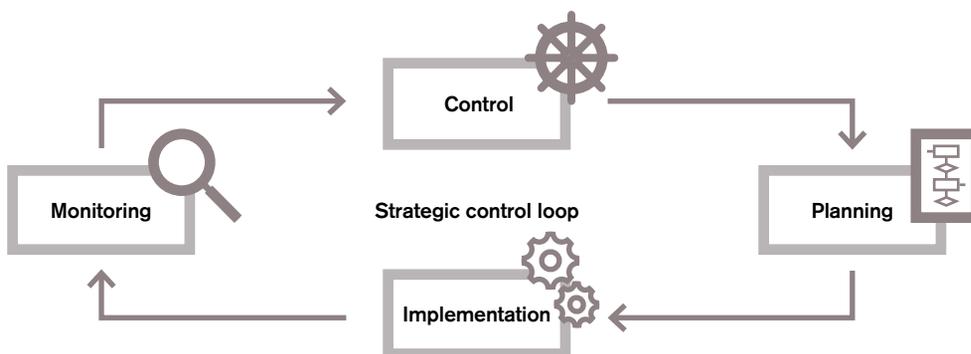


Figure 2:
The strategic performance management cycle for the SCWFS.

Source:
Own diagram.

The periodic monitoring process should ...

- » ... offer a well-founded, evidence-based information and decision-making tool for policy-makers and the administration, thus facilitating the timely control and coordination of resources (**monitoring as a basis for control**)
- » ... reveal trends and tendencies in all important policy areas of the City and encourage a transparent debate about the future requirements for action on the basis of underlying data and facts (**monitoring as a catalyst for city-wide strategy development**)
- » ... provide an insight into the City's various policy fields, flagging up cross-cutting issues and interfaces and contributing to the building of networks and cooperation among different actors (**monitoring as a platform for dialogue and cooperation**)
- » ... "illustrate" particularly relevant topics using current results to sensitise and mobilise the City, its enterprises and research institutions and, last but not least, its citizens, for the joint implementation of the strategy (**monitoring as a tool for communication and mobilisation**)

⁶ Results of the exploratory project SMART. MONITOR, carried out with support from the "City of Tomorrow" programme of the Federal Ministry of Transport, Innovation and Technology (bmvit) to determine the objectives, procedures and methodology of the monitoring process.



MONITORING
RESULTS

EVALUATING THE ATTAINMENT OF OBJECTIVES

The Smart City Wien Framework Strategy defines three closely interlinked headline goals for the dimensions of Resource conservation, Innovation and Quality of Life:



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



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



Quality of Life: “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.”



“These objectives are long-term, allow for flexibility in meeting the challenges of continuous social change, and should be seen as being inextricably linked to the existing targets set by the various specialised strategies of the City of Vienna.”

Smart City Wien Framework Strategy, p.30

In order to specify these long term headline goals in greater detail, a large number of quantitative and qualitative objectives were defined in different thematic fields.

The level of attainment was assessed on the basis of a four-grade qualitative scale:



The assessment was based on the indicators⁷ defined for the respective objectives at the deadline of 31 May 2017, as well as the appraisal by the experts from the objective evaluation team.

The impact of population growth

Target values and indicators that are defined in per capita terms are influenced by Vienna's strong population growth – viz. net growth by more than 200,000 people since 2007 alone.

If the population increases while resource consumption in absolute terms remains unchanged or rises slightly, per capita values “automatically” decrease. With respect to formal attainment of objectives, this has a positive effect on some indicators (e.g. greenhouse gas emissions, energy consumption or the degree of motorisation) and a negative one on others (e.g. gross domestic product).

In any case, this population effect frequently masks changes in the “actual” absolute target values, e.g. the actual reduction in CO₂ emissions as a result of the switchover to renewable energy sources, the reduction in energy consumption in existing buildings through upgrade of thermal insulation, or the increase in economic output as a result of attracting new businesses to the city.

Any evaluation of attainment of objectives must at any rate pay close attention to the population growth factor in order to verify the “net efficacy” of the implemented measures and hence determine the need for action and/or adjustment of objectives.

⁷ The table of indicators used in the SCWRS monitoring process and their sources is available for download in PDF format:
https://smartcity.wien.gv.at/site/files/2017/12/Ind_Quellen.pdf

OVERALL EVALUATION

A synopsis of the results paints a positive overall picture: **for 23 of the 51 individual objectives⁸ Vienna is fully on track, while attainment of another eleven objectives is rated as being largely on track** – i.e. a total of two-thirds of all objectives are in these two categories.

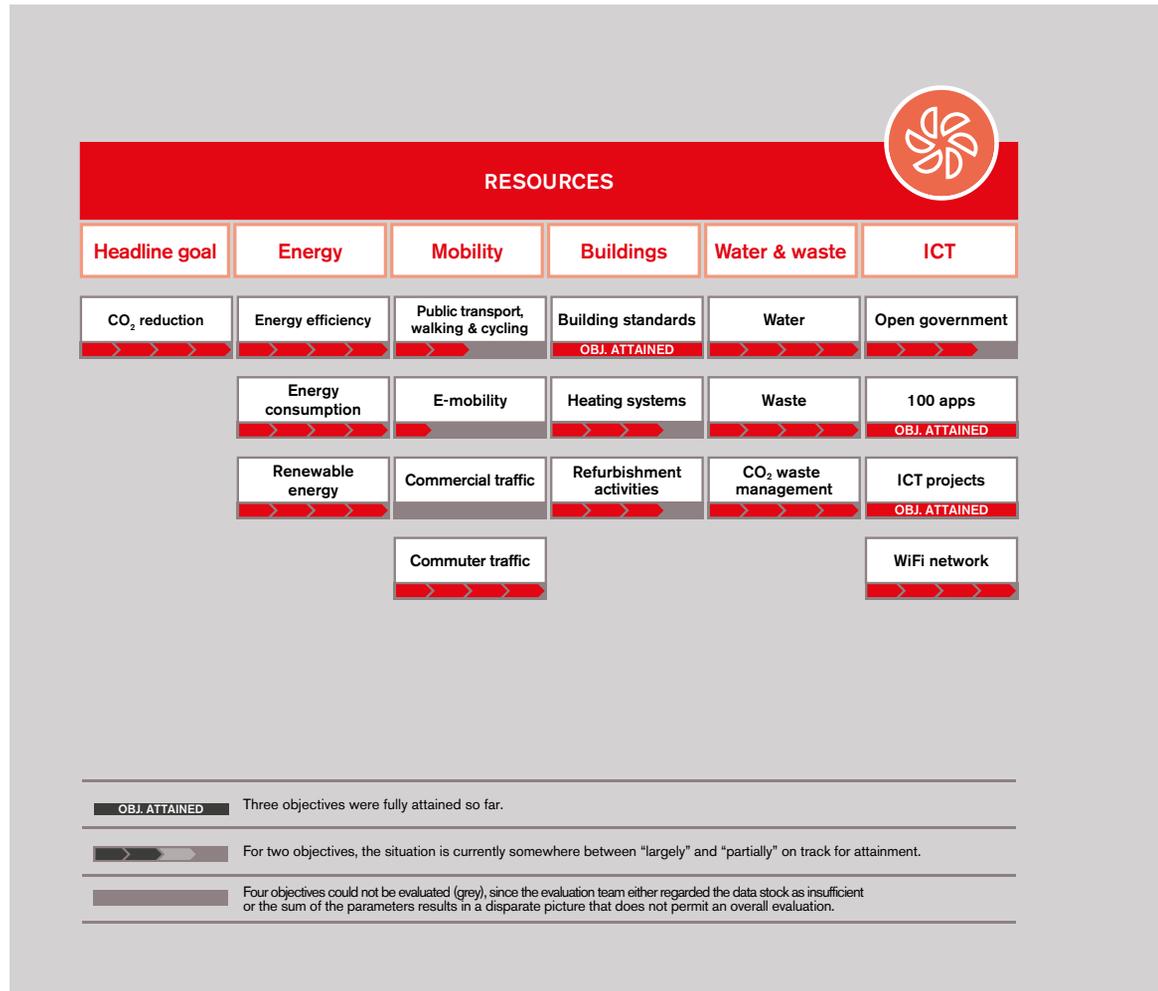


Figure 3:
The SCWFS objectives and their attainment.

Source:
Municipal Department
MA 18

Overview

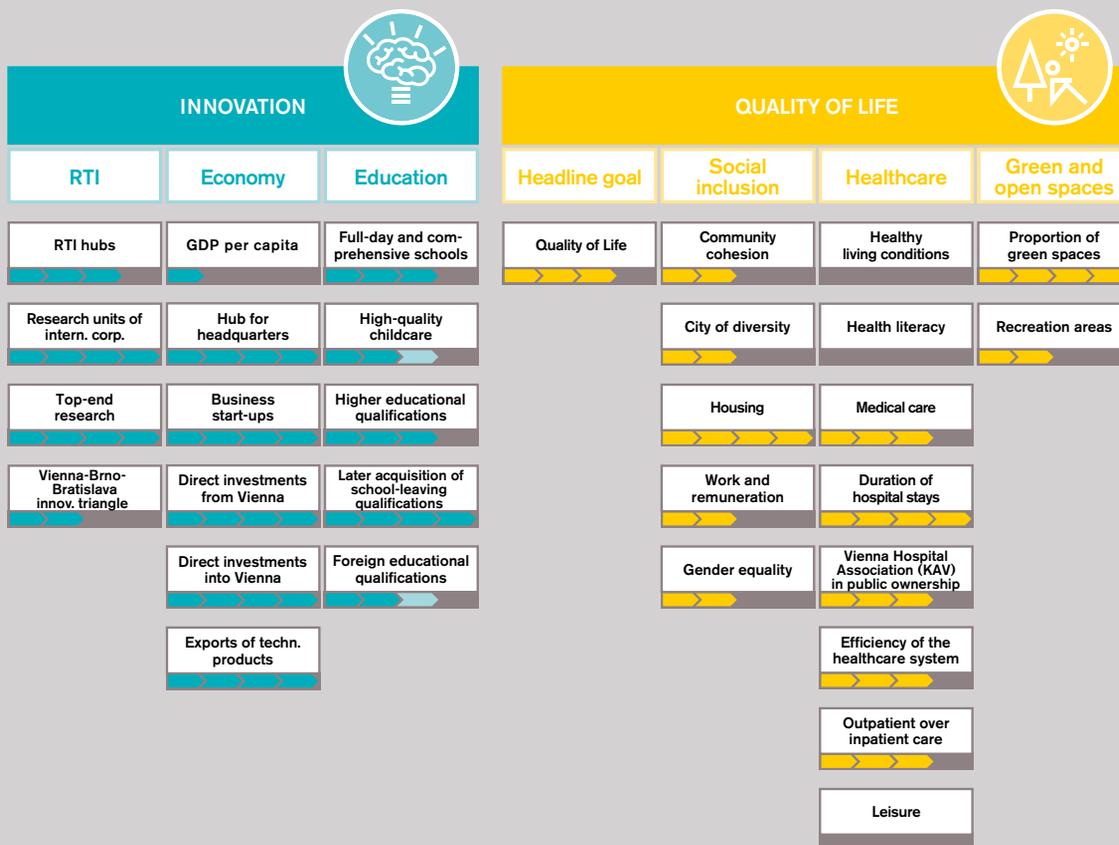
3 objectives	already attained
23 objectives	fully on track for attainment
11 objectives	largely on track for attainment
2 objectives	classified as between largely and partially on track
8 objectives	partially on track for attainment
3 objectives	not on track for attainment
4 objectives	not evaluated

Table 1:
Overview of attainment of objectives.

⁸ In the course of the monitoring process, some of the 51 individual objectives defined in the SCWFS were grouped together by theme – for instance the objective of maintaining the high standard of Vienna's waste management infrastructure and that of CO₂ reductions in waste management.

EVALUATION OF THE INDIVIDUAL OBJECTIVES: STATUS QUO AND ACTION REQUIRED

When evaluating the individual objectives it is important to note that the parameters are snapshots that only reflect the degree of attainment at the given point in time. A positive evaluation of "fully" or "largely" on track does not therefore mean that no further action is required to



attain the objective – indeed, from the long-term perspective greater action may be needed in order to stay on track for attainment. For the attainment of objectives with a long-term horizon, appropriate measures must often be taken and the course set right away, for example in the field of infrastructure with a long lifetime.



Maintain current course: Continue with existing programmes and sectoral sub-strategies.



Accelerate efforts: Measures and programmes must be intensified in order to attain long-term objectives.



Set new course: A new course must be set right now and huge efforts must be made if long-term objectives are to be attained.



RESOURCES



HEADLINE GOAL: CO₂ EMISSIONS

The reduction of CO₂ emissions and other greenhouse gases is the prime objective of global climate protection efforts. According to the calculation method⁹ applied in the Smart City Wien Framework Strategy, Vienna has de facto already achieved the medium-term goal of reducing CO₂ emissions by 2030. The focus now must therefore be on developing appropriate strategies and measures for achieving the ambitious goal set for 2050 – and on sharpening the objectives in the light of the Paris Agreement on Climate Action.

OBJECTIVE

CO₂ reduction

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

STATUS QUO

Vienna is currently on track for attainment of the medium-term objective of reducing per capita greenhouse gas emissions by 35% by 2030.

Compared to the baseline year of 1990, per capita emissions declined from 3.8 tonnes to 2.6 tonnes in 2014, which is equivalent to a reduction of some 33%. In absolute figures, greenhouse gas emissions diminished by 19% for the city of Vienna as a whole.

The SCWFS emissions targets are calculated according to the method defined in the Vienna Climate Protection Programme (KliP): however, this means that only part of the emissions are included. The calculation does not include emissions regulated by the European Union Emissions Trading System (such as e.g. those from large power plants with an output of over 20 megawatt) or those produced by traffic not directly attributable to Vienna. If the calculation method of the Survey of Air Pollutants in Austria (BLI) is used, per capita emissions in Vienna in 2014 were 20% below the values for 1990, whereas emissions in absolute figures according to the BLI calculation declined by 5%.

The attainment of the long-term objective of reducing greenhouse gas emissions by 80% by 2050 (compared with 1990) is currently not yet foreseeable.

⁹ According to the KliP calculation method – i.e. excluding emissions regulated by the European Union Emissions Trading System (such as e.g. those from large power plants) or those caused by petrol tourism traffic.



ACTION REQUIRED

The long-term emission target for 2050 de facto requires a gradual phase-out of all uses of fossil fuels such as coal, crude oil or natural gas. On the one hand this requires consistent implementation of Vienna's current Climate Protection Programme (KLiP II); at the same time, however, operational measures up to 2030 and beyond must be elaborated and politically approved with a view to inclusion in the follow-up programme (KLiP III). As a cross-cutting topic, climate protection requires new approaches in the various policy fields of the City of Vienna as well as the federal government and the EU, from heat and power supply through mobility to urban planning and building refurbishment. Innovative approaches to housing, heating supply and energy planning should be expedited, taking into account the low CO₂ emissions budget available in view of the reduction targets for 2050.

Furthermore, an adjustment of the CO₂ targets defined in the SCWFS must be discussed in the light of the Paris Agreement on Climate Action.¹⁰

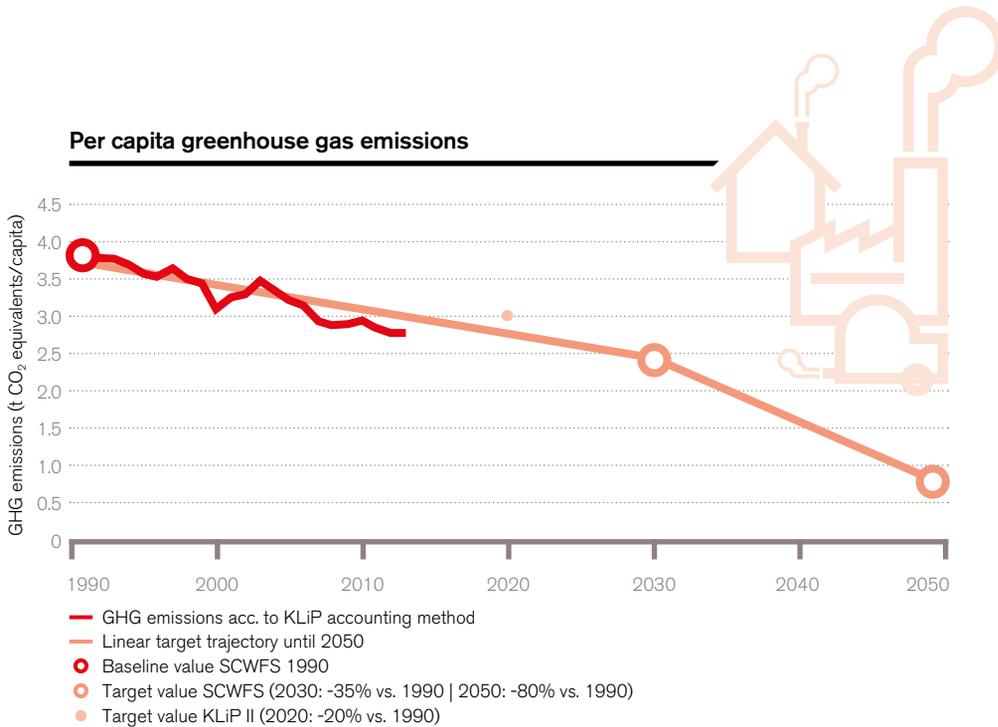


Figure 4:
Per capita greenhouse gas emissions according to the KLiP accounting method.

Source:
Municipal Department MA 20/Energy Report 2016. Data: BLI, emikat.at.

¹⁰ See also ["Review and revision of objectives – the example of CO₂ reduction"](#), p.63

ENERGY

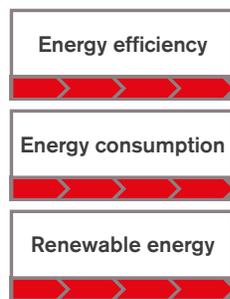


-14%
final energy
consumption
since 2005

Decline in per capita
final energy consumption
from 2005 to 2014.

The efficient use of energy and the utilisation of locally available renewable energy sources are essential for a Smart City. On the one hand they contribute to the emission reductions required under international agreements, and on the other they minimise Vienna's dependence on imports, thus increasing regional value creation. The monitoring results show that Vienna is currently on track for attainment of the objectives. However, increased efforts will be needed in the coming years to achieve the long-term targets by 2030 and 2050.

OBJECTIVE



Increase in energy efficiency and reduction of per capita final energy consumption 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 final energy consumption will originate from renewable sources.

STATUS QUO

The energy indicators are currently on track for attainment of the objectives.

Since the baseline year 2005, both per capita primary energy consumption and specific per capita final energy consumption have fallen by about 14%. The sliding four-year average for both indicators is below the trajectory required to meet the targets and the trend of recent years likewise shows a downward tendency. These objectives are measured using relative per capita values – the reduction achieved so far is mainly due to population growth (+12% compared to 2005) and only to a lesser extent to a reduction in absolute energy consumption (-7%).

The share of renewable energies amounted to 19.5% in 2015 compared to 12.1% in 2010; the target value for 2030 is thus almost fully achieved, and the trend shows a continued increase. These values must be relativized insofar as a different calculation method was applied when the objective for the SCWFS was defined back in 2013: at first, only renewable energy produced in Vienna, or produced by utilities provider Wien Energie outside Vienna, was taken into account. An indicator of this kind can no longer be maintained in today's liberalised energy markets, so the SCWFS monitoring process now takes into account all energy imports into Vienna as well as the respective shares from renewables.¹¹ The development of renewable energies produced locally in Vienna has been low in recent years.¹²

¹¹ Currently, nearly half of the renewable proportion is imported to Vienna in the form of electrical energy from renewable sources. The imported quantity depends on the operating times of Wien Energie's combined heat and power (CHP) plants: increased operating times of the CHP plants mean fewer imports = smaller proportion of renewable energy in power consumption.

¹² In 2015, 4,360 GWh of renewable energy was produced in Vienna (a rise of 330 GWh or 8% compared to 2010); by contrast, imported renewable energies increased from 985 GWh to 3,310 GWh (+336%).



ACTION REQUIRED

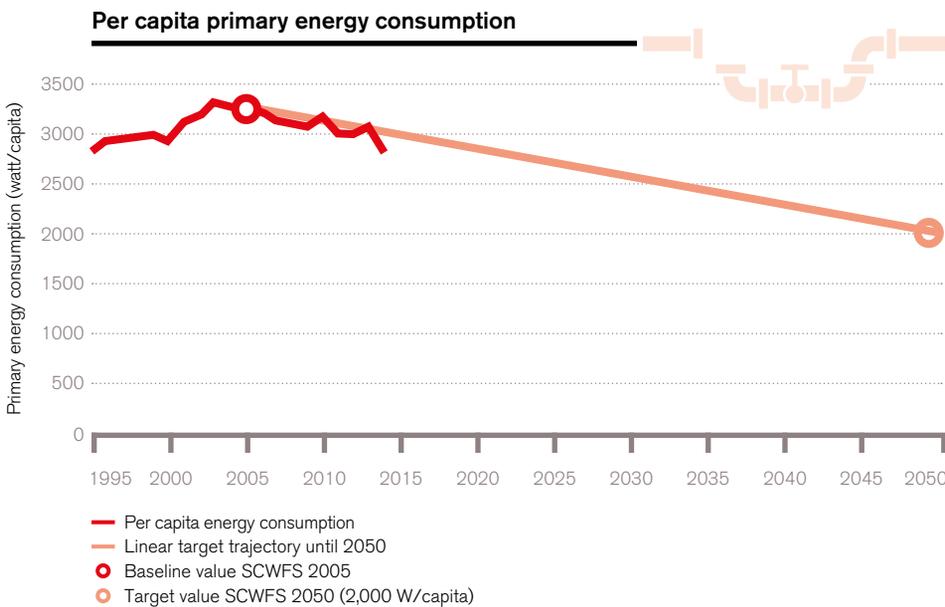
To attain the long-term objectives (target horizon 2050), increased efforts will be necessary. Given the lower future rate of population growth, for instance – according to current forecasts¹³ – absolute energy consumption will have to be reduced by a more substantial margin.

The expansion of renewable energies produced in Vienna and the use of waste heat potentials will also need to be stepped up significantly compared to the trend in recent years.

Recommended measures (inter alia)

- » Approval and implementation of the Vienna Energy Framework Strategy currently under consultation as well as relevant sub-programmes (e.g. continuation of the SEP 2030 Urban Energy Efficiency Programme, the STEP Strategic Concept on Spatial Energy Planning, etc.).
- » Consistent implementation of the measures in the thematic fields of ♻️ mobility and buildings (see relevant sections).

Critical evaluation of the indicators and/or (milestone) target values is also recommended.



¹³ Primary scenario demographic forecast, Statistics Austria.

Figure 5: Per capita primary energy consumption: primary energy consumption is calculated on the basis of the final energy consumption for Vienna plus conversion factors.

Source: Municipal Department MA 20/Energy Report 2016. Data: Energy budget 2014, AEA, Municipal Department MA 37 and OIB.

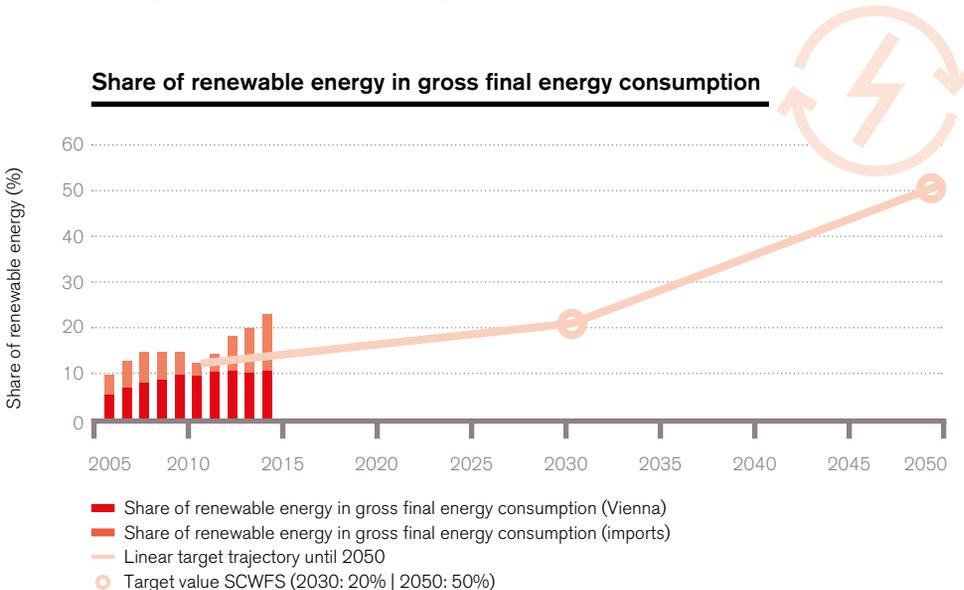
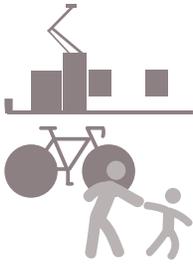


Figure 6: Share of renewable energy in gross final energy consumption: the imports of renewable electrical energy are calculated on the basis of the imported volume as per the energy budget (Energy budget, Statistics Austria) and the share of renewables in the Austrian electricity market as per the E-Control electricity market report.

Source: Municipal Department MA 20/Energy Report 2016. Data: Energy budget 2014, E-Control electricity market report.

MOBILITY



73%

of journeys are made by eco-friendly forms of transport

Percentage of journeys in Vienna made on foot, by bike, or on public transport (2016).

As a key area for reduction of CO₂ emissions, mobility is of special importance in the Smart City Wien Framework Strategy. Although there have been positive trends in the past few years, both investments and incentives will be necessary to achieve a further modal shift towards ecomobility (walking, cycling, public transport) and to support market development in the field of vehicles using alternative propulsion technologies. In the promotion of alternative propulsion technologies it is important to consistently prioritise ecomobility and mobility without privately-owned cars.

OBJECTIVE

Public transport, walking & cycling

Reduction of motorised individual traffic (MIT) in the city to 20% by 2025, to 15% by 2030, and to markedly less than 15% by 2050; shift from MIT to public transport and non-motorised forms of transport.

E-mobility

By 2030, the largest possible share of MIT should make use of new propulsion technologies (e.g. electric vehicles). By 2050, all motorised individual traffic within the municipal boundaries should do without conventional propulsion technologies.

Commercial traffic

By 2030, commercial traffic originating and terminating within the municipal boundaries should be largely CO₂-free.

Commuter traffic

By 2030, the energy consumption of passenger traffic across municipal boundaries should be reduced by 10%.

STATUS QUO

The monitoring results in the mobility field show some substantial variations.

Although the proportion of motorised individual traffic is continuously decreasing in the long term, current values indicate that further impetus is urgently required: after a strong decline in car traffic from 31% to 27% from 2010 to 2013, there was a stagnation in the subsequent years. If the medium-term targets for 2025/2030 are to be attained, the share of car traffic must fall by approx. one percentage point annually.

Vienna is currently not on track to attain its objective with regard to the shift to new propulsion technologies.

The slight increase in the number of passenger cars with alternative propulsion systems in recent years is primarily attributable to the increasing numbers of hybrid vehicles, and only to a lesser extent to growth in the number of electric vehicles. Overall, the share of passenger cars with alternative propulsion technologies in 2016 amounted to as little as 0.9%. The majority of current passenger cars and new registrations are still conventional diesel and petrol-powered vehicles. Due to the limited data available, no comprehensive evaluation of the development of CO₂-free commercial traffic can be made at present. Although heavy goods vehicles with alternative propulsion technologies as a share of total vehicles has increased since 2012, it was still only 0.8% in 2016.

The objective of reducing the energy consumption in cross-border passenger transport is on track for attainment. Fuel consumption fell by about 4% between 2010 and 2014; however, this was not due to a reduction in mileage (km driven) but to improvements in vehicle technology and the resulting decrease in fuel consumption per kilometre.



ACTION REQUIRED

There is a strong need for action regarding all objectives in the mobility field, as described in detail in the "Urban Mobility Plan for Vienna".

A combination of "push" and "pull" measures is recommended:

- » Investments in public transport, cycling and walking as well as in park & ride facilities.
- » Consistent parking management.
- » Promotion of e-vehicles and development of a basic network of charging stations.
- » Development of joint solutions for commuter traffic with Lower Austria.

In order to enable better future monitoring of traffic volumes and allow appropriate counter-measures to be taken, improvements in data collection are necessary, particularly with regard to commercial traffic and traffic in the metropolitan region.

Modal split over time

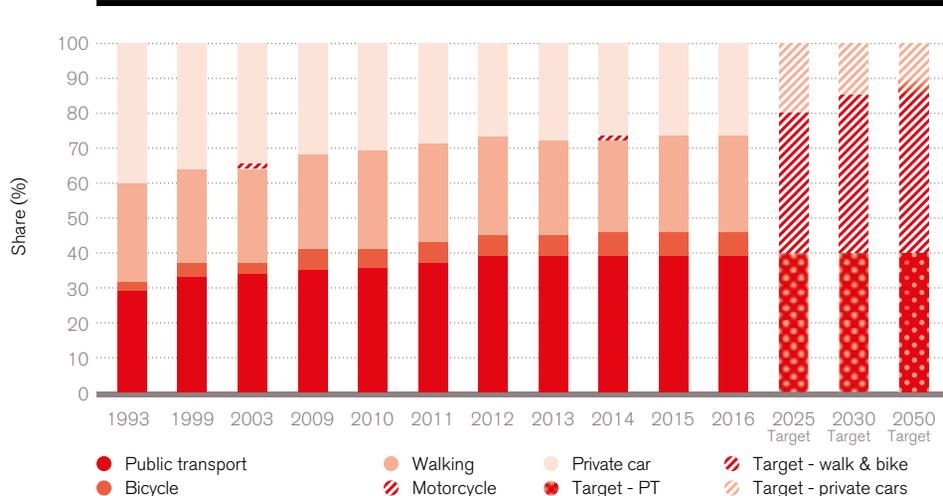


Figure 7: Modal split in Vienna.

Source: Diagram by UIV. Data: Wiener Linien

Cars and lorries with alternative propulsion systems

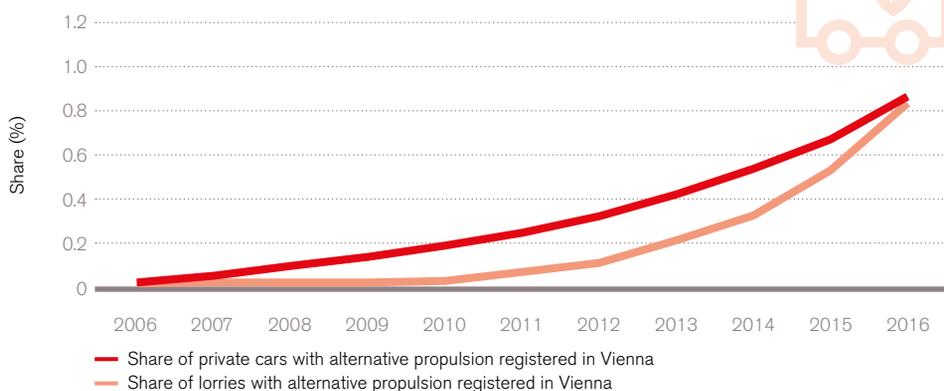


Figure 8: Vehicles with alternative propulsion systems: electric, hybrid and fuel cell propulsion systems are defined as alternative. The term "heavy goods vehicles" comprises Class N HGV and articulated lorries as well as motorised tractors and transport carts.

Source: Statistics Austria

BUILDINGS



45%

climate-friendly heating, air-conditioning and hot water supply systems

Share of heating, hot water and air-conditioning systems based on renewable energies and district heating (2014).

High energy standards for both newly constructed and existing buildings and climate-friendly heating, cooling and hot water supply systems are essential, especially in view of the current population growth and the high demand for housing. Here, Vienna is currently on track for attainment of the objectives. However, in view of the long investment and refurbishment cycles of buildings, appropriate courses must be set right now so that the long-term objectives for 2030 and 2050 can be attained.

OBJECTIVE

Building standards

OBJECTIVE ATTAINED

Cost-optimised near-zero-energy standards for all new builds, extensions and refurbishments from 2018/2020.

Heating systems

Further development of heating systems towards even better climate protection levels.

Refurbishment activities

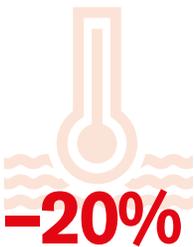
Comprehensive refurbishment activities result in a reduction of the energy consumption for heating/cooling/hot water in existing buildings by 1% per capita and year.

STATUS QUO

Vienna is currently largely on track for attainment of its buildings objectives, not least because stringent energy standards were incorporated in the city's building regulations as a matter of priority.

The share of renewable energy sources in final energy consumption for room heating, hot water and air-conditioning grew from 3.5% in 2005 to 6.1% in 2014, and that of district heating from 32.7% to 39.3%. The percentage of non-climate-friendly coal and oil heating systems has been reduced in recent years, but not that of gas-powered ones. The past few years have seen a renaissance of gas central heating in new builds, especially in large-scale housing developments.

The objective of reducing energy consumption for heating, cooling and hot water was recently (2014) on track for attainment. Since the baseline year 2010, however, specific final energy consumption for room heating, air-conditioning and hot water supply has fluctuated considerably. The main drivers of the drop in consumption were population growth and the warmer-than-average temperatures of the past few years, the number of days when heating was necessary having decreased by 28% since 1995.¹⁴



-20%

final energy consumption for heating, cooling and hot water since 2005

Decline in per capita final energy consumption for room heating, air conditioning and hot water from 2010–2014.

¹⁴ Basic climatic data for calculation of heating demand according to OIB.



ACTION REQUIRED

Swift action is necessary in the buildings field on account of the long lifetimes of heating and hot water supply systems and the extended refurbishment cycles. As well as stepping up efforts to increase the speed and quality of refurbishment activities, the use of fossil fuel heating systems in new builds must be phased out in the near future.

Recommended measures (inter alia)

- » A clear regulation for the use of climate-friendly energy systems via building regulations and other relevant guidelines to reduce the proportion of fossil fuel systems in existing buildings and limit it to an increasingly small number of exceptions in new buildings in the medium term.
- » Approval and implementation of an energy framework strategy, an action plan for energy from renewable sources and the Urban Energy Efficiency Programme (SEP 2030).
- » Analysis of the type of energy supply in newly erected buildings as documented in the energy certificates so that the trend can be assessed.

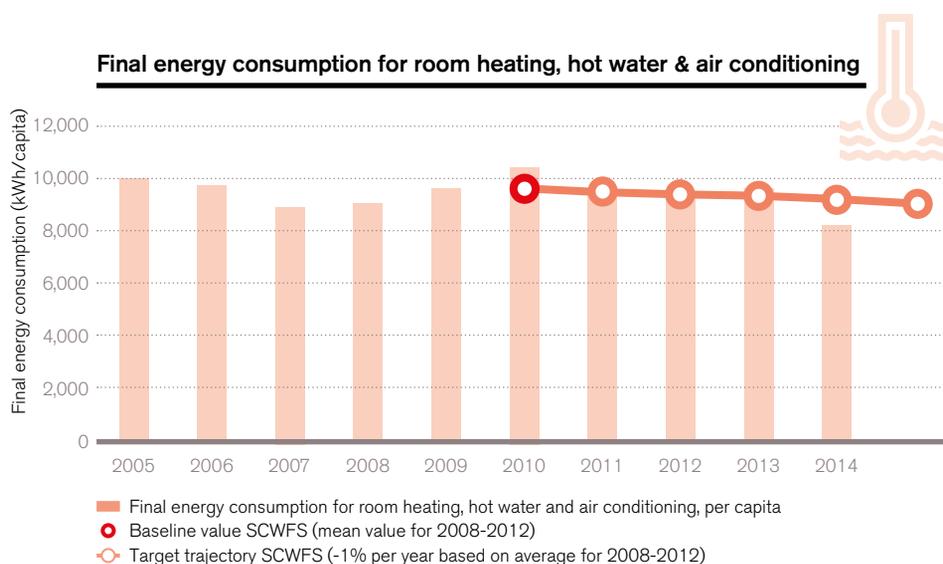


Figure 9: Per capita final energy consumption for room heating, air conditioning and hot water.

Source: Municipal Department MA 20/Energy Report 2016. Data: Useful energy analysis, 2014.

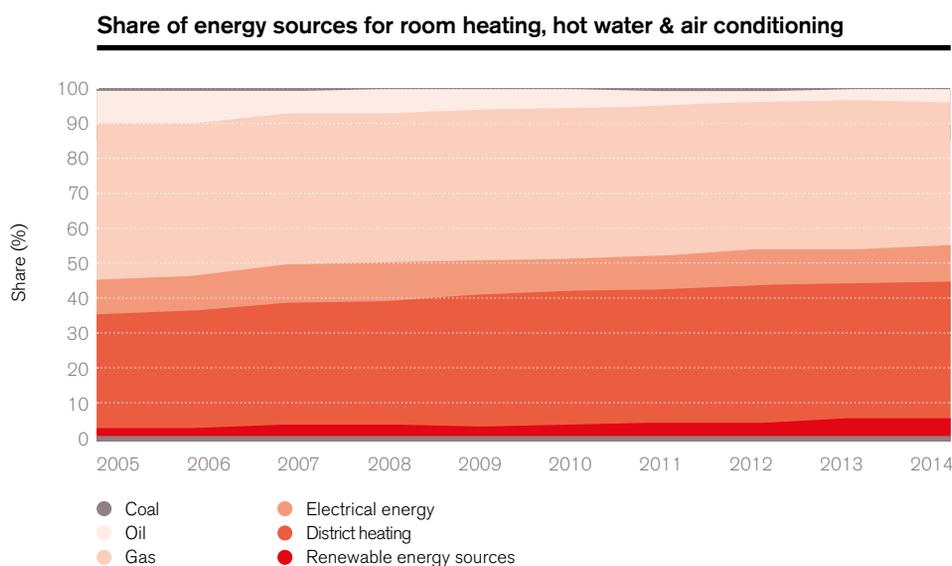
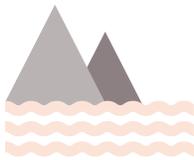


Figure 10: Share of energy sources in final energy consumption for room heating, hot water supply and air conditioning in Vienna, 2005-2014.

Source: Municipal Department MA 20/Energy Report 2016. Data: Useful energy analysis, 2014.

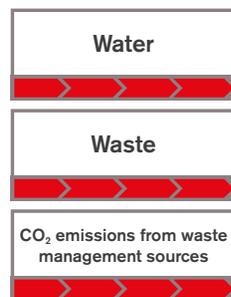
WATER AND WASTE



More than
99%
of households
in Vienna have
access to
high-quality
drinking water
from mountain
springs
(2016)

Water supply, waste water treatment and waste management are municipal services of special relevance for the conservation of resources and for their exacting requirements in terms of infrastructure development and maintenance. According to the latest monitoring results, the high quality of Vienna's infrastructure in these fields is secured for the long term. Ongoing programmes such as the refurbishment of the sewerage system, however, require consistent follow-through in order to stay on track for attainment of objectives.

OBJECTIVE



Maintenance of the high standard of Vienna's water supply and waste water management infrastructure.

Maintenance of the high standard of Vienna's waste management infrastructure.

In 2020, the savings achieved in municipal waste management already amount to approx. 270,000 tonnes of CO₂ equivalents as a result of further planned measures and improvements.

STATUS QUO

In the field of water supply, waste water treatment and waste management, all indicators are currently on track for attainment of objectives.

Despite a growing population and the unfavourable impacts of climate change, Vienna's water resources are secure for the long term with respect to both quantity and quality. Regardless of population growth, absolute water consumption has remained constant over the last 40 years. Urban sewage disposal and thus water resource protection are also guaranteed in the long run – provided that the necessary resources for the operation and continuous modernisation of the sewerage system and the sewage treatment plant remain available in the future.

Here again, annual residual waste volumes have remained constant despite the population growth of recent years. Total waste per capita has even decreased slightly. With regard to waste management, Vienna pursues a consistent multi-pronged strategy: supporting waste prevention – separation and collection of non-preventable waste for recycling, where practical – incineration of residual waste for production of district heating. Vienna's municipal waste management system thus makes a quantifiable contribution to climate protection: the emissions produced by waste management are lower than the credits earned.



ACTION REQUIRED

In order to maintain the high standard of Vienna's water supply, waste water management and waste management infrastructure in the long run, consistent follow-through of the planned modernisation and refurbishment programmes is required – including a massively intensified refurbishment of the sewerage system from 2022 onwards.

In future, rainwater management measures may also gain in importance. Due to the complexity of the topic, however, fundamentals must first be established (e.g. as part of research projects) and any conflicting objectives resolved as a prelude to developing practicable solutions.

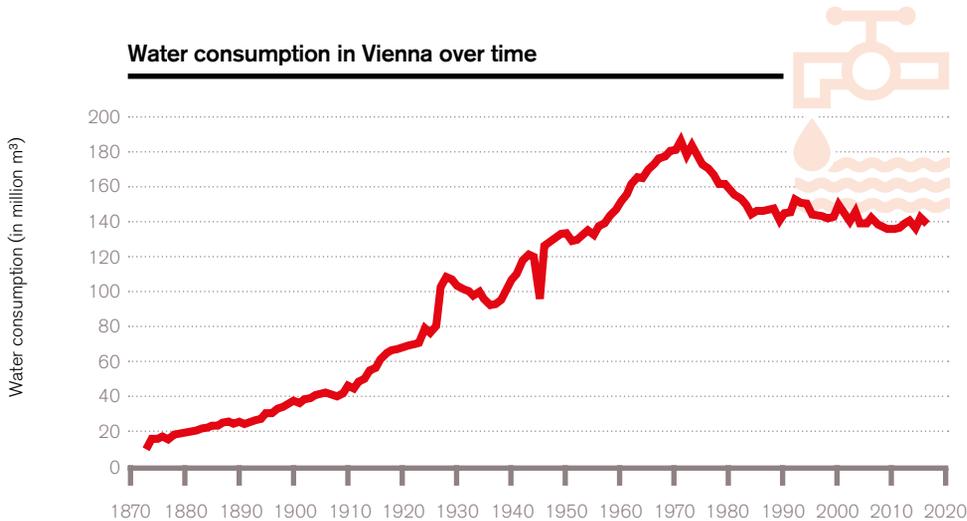


Figure 11: Water consumption within the municipal territory of Vienna based on water meter readings, 1873-2016.

Source: Municipal Department MA 31.

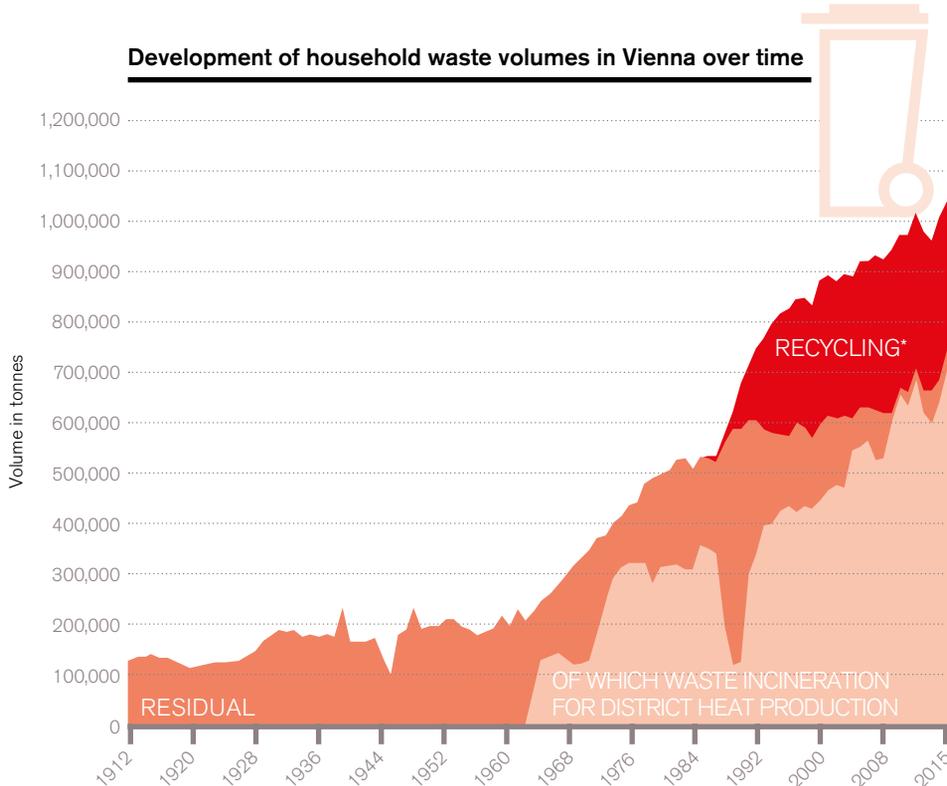


Figure 12: Development of household waste volumes produced in Vienna and collected by Municipal Dept. MA 48, 1912-2015.

*Waste paper, organic waste, glass, metal, etc.

Source: Municipal Department MA 48.

INFORMATION AND COMMUNICATION TECHNOLOGIES



210

open government data applications

Number of registered applications (apps, websites, visualizations, creative designs, etc.) based on open government data from the City of Vienna (as per end of 2016).

The sector of information and communication technologies is a key area for the elaboration of innovative Smart City solutions: Vienna makes available a wide range of open government data and supports the development of innovative applications for public use in various fields, such as energy, health, culture, environment, transport and housing. As measured by the current objectives, Vienna is making good progress – the challenge lies in the ongoing adjustment of the strategy to keep pace with rapid technological change.

OBJECTIVE

Open government
▶▶▶▶▶
100 apps
OBJECTIVE ATTAINED
ICT projects
OBJECTIVE ATTAINED
WiFi network
▶▶▶▶▶

In 2020, Vienna is the most progressive European city in all aspects of open government.

The next 100 apps in three years' time.

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

In three years' time, Vienna will have a wide public WiFi network.

STATUS QUO

Current indicators show a positive development for all objectives in the field of Information and Communication Technologies.

Vienna's "Digital City" initiative drives the launch of collaborative pilot projects between municipal bodies and ICT companies; seven collaborative projects of this kind were launched in 2016 alone. The target of development of 100 new applications based on Vienna's open government data has already been attained: 210 applications had already been registered via the official website data.gva.t by the end of 2016 alone, which is an increase by 114 apps compared to the baseline year of 2014. (However, it is virtually impossible to assess how intensively they are actually used.) The city-wide rollout of the public WiFi network has also been largely completed: 425 hotspots have been installed to date.

The objective of making Vienna the most progressive European city in all aspects of open government was discussed and evaluated within the framework of an overall qualitative estimate by the objective evaluation team. The broad consensus was that Vienna is making good progress here. However, a European comparative study would be necessary to better assess attainment of the objective in the future, particularly on an international scale.





ACTION REQUIRED

The need is less for special action with regard to the attainment of the current objectives than for a more precise definition of the objectives, i.e. the definition of precise measurement indicators (e.g. for assessing Vienna's open government performance compared to other European cities) as well as the general role of ICT solutions as catalysts for future-focussed development. Regarding the "technical" objectives (rollout of the WiFi network, development of apps), regular adjustment is necessary to keep pace with the technological developments or indeed to anticipate them.

Public WiFi hotspots in Vienna

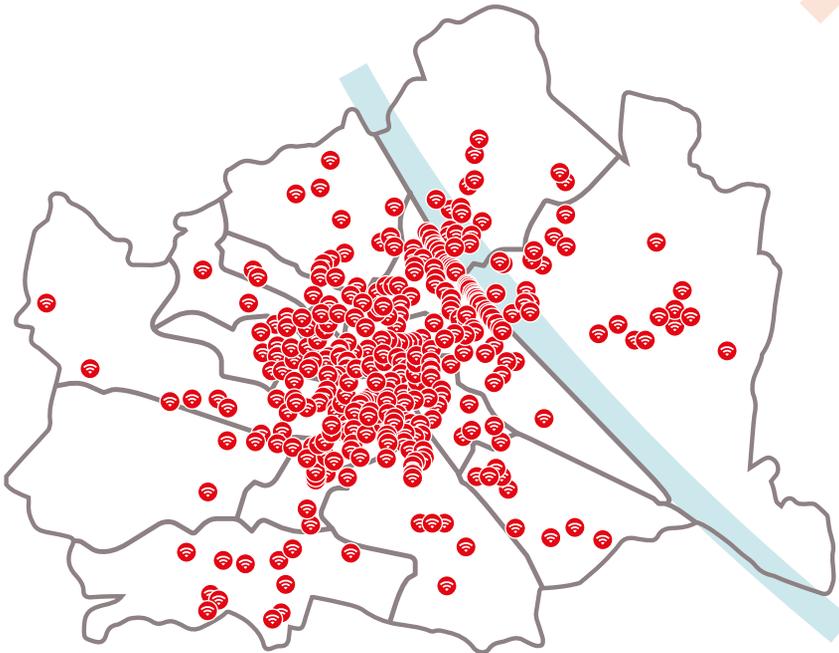
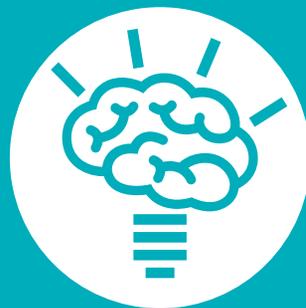
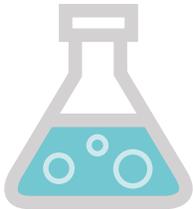


Figure 13:
Public WiFi hotspots in Vienna (as per November 2017).

Source:
wien.gv.at/stadtplan.



RESEARCH, TECHNOLOGY, INNOVATION



146

research units
of international
corporations
are located
in Vienna

(2013)

The SCWFS sees research and innovation as key to developing solutions for conserving resources and enhancing quality of life – and, at the same time, as an opportunity for Vienna's enterprises and research institutions. Vienna can only compete on the international stage if it has strong enterprises and top-level research (including in the fields of climate and energy). The initial monitoring results show that for numerous RTI indicators Vienna is already well on the way to attaining its self-defined objectives. The essential subsequent step for a Smart City is, first and foremost, to extend this perspective to the wider region.

OBJECTIVE



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

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

In 2030, Vienna is a magnet for top international researchers and students.

By 2030, the Vienna-Brno-Bratislava innovation triangle has a promising future as one of the fastest-developing cross-border innovation regions in Europe.

STATUS QUO

Vienna is on track for attainment of the majority of the objectives:

Spending on R&D is continuously increasing. The R&D ratio in the higher education sector (1.37%) and the business sector (1.88%) recently ranked first and 11th respectively amongst European regions¹⁵. In 2013, 146 research units of international corporations were located in Vienna (compared to 135 two years previously). The impact on Vienna of current political developments such as Brexit, or the tendency towards consolidation of corporate structures, cannot yet be predicted.

Vienna is also becoming increasingly attractive to international students and researchers: with some 200,000 students, Vienna is now the largest higher education centre in the German-speaking area, with one in four students coming from abroad (mainly from EU countries). Between 2012 and 2016, 73 ERC grants (subsidies for top-level research from the European Research Council) were awarded to Vienna and 44 to the other federal provinces.

The major shortcoming: in a regional comparison, the Vienna – Brno – Bratislava innovation triangle cannot currently keep pace with centres such as Leuven/Aachen/Eindhoven or Copenhagen-Malmö (Oresund). This is mainly due to the substantial imbalances within the region: while the Regional Innovation Scoreboard gives Vienna and Eastern Austria a “strong” rating, the Brno region only obtains a “moderate” score.

¹⁵ At NUTS II level, 2011.



ACTION REQUIRED

The long-term challenge for Vienna is to establish and strengthen attractive framework conditions for researchers and businesses. In this endeavour, a good cooperation with the federal government is indispensable. The Smart City Memorandum of Understanding¹⁶ concluded by the City of Vienna and the Federal Ministry of Transport, Innovation and Technology provides a good basis for this partnership. The incentive schemes and support programmes for innovation-led foreign enterprises looking to locate in Vienna should likewise be maintained and expanded.

Regional performance in the field of innovation acc. to Regional Innovation Scoreboard 2017

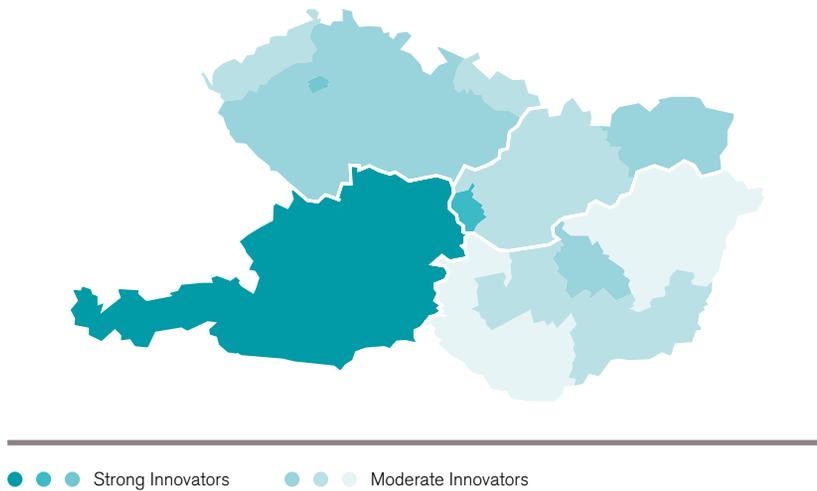


Figure 14:
Regional Innovation
Scoreboard 2017
(excerpt).

Source:
European Commission/
Directorate-General for
Growth.

Development of student numbers in Vienna

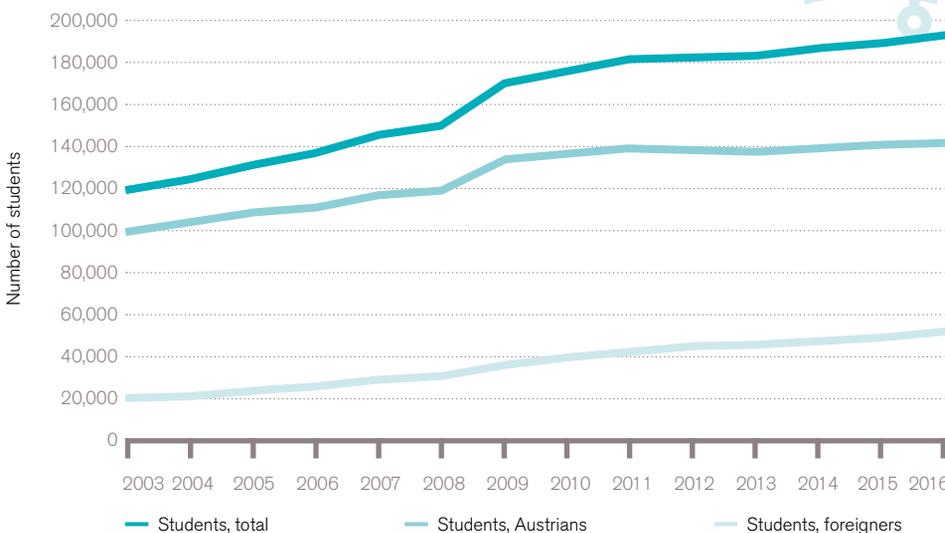


Figure 15:
Development of student
numbers in Vienna:
students at public
universities, universities
of applied sciences,
teacher training
colleges and private
universities in the
winter semester of the
respective calendar year
or academic year.

Source:
Statistics Austria

¹⁶ On 24 July 2013, Mayor of Vienna Michael Häupl and Minister for Infrastructure Doris Bures signed a Memorandum of Understanding (MOU) between Vienna and the Federal Republic of Austria to advance the Smart City cause. The aim is to set up a joint steering group to initiate future projects and cooperations and obtain funding at the European level.

ECONOMY



221

**regional
headquarters of
multinational
companies in
Vienna**

Number of multinational companies with CEE headquarters in Vienna (2016).

A thriving economy, a strong and competitive international position and a pronounced focus on creative start-ups and modern technologies are the prerequisites for the development of Vienna as an innovative Smart City. The current monitoring results confirm Vienna's good performance in a number of key areas. However, with regard to the social dimension of the Smart City, they also flag up a core challenge for the coming years: integration of the growing population into the labour market.

OBJECTIVE

GDP per capita
Hub for headquarters
Business start-ups
Direct investments from Vienna
Direct investments into Vienna
Exports of tech. products

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 city for company headquarters in Central/South-Eastern Europe.

10,000 persons per year set up an enterprise in Vienna.

Direct investment flows from Vienna have doubled compared to 2013.

Direct investment flows into Vienna have doubled compared to 2013.

The share of technology-intensive products in total exports has increased to 80% by 2050 (compared to the baseline of 60% in 2012).

STATUS QUO

Vienna is currently on track to attain the majority of the objectives in the Economy field.

Between 2015 and 2016, the number of company headquarters located in Vienna grew from 214 to 221. Given the global economic environment, the functions of the Vienna-based branch offices within their respective parent groups are continually changing; generally, however, Vienna has been able to secure its position as a hub for Central and Eastern Europe. There has also been an increase in investments and enterprises established abroad by Viennese companies: just under 9,000 newly established companies in 2016 constitutes a growth of more than 300 such companies (+3.5%) in comparison to the previous year. Investments by Viennese enterprises abroad saw an increase of more than €5 billion (+5%), while investments by international enterprises in Vienna grew by an impressive €1.5 billion (+14%). Technology-intensive products as a share of total exports most recently amounted to 69.6% (2015), and as such was somewhat lower than in 2014 (-1.3 percentage points). Considering the significant increases of the previous years, however, this indicator is also on track for attainment.

By contrast, the situation regarding per capita GDP is quite different. Currently ranking in 17th place among the European regions, Vienna is not in the envisaged Top 10 position at present. This relative decline is primarily due to the comparatively strong population growth of the past few years, with which economic development could not keep pace.¹⁷

ACTION REQUIRED

In view of the continuing immigration to Vienna, increased efforts will be necessary in the coming years to promote the integration of the growing population into the labour market. Vienna's 2020 Qualification Plan is an important starting point in this regard. In order to support technological development in Vienna, close coordination is required between the city's own innovation policy (based on the "Innovative Vienna 2020" strategy) and the instruments available to promote the export activities of Viennese enterprises at federal level.

Purchasing power of selected European regions

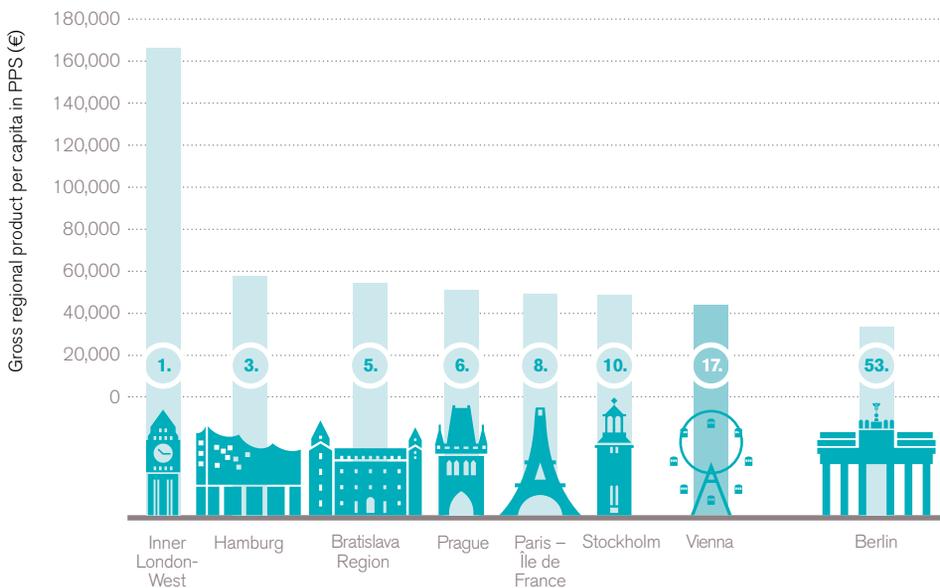


Figure 16: Comparison of the gross regional product of selected European NUTS-II regions by purchasing power standards in 2015.

Source: Eurostat.

Development of direct investment

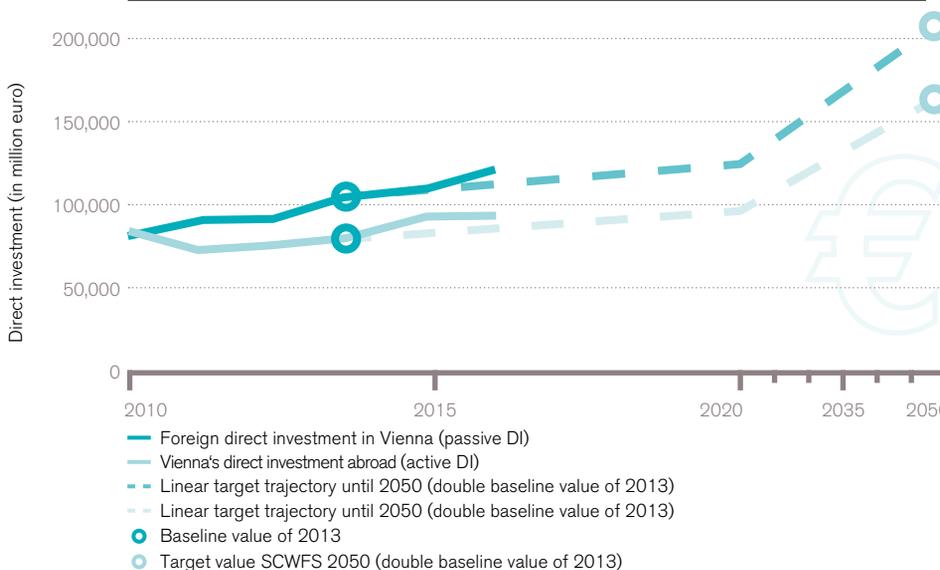


Figure 17: Development of active and passive direct investment.

Source: Austrian National Bank (ÖNB).

¹⁷ Measuring per capita GDP by purchasing power standards distorts the picture slightly, as Central/Eastern European capital regions such as Prague and Bratislava tend to be overvalued due to the enormous disparities within their countries. However, this does not change the essentially downward trend of this indicator.

EDUCATION



39% of primary school pupils attend school-based day care

Proportion of pupils in state primary schools with day-care facilities (both all-day schools and open schools; school year 2016/17).

Education fulfils a central interface function within the SCWFS, a high level of education being a prerequisite for equal opportunities and opportunities for participation, as well as for quality of life and innovation. The monitoring results show the progress achieved in different fields of education, from primary schooling through to acquisition of school-leaving qualifications later in life via adult education. Last but not least, the recent immigration and refugee crises also emphasized the urgent need to actively counteract educational disadvantage and ensure equal educational opportunities for all.

OBJECTIVE



Full-day and comprehensive schools

City-wide provision of full-day and comprehensive schools.



High-quality childcare

Further improvement of high-quality childcare provision.



Higher educational qualifications

Up to 2020 and beyond, it will be important for Vienna to ensure that as many young people as possible continue their education beyond compulsory schooling and thus attain higher educational qualifications.



Later acquisition of formal school-leaving qualifications

Up to 2020 and beyond, it will be important for Vienna to create conducive conditions for people to acquire formal school-leaving qualifications later in life via adult education.



Foreign educational qualifications

Up to 2020 and beyond, it will be important for Vienna to create conducive conditions for the recognition of foreign educational qualifications acquired by adults.

STATUS QUO

Regarding the educational objectives, the monitoring results show a mixed picture:

Progress has been achieved in the fields of primary education and childcare, among others: the number of places available in public and private educational and childcare facilities for children aged 0-6 increased significantly, as did the provision of all-day schools (+9% all-day classes in primary schools, +14% in the new middle schools in 2016 compared to 2015). The proportion of "early school leavers", i.e. persons aged 18-24 with no educational qualifications beyond compulsory schooling, decreased from 11.9% to 8.7% during the period 2009–2016.¹⁸ At present, the only way of measuring progress in catching up on formal educational qualifications in adulthood is the number of extraordinary final apprenticeship examinations, where significant increases were likewise recorded between 2011 and 2016 (from 1,734 to 2,226).

No quantitative details can be provided regarding the provision of comprehensive schools at present, since the appropriate legal basis for implementation must first be put in place at the federal level. The formal recognition of qualifications obtained abroad has not yet been properly regulated by the legislator.

¹⁸ The target for 2020 is 8.1%, according to the Qualification Plan.

ACTION REQUIRED

In pursuing the SCWFS objectives and interpreting the indicators, particular attention must be paid to external factors such as the steady population growth and the 2015 influx of refugees, the dimensions of which were unforeseeable when the framework strategy was first drawn up. In future, special importance will have to be attached to taking consistent measures against educational disadvantage and ensuring equal starting opportunities for all, including:

- » Establishment of an appropriate framework for the recognition of qualifications obtained abroad, as well as non-formal qualifications (standardisation of the Viennese rules on recognition of qualifications, adoption of a Viennese Recognition and Evaluation Act).
- » Quality assurance in the expansion of primary education and childcare, creation of uniform standards that go beyond the Early Years Education Plan.
- » Optimisation of framework for further training in adulthood (educational leave, paid study leave, combining work and training, etc.).

Provision of childcare facilities for children aged 0 to under 3 years

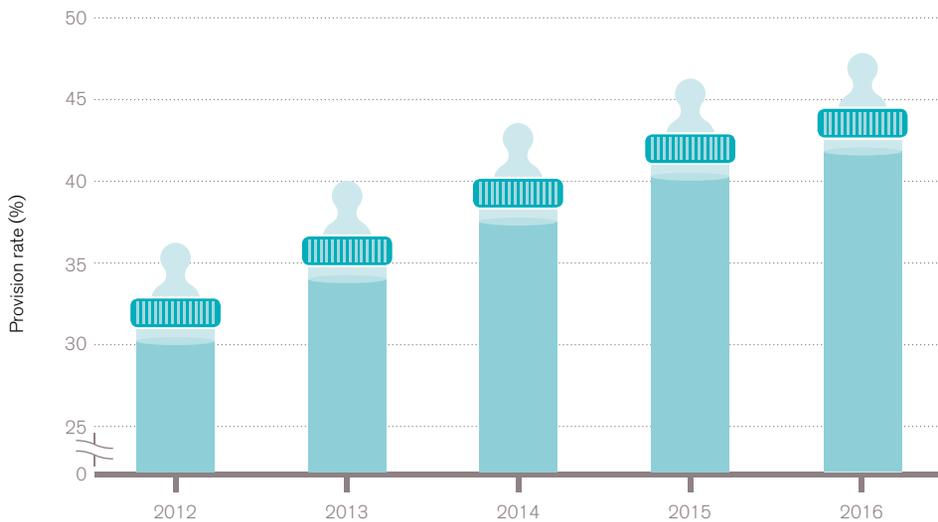


Figure 18: Provision of childcare facilities for children aged 0 to under 3 years.

Provision rate: Share of places in primary education and care institutions as measured against the residential population in this age bracket. The deadline for calculation is always 1 October of the respective year.

Source: Municipal Department MA 10.

Early school leavers

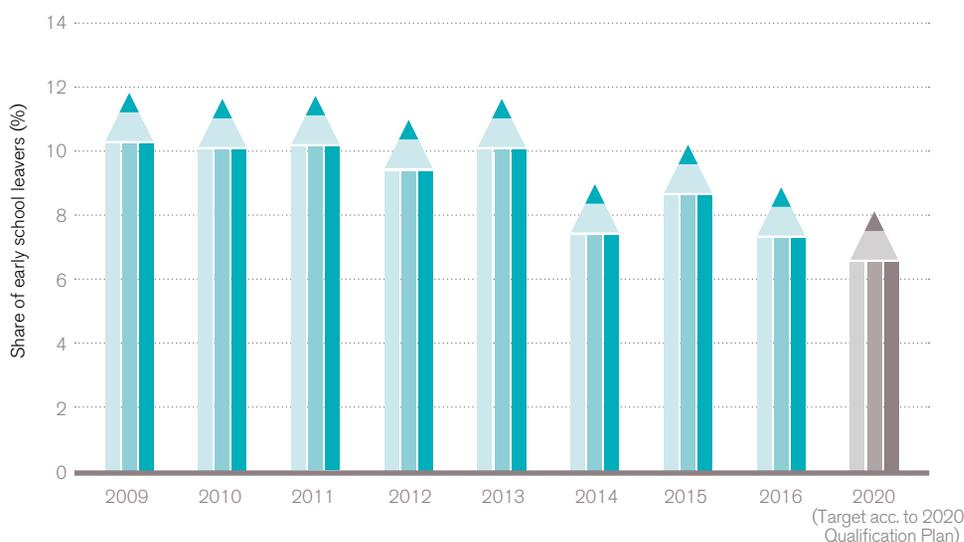


Figure 19: Early school leavers: Early leavers from education and training: persons aged 18-24 years with no formal education beyond compulsory schooling who are not participating in any (further) training, as a share of the respective age bracket (population in private households, excluding persons in compulsory military or community service).

Source: WAFF/Vienna 2020 Qualification Plan. Data: Statistics Austria, Municipal Dept. MA 23.



QUALITY OF LIFE



HEADLINE GOAL: QUALITY OF LIFE

The Smart City Wien Framework Strategy deliberately ranks maximum Quality of Life as a headline goal of equal importance next to Conservation of Resources and Innovation. The monitoring results indicate that the citizens of Vienna consider their quality of life to be very high. The objective criteria and specific action required are discussed in detail in the following thematic areas.

OBJECTIVE



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

STATUS QUO

If the Viennese population's subjective satisfaction with their quality of life is taken as an indicator, Vienna is currently largely on track for attainment of the objective.

According to a survey by the European Commission, 96% of the citizens of Vienna enjoy living in their city¹⁹ – a high value, even when compared internationally with 78 other European cities. This finding is also confirmed by surveys conducted by the City of Vienna: according to these, 84% of the Viennese population are very satisfied or satisfied with their general life situation, and 97% say that they enjoy living in Vienna or enjoy it very much. Over half (54%) of the respondents expect their personal life situation to remain unchanged in the next five years, 26% expect an improvement, and only 19% a deterioration of their quality of life.

Satisfaction with the opportunities for co-determination in Vienna as an aspect of social inclusion shows mean values of 3.7-4.2 on a seven-point scale over time. These values can be interpreted as neutral at best.

It should be noted, however, that the current satisfaction survey only highlights the overall situation. Objective criteria (including those from the other two dimensions of Resources and Innovation) were not taken into account in the assessment.



ACTION REQUIRED

The objective here is the headline goal of the SCWFS dimension "Quality of Life" – the concrete action required will be specified under the following detailed areas (social inclusion, healthcare, etc.). It is recommended that the objective and its measurement indicators be more precisely defined as part of an impending review and revision of the Framework Strategy. This will also allow a more precise evaluation of the claim of making "social inclusion the focus of policy design".

¹⁹ Sum of "strongly agree" and "rather agree". Source: Quality of Life in European Cities 2015.

European comparison of citizens' satisfaction with their city, 2015

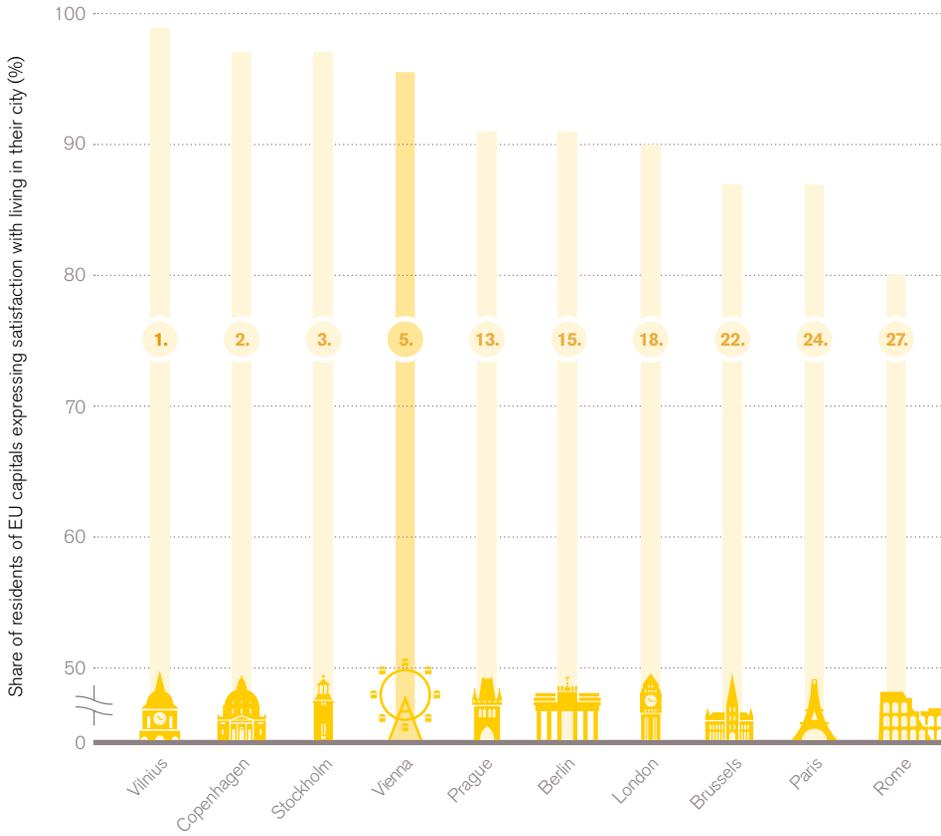


Figure 20: European comparison of citizens' satisfaction with their city, 2015.

Source: European Commission/ Quality of Life in European Cities 2015.

Satisfaction with life in Vienna over time

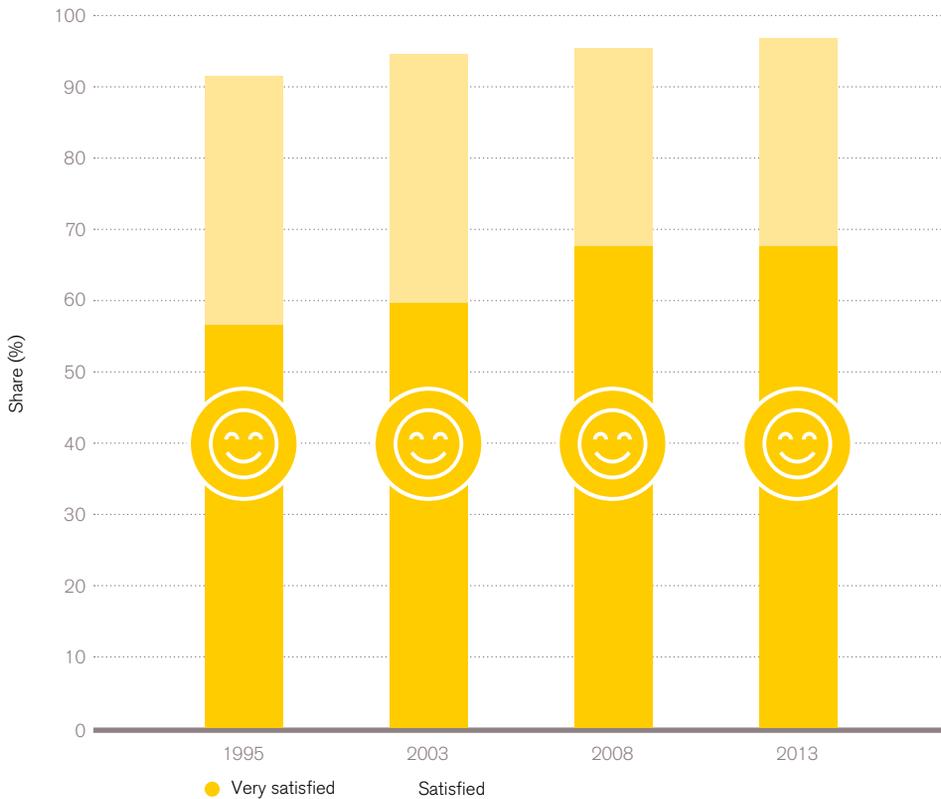


Figure 21: Satisfaction with life in Vienna over time.

Answers to the question: "How much do you enjoy living in Vienna?"

Source: Municipal Dept. MA 18/ Survey on quality of life in Vienna 1995-2013.

SOCIAL INCLUSION



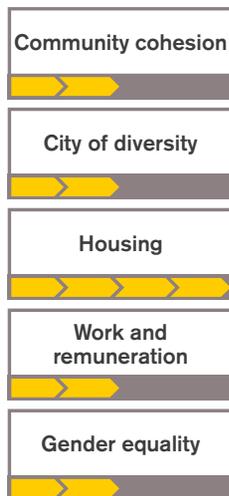
27%

of the Viennese population have no right to vote

Percentage of individuals of voting age without right to vote in municipal elections (2016).

Social inclusion is a key factor in the quality of life in Vienna and at the same time the product of a variety of individual factors. The first monitoring results show an ambivalent picture: on the one hand Vienna offers conducive conditions for social cohesion, equal treatment and upward social mobility, but on the other hand critical societal and social processes are visible that present new challenges for social, integration and labour market policy.

OBJECTIVE



All people in Vienna enjoy a peaceful community life in a safe environment, irrespective of their background, physical and mental health status, sexual orientation and gender identity.

Vienna is a diverse city, and this diversity permeates all spheres of life.

High-quality, affordable housing and attractive living conditions should be accessible to the largest possible share of the population.

Opportunities for active participation in the workplace, as well as adequate remuneration for work performed to cover the basic necessities of life.

Women's involvement in planning, decision-making and implementation processes is proportional to their share of the population. All persons involved in these processes have competence in gender issues.

STATUS QUO

The monitoring results in the field of social inclusion are extremely varied:

Diversity is part of life in Vienna – social inclusion and equal opportunities are among the city's basic values. However, some data from the monitoring process also flag up trends towards societal and social exclusion: around 40% of third-country nationals have no full access to social rights, for example, and around 20% of people in Vienna say that they have already experienced discrimination. About a quarter of the Viennese population (24%) are financially deprived, i.e. they find it difficult to afford important everyday items and services or cannot afford them at all.

Subsidized housing continues to be a central pillar of inclusion policy in Vienna: net rents and the share of disposable household income that needs to be spent on rent are very low by international comparison²⁰, although recently they have shown an upward trend. The large share of subsidized housing has a price-dampening effect on the whole housing market. Demographic and socio-economic change, however, will present a huge challenge to the future attainment of these objectives – both in terms of safeguarding the huge share of subsidized housing as well as maintaining access to subsidized housing for as broad a sector of the population as possible.

The picture on the labour market is likewise ambivalent. Vienna has high levels of economic development and wages, employment rates are high, and the differences in employment rates for men and women are low (71.6% for men, 70.3% for women). Problematic areas include high unemployment, the increasing number of persons able to work but living on needs-based minimum benefit (BMS), and the high proportion of low-wage employment, especially for women. Lastly, employees from third countries are frequently over-qualified for the jobs they do.

²⁰ Only for 36% of households do housing costs exceed one quarter of the total disposable household income.

Regarding equal opportunities for men and women, the share of women in representative political bodies is rising, but is still significantly below 50%, and for women in leadership positions in statutory interest groups the figure is indeed only 30%.



ACTION REQUIRED

At present the need for action is particularly great in the following areas:

- » Enhancement of the educational and employment prospects of young people living on needs-based minimum benefit.
- » Measures to improve equal opportunities in terms of reducing gender-specific differences, fostering labour market integration of persons with a migration background, and enabling participation for all long-term residents of Vienna.
- » Anticyclical economic policy and continuation of measures to revive the economy.
- » Promotion of political participation and political involvement of women as well as persons of foreign nationality.
- » In order to maintain the high share of subsidized housing, the housing construction programme (13,000 flats per year, 9,000 of which are subsidized) should be implemented according to plan and special attention paid to ensuring access to affordable housing.

Affordability of housing in European cities in 2015

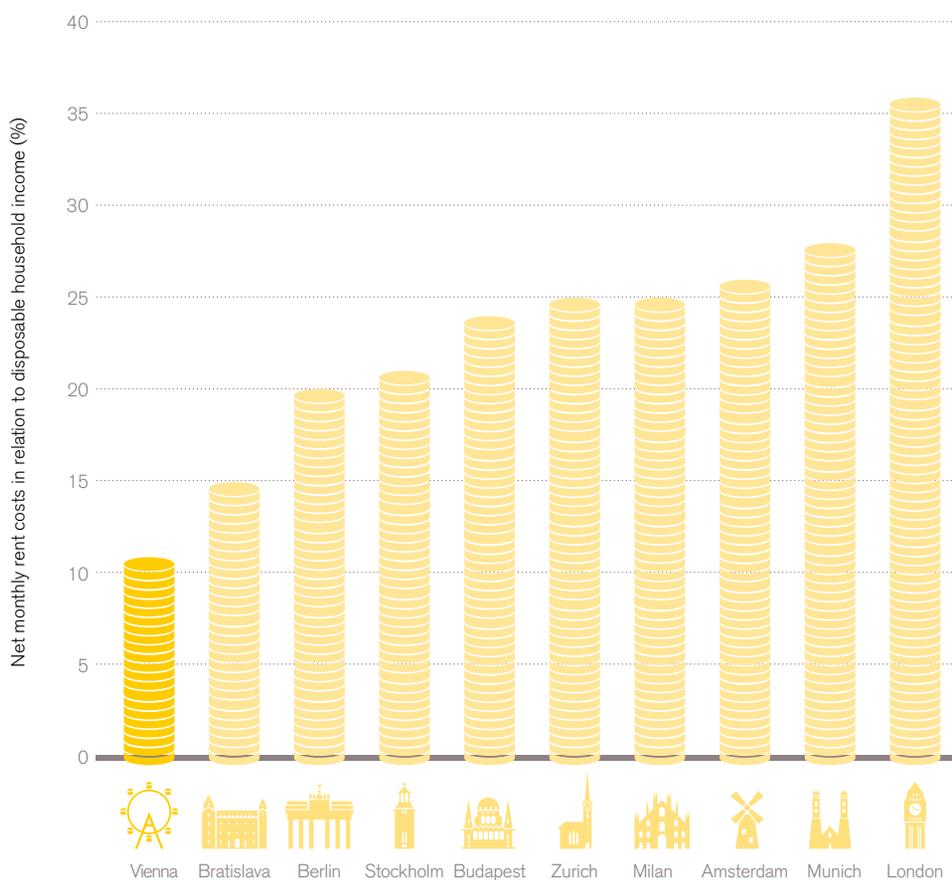


Figure 22: Affordability of housing in European cities in 2015: net monthly rent costs in relation to disposable household income.

Source: Municipal Dept. MA 50/ Housing provision in major European cities.

HEALTHCARE

79%

of the Viennese population rate their state of health as 'very good' or 'good'

Proportion of respondents who rate their state of health as 'very good' or 'good'. ATHIS health survey (2014).

Physical health, and in particular also psychosocial health, are factors that play an essential role in individual well-being and life satisfaction. The initial monitoring results show that Vienna is well on track to attain the objectives set for the healthcare field. However, these do not as yet include the possible contribution Vienna's healthcare sector could make to attaining the climate, energy and resource objectives. The city's existing environmental and energy concepts can be taken as a basis for utilising efficiency potentials and developing Vienna's healthcare institutions into lead enterprises for Smart City Wien.

OBJECTIVE

Healthy living conditions	Promote healthy living conditions across all sectors of the population.
Health literacy	Promote health literacy across all sectors of the population.
Medical care	Ensure the highest standards of medical care based on efficient, needs-based delivery structures and processes (best point of service).
Duration of hospital stays	Reduction of frequency and duration of hospital stays.
Vienna Hospital Association (KAV) in public ownership.	To ensure the provision of a robust, socially equitable public healthcare system, the Vienna Hospital Association (KAV) and its facilities should remain under public ownership.
Efficiency of the healthcare system	Potentials for greater efficiency (in the public healthcare system) should be systematically reviewed and implemented in all areas.
Outpatient over inpatient care	As a basic principle, outpatient should be favoured over inpatient care in the delivery of nursing services – patients should receive excellent home-based nursing care for as long as possible.
Leisure	The inhabitants of Smart City Wien are happy with the quantity and quality of their leisure time.

STATUS QUO

Wherever the monitoring results allowed a clear assessment to be made, the indicators were largely on track for attainment of the objectives.

With regard to promoting healthy living conditions (measured by air quality, noise pollution, bathing water quality, etc.) and health literacy across all sectors of the population, the trend was generally positive. Vienna is also largely on track to attain its objectives regarding satisfaction with medical care structures and delivery standards. In terms of maximising potentials for greater efficiency in the public healthcare system, recent expenditure was already below the maximum spending target set for 2020. Both the frequency and duration of hospital stays have been significantly reduced, with current performance actually better than the respective

target values (-2.8% and -2.0% compared to the targets of -1.1% and -0.8%). Since the implementation of the Geriatrics Concept in 2015, the objective of “outpatient over inpatient” is no longer considered a priority and has been replaced by the “Prevention and rehabilitation over long-term nursing care” approach.

Regarding optimisation of opportunities for recreational activities and achieving a good work-life balance, the current parameters show a mixed picture: there is a significant discrepancy between the high level of satisfaction with the available leisure/cultural facilities and the subjective perception of how much leisure time is actually available: one in four respondents rated the latter as poor or insufficient.



ACTION REQUIRED

Further efforts must be made in order to remain on track for attainment of the Healthcare objectives. This concerns in particular:

- » Better regional coordination with the Greater Vienna region and consistent implementation of higher-level strategies (e.g. Urban Mobility Concept for Vienna, Noise Action Plan, etc. etc.)
- » Information and awareness-building measures to increase early health literacy among children and youngsters.
- » Implementation of projects such as “Alcohol 2020” or the development of novel forms of outpatient care on the basis of the Regional Healthcare Structure Plans.
- » Optimisation of the administrative processes and measures to increase efficiency in hospital facilities.

Efforts should also be made to investigate the extent to which inpatient facilities such as hospitals, care homes and old people’s homes can additionally make a substantial contribution to the attainment of the resource objectives by reducing their ecological footprint.

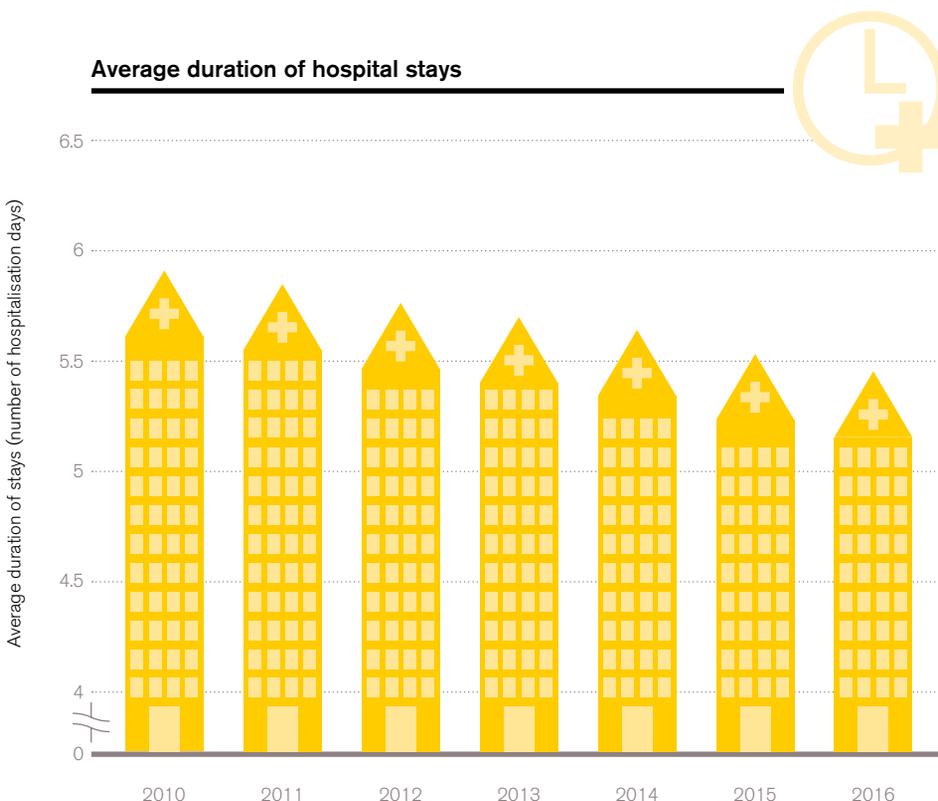


Figure 23:
Average duration of hospital stays over time.

Source:
Federal Target Control Commission for Health.



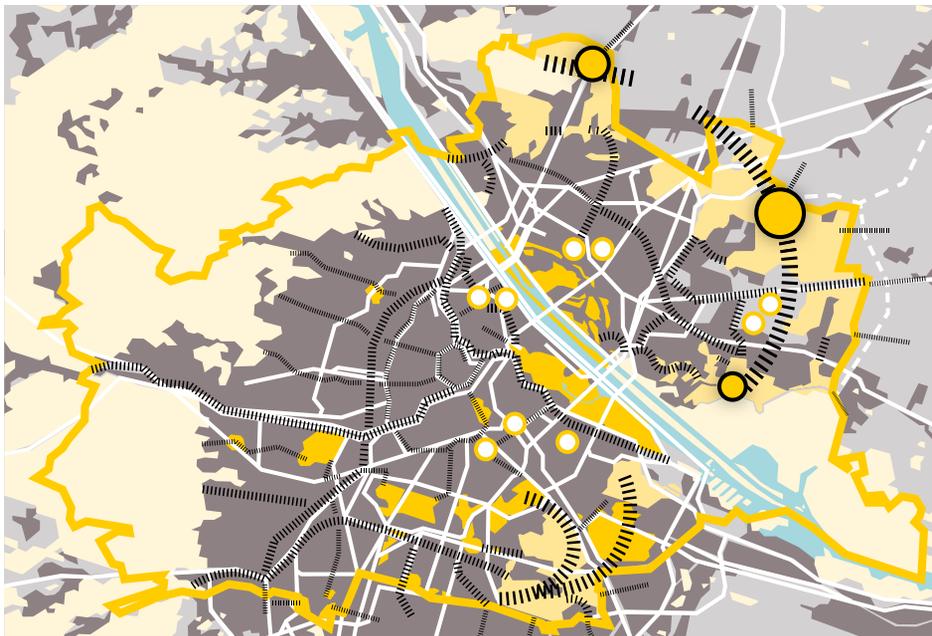
ACTION REQUIRED

Considering the city's dynamic population growth, it is not only essential to create and safeguard additional recreation areas, but also to ensure that outdoor spaces remain accessible in the increasingly more densely built-up areas.

Efforts should also be undertaken to ensure that the proportion of green spaces in new-build projects is maximised through careful planning of unsealed surfaces and compensatory measures (e.g. the greening of rooftops and facades) as well as through quantitative specifications.

The linking up of green and open spaces across federal provinces and municipalities, as is currently being tested in a number of pilot projects, is an important instrument for safeguarding and developing the cultural landscape of the wider urban region and should therefore be done on a larger scale wherever possible.

Schematic overview of green space-related measures



Situation:

- Built-up areas (2013)
- Forest areas in the environs of Vienna

Existing green spaces:

- Landscape dominated by forests
- Landscape dominated by agric.
- Large-scale urban green spaces

Planned measures:

- Upgrading of recreation areas
- New parks (2-10 hectares)
- Networking of open spaces

Figure 24: Schematic overview of green space-related measures.

Source: Municipal Dept. MA 18/STEP 2025.
Data: Municipal Depts. MA 21, MA 22 ("Wien Umweltgut" map), MA 41, Central Institute for Meteorology and Geodynamics (ZAMG), Urban Atlas.



ANALYSIS OF THE
OVERALL STRATEGY

CONCLUSIONS REGARDING THE SYSTEM OF OBJECTIVES USED IN THE FRAMEWORK STRATEGY

The monitoring results for the individual objectives show where progress has already been made towards attaining the SCWFS objectives, as well as the areas in which greater action is required in order to steer back or remain on track for attainment. These initial evidence-based findings provide valuable information for managing the implementation of the SCWFS. In a second step, the synopsis of the evaluations of the individual objectives was used as the basis for an analytical assessment of the overall strategy, paying special attention to the appropriateness, time horizon, and current relevance of the objectives, as well as to any interrelationships or conflicts between them. To summarise, the resultant findings are as follows:

A long-term strategy for the whole city requires regular readjustments and modifications to take account of current developments and changed framework conditions and, not least, to sustain the momentum of the Smart City Wien Initiative (see ↻ “Review and revision of objectives”, page 62).

The SCWFS is designed as the umbrella strategy for the City of Vienna's sectoral strategies, concepts and programmes and, accordingly, it should be adequately reflected in the latter. An initial analysis shows that this is only partly the case so far (see ↻ “The SCWFS as an umbrella strategy”, page 65).

Despite efforts to reflect as many policy fields as possible in the SCWFS, a number of important (cross-sectoral) topics have not yet been integrated, or not sufficiently so (see ↻ “New thematic areas and cross-cutting topics”, page 66).

The further establishment and expansion of the governance structure for the Smart City Wien Initiative also remains a challenge. Without this, the special challenges faced by all actors in implementing the Framework Strategy are difficult to master: these range from the setting of political priorities through the provision of the necessary resources to the definition of responsibilities and processes. The involvement of all relevant actors in both the municipal administration and its associated organisations and enterprises has only been partly accomplished so far. The promotion of cooperation across topics and departments is an essential factor for the successful implementation of Smart City projects and measures (see ↻ “Governance, actors and participation”, page 67).

Vienna's Smart City Initiative with its specific approach centred on social inclusion and quality of life has aroused much interest both in Austria and internationally and has secured Vienna top positions in several international rankings. This high visibility and international response support the SCWFS objective of positioning Vienna as a “strong brand” (see ↻ “External impact of the SCWFS”, page 68).



“The Smart City Wien Framework Strategy with its holistic basic orientation has showcased new approaches to an international audience. The monitoring process for verifying its implementation was developed with the same high aim in mind.”

Thomas Madreiter, Director of Urban Planning Group, City of Vienna

INTERRELATIONSHIPS BETWEEN AND CONSISTENT ALIGNMENT OF OBJECTIVES



“First and foremost, Smart City Wien is about striving to conserve resources. Processes of development and change in the sectors of energy, mobility, infrastructure and building management are to dramatically reduce CO₂ emissions by 2050. The three major dimensions – Resource conservation, Quality of Life, and Innovation – are closely interlinked [...]. The special impact of the Framework Strategy should and will find its expression in the development of stronger links between the individual thematic fields and dimensions.”

Smart City Wien Framework Strategy, Chapters 1 and 9

An analysis of the interrelationships between objectives carried out as part of the monitoring process shows that, at present, the individual objectives within a dimension only make few explicit references to the respective other dimensions and/or to the basic intention of the SCWFS. In the Quality of Life and Innovation dimensions there are no individual objectives that explicitly refer to the headline goal “Resource conservation – reduction of greenhouse gas emissions”. Examples of such references would be, for instance: in the thematic field of education – establishing a broad awareness of climate and environmental protection at all levels of the education system; in the thematic field of healthcare – promoting energy efficiency and resource conservation in the city’s numerous healthcare institutions.

Within the respective dimensions, however, the interrelationships between the individual objectives are mostly clear and support the headline goal of the respective dimension. The latter is particularly marked in the Quality of Life dimension. In the dimension of Resource Conservation, there are strong interrelationships between the energy, mobility and buildings objectives and the headline goal “Reduction of greenhouse gas emissions”.

Discussions during the monitoring process showed that the actors are often unaware of the intended and actual interrelationships between the objectives. This is probably one reason why the indicators chosen to measure attainment of the objectives tend to focus exclusively on the wording of the respective objective and hardly make any reference to the underlying intentions and interrelationships. One example: the SCWFS defines ICT as the »nervous system« of the Smart City Wien Initiative and stipulates that “Pilot projects should model changes to processes and at the same time help to leverage efficiency potentials in combination with management structures”. These requirements are reflected neither in the wording of the objectives in this field, nor in the selected indicators.²². The actual measures and projects developed and implemented by the respective competent institutions, however, are primarily geared towards the objectives as worded.

- ⊗ Recognise interrelationships between objectives and discuss these with experts.
- ⊗ Strengthen headline goals and define individual objectives with explicit reference to the latter, especially the headline goal “Resource conservation and reduction of greenhouse gas emissions”.

²² Indicators: Progress in the thematic field “open government” – expert assessment; number of applications based on OG data; number of projects initiated under the “Digital City Vienna” initiative; number of WiFi hotspots.

Consistent alignment of objectives

Any future review and revision of the Smart City Wien Framework Strategy should focus the various individual objectives more strongly on the underlying intentions and headline goals and ensure that the integrated approach of the SCWFS is also firmly anchored in the system of objectives. Consistent alignment of the individual objectives with the headline goal of "Ensuring the highest possible quality of life while maximising conservation of resources" would generate much stronger synergies between the respective policy and activity fields while simultaneously eliminating potential conflicts between objectives. Two examples:

Decoupling economic momentum from consumption of resources

At present, the Innovation dimension of the Framework Strategy still chiefly comprises objectives with an orientation towards general economic growth. A more precise alignment reflecting the underlying intentions of the SCWFS could take the form of a focus on sustainable start-ups, say, or on foreign direct investments in green technologies. At the measures level, this could translate into appropriate subsidy programmes, for instance. Likewise, this basic principle could also be embedded in the RTI and education objectives (e.g. focussing active labour market policy and associated qualification programmes on "green jobs").

Supporting structural objectives through awareness-raising and behaviour change

This means, for instance, not only ensuring that the structural framework for resource-efficient forms of business, mobility or housing is in place, but also creating a high level of acceptance for these approaches. This requires appropriate awareness-raising measures to be explicitly embedded in the education system and supported by relevant SCWFS objectives.

"The Smart City Wien Framework Strategy is a long-term, far-sighted strategy with objectives across all policy areas that can endure beyond government programmes and legislative periods."



Pia Hlava, City of Vienna, Municipal Department for Urban Development and Planning (MA 18)

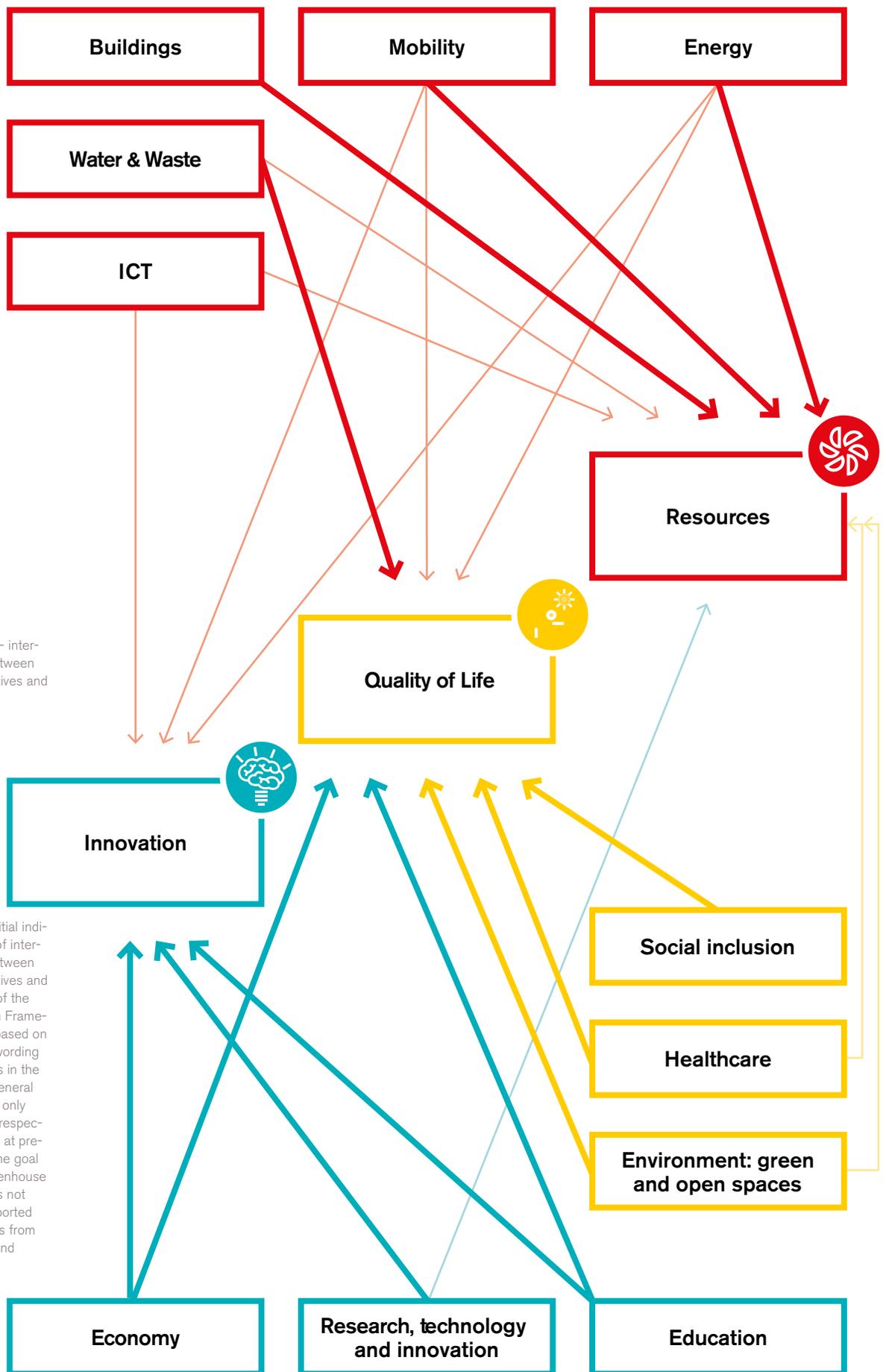


Figure 25: Good relations – inter-relationships between individual objectives and headline goals.

Source: Own diagram.

Results of an initial indicative analysis of inter-relationships between individual objectives and headline goals of the Smart City Wien Framework Strategy, based on the respective wording of the objectives in the SCWFS. As a general rule, direct links only exist within the respective dimensions; at present, the headline goal of reducing greenhouse gas emissions is not sufficiently supported by the objectives from the Innovation and Quality of Life dimensions.

CONFLICTING OBJECTIVES

The synopsis of objectives and monitoring results flags up a number of explicit or potential conflicts between the individual objectives. One of the reasons for this is that the definition of the individual objectives follows the respective sectoral logic, while any reference to the other dimensions recedes into the background.

Most objectives from the thematic field “economy” concern growth, usually accompanied by increased consumption of resources and additional greenhouse gas emissions – whether directly (additional companies means additional consumption of space and energy) or indirectly (additional wealth often leads to more resource-intensive lifestyles). The targeted decoupling of growth from consumption of resources is specified in the text of the Framework Strategy, but not in the objectives (or the associated measurement indicators).

There is also a potential conflict between the objective of high energy standards for buildings (though associated with lower operating costs, the latter often entail higher investments) and ensuring access to affordable housing, as well as between the use of space necessarily associated with new housing developments and ensuring that the proportion of green spaces in the urban territory of Vienna is as high as possible.

If these conflicting objectives are made explicit, they can be clarified or prioritised accordingly. Affordable housing and energy standards, for instance, can be reconciled through appropriate consideration of costs (e.g. life-cycle costs of a building instead of investment costs only).

- ⊗ Make conflicting objectives explicit and negotiate accordingly.
- ⊗ Define objectives more precisely or, where necessary, establish strategic hierarchies through management of the Smart City Wien Initiative.

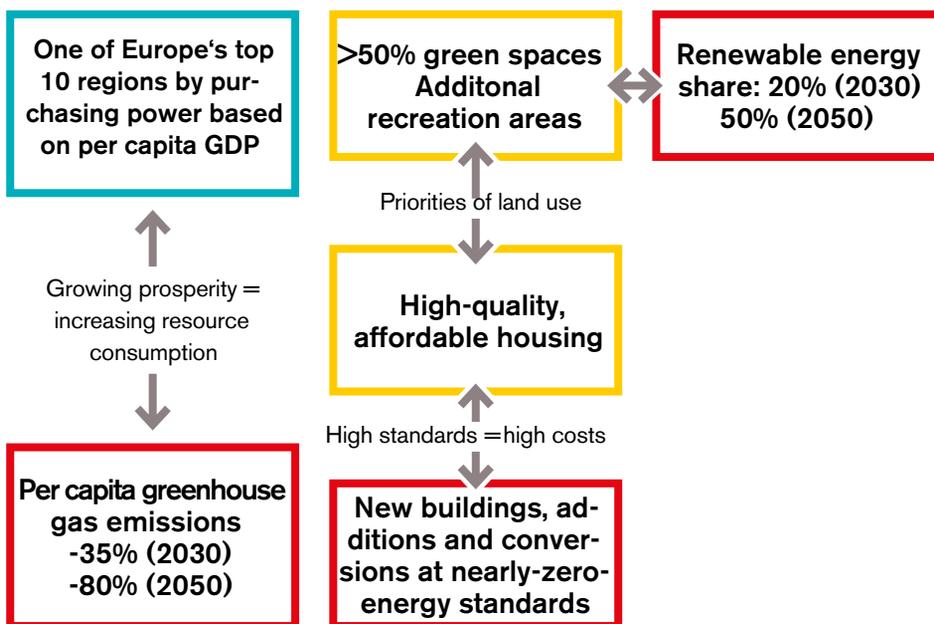


Figure 26:
Potential conflicts
between SCWFS
objectives.

Source:
Own diagram.



DETAILING OF OBJECTIVES AND TIME HORIZON

“This Framework Strategy describes the major goals and objectives and the basic pathways to their attainment. It represents a set of guidelines for the numerous specialised strategies of the City of Vienna.”

Smart City Wien Framework Strategy, Chapter 1

This aim was not always achieved in the definition of the individual objectives, which range from extremely wide-ranging strategic goals through to highly detailed targets that would be better suited as indicators for measuring attainment of the objectives. These great differences in the level of detail are also reflected in the long- or short-term time horizons of the objectives.

The SCW Framework Strategy is basically strategic and long-term in orientation (2030, 2050), and as such aims to provide orientation for the focus of policies, strategies and measures across legislative periods and beyond the duration of current implementation programmes. This should be consistently reflected in the individual objectives. Any short-term targets and measures derived therefrom should therefore be elaborated in the respective sectoral strategies, programmes and specialised thematic concepts (see also [↗](#) “The SCWFS as an umbrella strategy”, page 65).

Table 2:
Examples of SCWFS objectives with an especially high degree of detail and a short-term time horizon.

Objective	Assessment
RI 3: The next 100 apps in three years' time	Very short term, due to specific definition better suited as indicator than as SCWFS objective
RI 4: Pilot projects with ICT enterprises are to serve as showcases for the city and its economy	Possible indicator or implementation measure
RI 5: In three years' time, Vienna will have a wide public WiFi network	Very short term, due to specific definition better suited as indicator than as SCWFS objective

- ⚙️ Focus SCWFS objectives on “the major goals and objectives and the basic pathways to their attainment”, while ensuring wording is sufficiently specific and detailed for implementation and external communication.
- ⚙️ Define detailed, short-term targets derived from the SCWFS objectives in strategy documents, specialised thematic concepts and programmes.

REVIEW AND REVISION OF OBJECTIVES

The monitoring process shows that a number of individual objectives require review and revision. On the one hand, as described in the previous sections, the objectives must be better aligned to the core intentions of the Smart City Wien Framework Strategy and any conflicting objectives must be resolved. Above all, however, the objectives must be swiftly adjusted in response to changes in the framework conditions – be they demographic developments (such as population growth, migration movements) or international commitments and agreements.

One example is the Paris Agreement on Climate Action adopted at the end of 2015, committing all countries to much more ambitious climate protection goals to keep global warming below two degrees Celsius.

Furthermore, it is unclear whether some of the short- to medium-term milestone targets are sufficiently ambitious to allow attainment of the long-term objectives (2050). Attainment of these milestone targets can give a false picture regarding the efforts necessary in the long term.

- ⊗ Determine procedure and responsibilities for changes to the SCWFS objectives.
- ⊗ Establish technical and political specifications for the definition of objectives.
- ⊗ Revise objectives that have already been attained.

Review and revision of objectives – the example of CO₂ reduction

One central objective of the SCWFS is the reduction of per capita greenhouse gas emissions by 80% from 1990 levels by 2050, with the milestone target of a 30% reduction by 2030. On the basis of the indicators applied, this milestone was almost achieved in 2015 – one year after the adoption of the Framework Strategy and 15 years prior to the planned target date! How is this possible and what are the implications regarding attainment of the long-term objectives? A closer analysis shows that several factors support the necessity for review and revision of the objectives:

- » Per capita greenhouse gas emissions in Vienna have already been declining for the past twelve years. This is due to a decline in total emissions on the one hand, combined with strong population growth on the other. In the light of these trends, the target set for 2030 was not very ambitious.
- » The achievement of the milestone long before the target date could be an indication that the long-term objective will also be relatively easy to attain. However, several experts point out that the reduction target of -80% requires a massive intensification and expansion of measures, especially in the fields of energy, buildings, and mobility. The current SCWFS energy objectives (increase energy efficiency by 40%; 50% of energy from renewables by 2050) will not be sufficient.²³
- » The current accounting method used as the basis for the CO₂ emissions objective (i.e. the method defined in the Vienna Climate Protection Programme (KliP) only factors in 50–60% of Vienna's greenhouse gas emissions as reported in the national emissions statistics. Large power stations, industrial facilities and "traffic not directly attributable to Vienna" are not included in the calculation. From the perspective of climate protection and compliance with international agreements, consideration should possibly be given to supplementing the current indicator for the SCWFS with a set of other indicators (which also contain absolute values).
- » In the light of the Paris Agreement on Climate Action (two-degree target²⁴), the EU is currently tightening up its emissions targets in comparison with the ones in place when the SCWFS was adopted. A number of European Smart Cities are also setting more ambitious reduction targets for absolute total emissions.

²³ According to calculations by the UIV Energy Center.

²⁴ In order to keep global warming significantly below two degrees Celsius – as defined as a goal in the Agreement on Climate Action – global net greenhouse gas emissions must be reduced to zero between 2045 and 2060. The sooner emissions reduction begins, the longer the period required for the necessary transformation.

Vienna's CO₂ emission levels acc. to different accounting methods

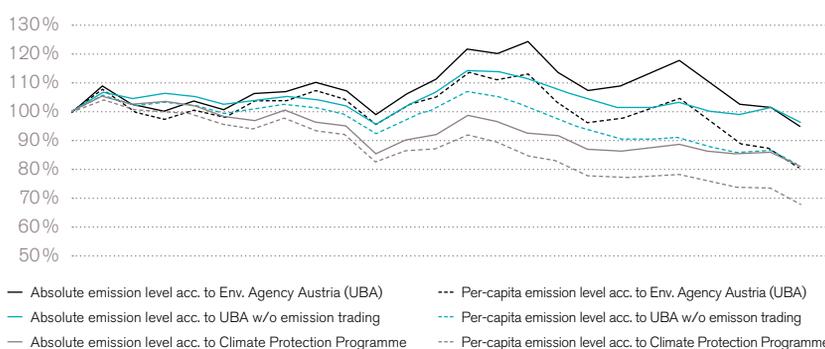


Figure 27: Vienna's CO₂ emissions according to different accounting methods.

Source: Urban Innovation Vienna – Energy Center. Daten: BLI, emikat.at.

CO₂ targets of European cities in comparison

Berlin:

CO₂ target for 2050: 1.7 tonnes per capita – compared to around 11 tonnes in 1990.

According to the Energy Transition Act, total carbon dioxide emissions in Berlin are to be reduced by at least 40% by 2020, by at least 60% by 2030, and by at least 85% by 2050 compared to total emissions in 1990.

Both the emissions produced in Berlin and all the emissions caused by Berlin are taken into account. This means, for example, that electricity imports to Berlin and a share of the aircraft emissions at the airports in Brandenburg are assigned to Berlin.

Paris:

Paris uses a set of target indicators, all of which are expressed in absolute figures (not per capita) as measured against the baseline year 2004 (as opposed to 1990). As in Berlin, emissions from the Greater Paris region which can be assigned to Paris are also included.

Targets for 2030:

- » Reduction of energy consumption by 35%
- » Increase in share of renewables to 45% (including the procurement of renewable electricity and gas from “outside”)
- » Reduction of local greenhouse gas emissions by 50%
- » Reduction of the “global CO₂ footprint” by 40%: this also includes Paris’s “grey energy” consumption.

Targets for 2050:

- » Reduction of energy consumption by 50%
- » 100% renewable energy, of which 20% from local production
- » Reduction of local greenhouse gas emissions by 100%
- » Reduction of “global CO₂ footprint” by 80% – the remainder to be compensated through “offset measures”.

Amsterdam:

New targets apply since mid-October 2017, as coordinated with the overall government targets for the Netherlands:

- » 2030: reduction of CO₂ emissions by 50% (compared to 1990)
- » 2050: reduction of CO₂ emissions by 85–100% (compared to 1990)

Here again, the targets are expressed in absolute figures and not per capita. The calculation takes into account the energy consumed by the citizens of Amsterdam, i.e. it includes emissions from industrial facilities and power plants producing fuel or electricity for Amsterdam.

Stockholm:

CO₂ emissions are to be reduced to zero by 2040 – this is also the target for Sweden as a whole, implying that all energy “imports” to Stockholm must also be CO₂-free by that date or earlier.



THE SCWFS AS AN UMBRELLA STRATEGY



“As an umbrella strategy, the Smart City Wien Framework Strategy is a set of guidelines for the governing bodies, municipal departments and all other institutions of the City of Vienna. Specialised thematic concepts and strategies, as well as implementation activities and decisions which are of relevance for the attainment of the objectives of the Smart City Wien Framework Strategy, should be aligned towards the latter. Appropriate justification must be given for any deviations.”

Vienna City Council resolution on the Smart City Wien Framework Strategy

The Smart City Wien Framework Strategy has succeeded in transcending the sectoral logic of individual departments to anchor the topics of climate protection and resource conservation as a priority in the political consciousness.



“Thanks to the Smart City Wien Framework Strategy, climate change and its challenges are being addressed in Vienna in all areas and at all levels.”

Gabriele Berauscheck, City of Vienna, Municipal Department for Urban Development and Planning (MA 18)

It is less clear to what extent the SCWFS has so far fulfilled its intended role as an umbrella strategy.

An initial screening of the city's specialised strategies and thematic concepts conducted in the course of the monitoring of the overall strategy shows that the SCWFS is taken into account in almost all documents drawn up since its finalisation, though to varying extents.

The strongest content references are made by the STEP 2025 – Urban Mobility Concept for Vienna²⁵, adopted in 2014, as well as the Energy Framework Strategy and the STEP 2015 – Strategic Concept on Spatial Energy Planning, currently under development, which all adopt objectives directly from the SCW Framework Strategy and specify them in greater detail. The other specialised thematic concepts mention the SCWFS less frequently and adopt hardly any to none of the SCWFS objectives. The Digital Agenda Vienna, the Tourism Strategy Vienna 2020 and the research, technology and innovation strategy “Innovative Vienna 2020” refer to SCWFS as a higher-level umbrella strategy, while the Urban Heat Islands Strategic Plan – despite its strong focus on adjusting to climate change – only gives the SCWFS a brief mention at the beginning. Other concepts and programmes, e.g. in the fields of healthcare and education, do not explicitly mention the Framework Strategy although there are plenty of good connection points, for example in the operation, refurbishment and new build of education and healthcare facilities.

At present there is a lack of coordination in terms of ensuring that sectoral strategies and concepts are elaborated in alignment with the objectives of the SCWFS and explicitly support the latter.

- ⚙️ Perform a comprehensive analysis of the extent to which the SCWFS is reflected in sectoral policies, strategy documents, programmes and specialised thematic concepts.
- ⚙️ Develop and implement an appropriate process to ensure that all relevant strategies and programmes of the City of Vienna are aligned with the SCWFS (governance).

²⁵ See Glossary.

Sectoral strategies to be considered

During the assessment of the strategy documents in the light of the SCWFS, it also became apparent that supplementary sectoral concepts are required:

Strategy for the metropolitan region

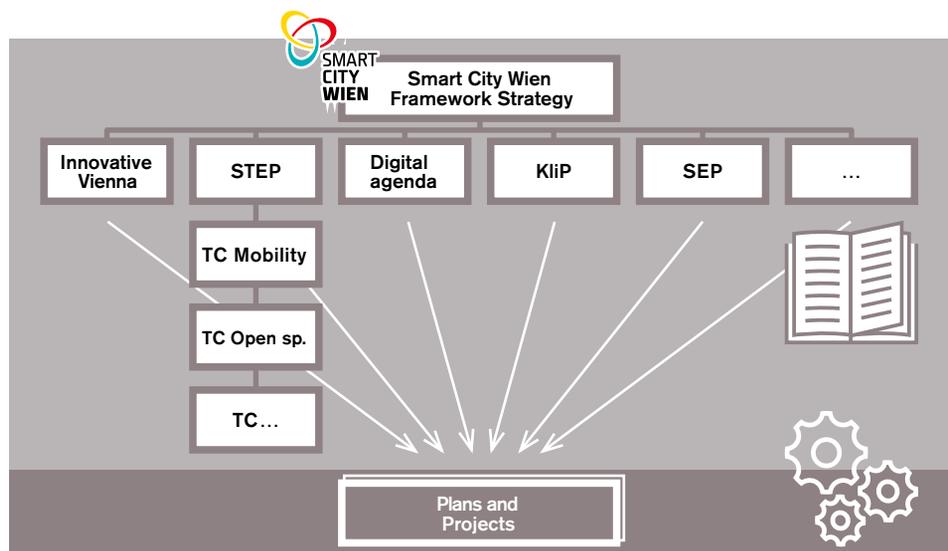
In order to attain the objectives in the fields of energy, traffic and noise (see also the Urban Mobility Concept for Vienna and the Noise Action Plan) as well as innovation, extensive cooperation within the region is required, especially with Lower Austria and Burgenland. It would therefore appear useful to develop a joint strategy for the “smart” metropolitan region (Vienna, Lower Austria, Burgenland) extending beyond the city borders, complete with effective implementation and governance mechanisms.

Strategy for sustainable economic development and business promotion

Another essential requirement would be a strategy to reconcile the existing objective of dynamic, growth-oriented economic development with the fundamental principle of maximum resource conservation, also taking account of the (quite disruptive) trends in the field of production (cf. digitalisation, Industry 4.0, etc.) as well as new forms of work and employment. Approaches towards this goal can be found in the economic policy guidelines of the City of Vienna, as well as in the RTI strategy “Innovative Vienna 2020” and the latest studies commissioned by the city.

Figure 28:
The SCWFS as
an umbrella strategy.

The alignment of the sub-strategies pursued by the City of Vienna with the headline goals of the SCWFS should ensure that concrete plans and projects in all areas are developed in compliance with the Framework Strategy, thus also ensuring implementation of the SCWFS objectives.



NEW THEMATIC FIELDS AND CROSS-CUTTING TOPICS

A series of thematic fields feature in the Smart City Wien Framework Strategy but were not linked to specific objectives, so they are not expressly addressed during either implementation or monitoring. Some of them are cross-cutting topics which permeate several areas without being explicitly anchored in any particular one.

A number of these thematic fields were identified during assessment and evaluation of the objectives. In future, after appropriate analysis, they are to be (more) explicitly anchored as overarching topics in the Framework Strategy and its system of objectives, and accordingly given detailed consideration in the implementation process. They include:

- » Factoring in of the “grey energy” associated with products in a consumption-based accounting system for energy and CO₂ emissions²⁶
- » Digitalisation
- » Highly automated and/or driverless vehicles
- » Adjustment to climate change
- » Closed circle economy
- » New forms of business and employment (on-demand production, sharing economy)
- » Pollutant emissions in air, water, and soil as a key aspect of quality of life
- » Smart Region
- » Social innovation
- » Urban manufacturing, Industry 4.0

Recommendation

- 🌀 Identify and analyse missing thematic fields and, if necessary, anchor them explicitly in the SCWFS together with appropriate defined objectives.

GOVERNANCE, ACTORS AND PARTICIPATION

“Vienna’s aspiration to be a Smart City and the implementation of the Framework Strategy entail special challenges for the Austrian capital. Many of the objectives cannot be tackled on the basis of individual activities or competencies but require overarching thematic management. A lack of co-operation entails high costs in terms of inconsistencies, duplications of effort or gaps.”

Smart City Wien Framework Strategy, Chapters 9 and 10

The monitoring process clearly highlighted the need for “overarching thematic management”. The monitoring process would not have been feasible without the conceptual and coordinative activities of the Smart City Project Unit at the Municipal Department for Urban Development and Planning (MA 18). However, SCW support functions and bodies are also essential for the ongoing management and implementation of the Framework Strategy, because it requires activities and measures that cut across divisions and departments. The SCWFS therefore devotes a separate chapter to “Governance” and examples of implementation steps are described.

“The Smart City Wien Framework Strategy has triggered a dialogue about the city’s future, and synergies and cooperation are actively being sought. [...] Departments are reflecting their own performance against the backdrop of the SCWFS.”

Karin Zauner-Lohmeyer, customer service, Vienna Housing Agency

The clear anchoring of tasks and responsibilities in the line management structure for the implementation of the Framework Strategy is an integral part of SCW governance. The discussions during the monitoring process showed that this has not yet happened to a sufficient extent.

²⁶ See Glossary.

Efficient implementation from a city-wide perspective not only calls for intensive cooperation within the municipal administration, but also with all relevant stakeholders. These include the enterprises (KAV, Wiener Wohnen, Wien Kanal) and companies (e.g. Wiener Stadtwerke) of the City of Vienna, research and educational institutions, industry, chambers, trade associations and NGOs, as well as the federal provinces of Lower Austria and Burgenland.



"The monitoring process and its indicators are only the starting point. It also takes bold, far-sighted people who make decisions based on the results..."

Theodora Manolakos, City of Vienna, Municipal Department MA 17 – Integration and Diversity

It became apparent during the monitoring process that a number of significant players have not yet been sufficiently involved in the implementation of the SCWFS. This applies particularly to the point in the SCWFS regarding "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" (see also Strategy for the metropolitan region in "Sectoral strategies to be considered", [page 66](#)).

- ⚙️ Analyse in detail which offices, institutions and enterprises of the City of Vienna are already playing an active role in the implementation of the SCWFS and identify where a stronger involvement in both implementation and setting of objectives is required.
- ⚙️ Evaluate the plans outlined in the SCWFS regarding governance in preparation for the review and revision of the SCWFS.

EXTERNAL IMPACT OF THE SCWFS



"The Smart City Wien Initiative is a package of important steps towards change in Vienna over the coming decades. The municipal administration and policy-makers have designed a strong, broad-based communication strategy to bring the concept to life. This will only be possible through constant exchange and dialogue with the Viennese population as well as numerous other partners. In this way, Vienna can be positioned as a strong brand in the international competition among cities."

Smart City Wien Framework Strategy, Chapter 10.4

The Smart City Wien Initiative and the specific Viennese approach pursued in the Framework Strategy have so far generated a high level of international interest. This is not only evidenced by the city's No. 1 ranking in the Smart City Index published by Roland Berger at the beginning of 2017, but also by the considerable number of national and international enquiries and visits by delegations to municipal institutions, Viennese universities, etc.²⁷ The website of the Smart City Wien Initiative recorded around 50,000 visitors in 2016, 30,000 of whom accessed the site from abroad.

The extensive, indicator-based monitoring process is a showcase project and a vehicle through which Vienna can continue to position itself as a front runner in the Smart City field and initiate partnerships to advance the common interests of Smart Cities at the European level.

²⁷ About 180 enquiries and 45 invitations to lecture were received and 27 delegations were registered at the Smart City Agency in Vienna in the first half of 2017 alone.

At the same time, the monitoring results provide a good basis for communication with the citizens of Vienna. They make the complex Smart City Wien Framework Strategy and the sometimes abstract goals tangible, throw light on the successes and impact achieved so far and create transparency about the future challenges involved in attaining the objectives. It is important to illustrate the results with vivid examples which are as close as possible to the everyday lives of Viennese people ("What does it mean for me?").

The communication of the monitoring results is also intended to have a mobilising effect. In order to achieve this, it not only has to make the efforts of policy-makers, administrations and public institutions visible, but also clearly indicate the areas in which sustainable successes can only be achieved through increased efforts on the part of the entire city and, if necessary, changes in the behaviour patterns of each individual ("What can I contribute?").

- ⊗ Conduct detailed monitoring of the external impact.
- ⊗ Make resources available for ongoing publicity for the SCWFS.
- ⊗ Communicate monitoring results within the municipal administration, the city's enterprises and to the public, to make the SCWFS tangible, strengthen awareness of the interrelationships and action required, and bring on board partners for its implementation.
- ⊗ Use the monitoring results to initiate an international specialist discourse in order to win partners for the advancement of the common interests of Smart Cities at the European level.

"The SCWFS monitoring process not only has an important role to play in making the municipal administration more transparent, but also creates awareness among the citizens of Vienna about the challenges facing a fast-growing city."

Ingrid Kunz-Henrichs, City of Vienna, Municipal Department MA 53 – Press and Information Services





MONITORING PROCESS
AND METHODOLOGY

DESIGN OF THE SCWFS MONITORING PROCESS

Both the SCWFS and the City Council Resolution of June 2014 clearly state that periodic monitoring must be carried out to ensure effective implementation of the SCWFS and that a “coherent monitoring and reporting process”²⁸ is to be developed for this purpose. In accordance with the division of tasks within Vienna’s municipal administration, the Municipal Department for Urban Development and Planning (MA18) was entrusted with the implementation of these plans. The first task of the Smart City Wien Project Unit at MA 18 was to develop and coordinate the appropriate monitoring process for the SCWFS. An extensive exploratory project²⁹ was established for the elaboration of the methodology in order to build on the state of the art in international research and at the same time to take account of the structural framework and reflect the specifics of the Smart City Wien Framework Strategy as closely as possible.

In the design of the SCWFS monitoring process, special attention was paid to the following two principles:

- » **Extensive co-operation:** All steps in the monitoring process involved the municipal departments of the City of Vienna and its associated organisations and enterprises. Focus groups, structured interviews, individual interviews and thematic workshops were used for detailed specialist discussions about content and procedural questions. The rationale was that a well-coordinated approach would elicit maximum support (ownership) from the actors.
- » **Building upon existing data, evaluations and reports** to keep the data collection workload to a minimum for the participants. In a first step, the data pool and reporting structure were analysed in consultation with the competent specialised departments in order to determine suitable indicators for the SCWFS.



“The monitoring process (and other formats) have forged a new network among the municipal departments and in doing so have brought a new quality to the activities of the municipal authority.”

Andreas Trisko, Head of Municipal Department for Urban Development and Planning (MA18)

PROCEDURE

The first monitoring process was implemented in 2017 within the framework of an EU-funded project³⁰ and comprised two areas:

- » **Attainment of monitoring objectives: evaluation of the individual objectives in the three SCWFS dimensions based on an extensive set of indicators**

The extensive data collection and data capture process was effected via an online reporting tool; a qualitative evaluation of attainment was subsequently conducted for each individual objective. The core results for each thematic field were then summarised, technically adapted, and communicated to all the city’s policy-making departments.

- » **Overall monitoring strategy: overall analysis of the monitoring results and the SCWFS**

The collected information was reviewed by the project team plus external experts with regard to interfaces between the individual objectives, possible conflicting objectives, cross-cutting topics, action required, and conclusions.

²⁸ Smart City Wien Framework Strategy, p. 93.

²⁹ The monitoring process was designed within the framework of the exploratory project SMART.MONITOR with support from the “City of Tomorrow” programme of the Federal Ministry of Transport, Innovation and Technology (bmvit).

³⁰ The first SCWFS monitoring iteration was carried out with funding from the European Regional Development Fund (ERDF Investment for Growth and Employment programme).

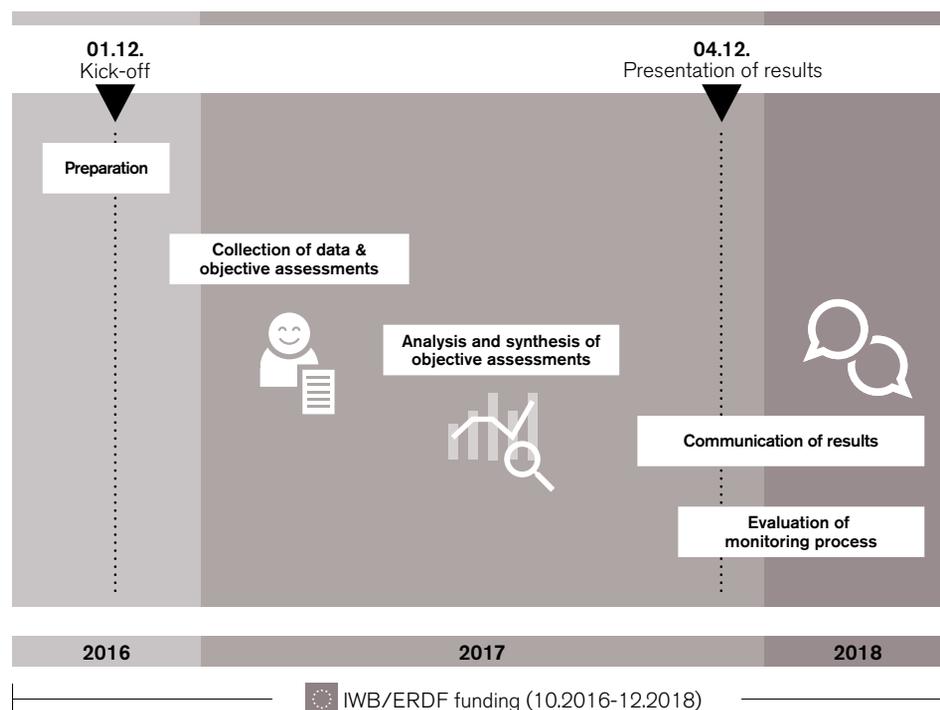


Figure 29: Chronological sequence of the SCWFS monitoring process.

Source: Own diagram.

PARTICIPANTS

The monitoring process, commissioned by Dr. Erich Hechtner, Chief Executive Director of the Municipal Authority, was designed to ensure broad participation while simultaneously keeping the necessary workload for the participants as manageable as possible.

Operationally, tight coordination by the project management team in the Smart City Project Unit at the Municipal Department for Urban Development and Planning (MA 18) delivered solid, meaningful results within a short time frame. The project team was completed by Urban Innovation Vienna and the Municipal Department for Automated Data Processing, Information and Communication Technologies (MA 14), together with external partner institutions (ETA Umweltmanagement GmbH and the Vienna Science and Technology Fund (WWTF)). The responsibilities of the project team included coordination and quality assurance of the monitoring process, mediation between the participants, and the further processing, evaluation, editing and communication of the results.

The following roles were defined for the content-related process steps, from data collection to analysis and evaluation of objectives, and assigned to specific institutions or persons:

- » **Reporting on objectives:** A reporting office within the municipal authority or the municipal organisations was determined for each SCWFS objective. Their job was to coordinate reporting on the respective objective – especially the collection, pre-processing and delivery of the parameters and the subsequent qualitative evaluations of the objective.
- » **Objective evaluation teams:** The evaluation of attainment was not done by the reporting persons alone, but by objective evaluation teams made up of relevant experts from the municipal institutions whose task was to elaborate a joint assessment of the extent to which the objective had been attained. In light of the sometimes very broad and qualitative definition of the objectives, this specialist discussion and the common interpretation of the collected parameters constituted the core of the monitoring process.
- » **Data providers:** In the collection and input of the parameters for the pre-defined indicators, the persons responsible for reporting were supported by the specialist departments with the respective data at their disposal (e.g. from internal statistical capture and reporting systems).

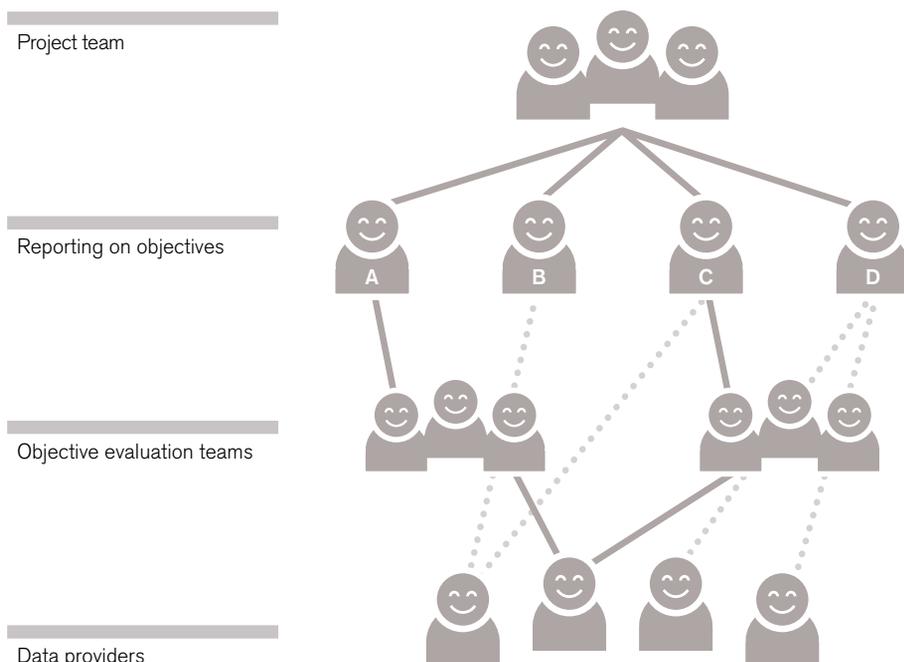


Figure 30: Organisational structure of the SCWFS monitoring process.

Source: MA 18, Smart.Monitor

A total of 120 experts from around 50 municipal departments, funds, enterprises and companies of the City of Vienna, as well as all its administrative groups, participated in the first monitoring cycle.

Participants in the SCWFS monitoring process

Persons from	
Municipal departments	77
Chief Executive offices	12
Associated organisations and enterprises	31
Total	120
Participating organisational units	
Administrative groups	7 out of 7
Municipal departments	25 out of 57
Associated organisations and enterprises	18
Participants according to their roles	
Reporting on objectives	34 internal, 1 external
Data provision	41 internal, 5 external
Objective evaluation teams	86 internal, 27 external
Project team	3 internal, 7 external
Gender distribution	
Women	44 internal, 11 external
Men	45 internal, 20 external

Table 3: Participants in the monitoring process.



INDICATORS AND EVALUATION METHODOLOGY

"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."

Smart City Wien Framework Strategy, Chapter 11

One-third of the objectives of the Smart City Wien Framework Strategy are formulated in quantitative terms and comprise easily measurable specific target values – accordingly, attainment of the objective can be mapped by a single indicator. By contrast, the majority of the objectives consist of qualitative, mostly extensive descriptions. Here, the individual indicators were grouped together in sets, a synopsis of which enables adequate mapping of the subject area and ultimately an assessment of the degree of attainment.

In dialogue with the respective specialist departments, a total of 153 indicators were determined from 47 data sources.

Objective	Indicator(s)
Increase in energy efficiency by 40% by 2050 (compared to 2005). (1)	Final energy consumption [kWh per capita]
Vienna maintains its quality of life at the current superlative level and continues to focus on social inclusion in its policy design. In 2050, Vienna is thus the city with the highest quality of life and life satisfaction in Europe. (2)	<ol style="list-style-type: none"> 1. Subjective life satisfaction on a scale of 1-5 [%]. Source: Surveys on quality of life in Vienna 2. Subjective response to the question "How much do you enjoy living in Vienna?", three-grade scale [%]. Source: Surveys on quality of life in Vienna 3. Key statements from the "multi-topic survey". Source: Specialist assessment by the objective evaluation team 4. Subjective assessment of quality of life in different European cities [%]. Source: Quality of Life in Cities – perception survey, European Commission

Table 4:

Examples of individual objectives which were evaluated on the basis of a single indicator (1) or a set of indicators (2).

Objective evaluation process

The respective parameters for the indicators were collected by the data providers und interpreted by the respective objective evaluation team. In addition a qualitative evaluation was conducted which summarised the main findings for the respective individual objectives and set them in context.

On this basis the objective evaluation teams were able to assess the degree to which the objectives had been attained and infer the action required in order to attain them.

In the interests of ensuring maximum transparency, all the indicator values and qualitative evaluations were recorded in data sheets accessible to all participants and made available via an online tool.

To enable uniform presentation of the overall results, a four-level scale was determined and used to evaluate the degree of attainment of all objectives, both quantitative and qualitative:

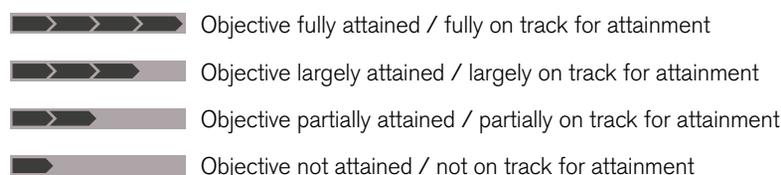


Figure 31:

Evaluation steps.

Source:

cf. Smart Monitor 2016.

In order to condense the results for the individual objectives, a concise summary (synopsis) was compiled to show the status quo and identified need for action for each thematic field and its associated three to five individual objectives.

CONCLUSIONS FOR THE FURTHER DEVELOPMENT AND ROUTINISATION OF THE MONITORING PROCESS

Following the conclusion of the first monitoring cycle a comprehensive evaluation of the monitoring process is planned, involving all actors. The aim is to elaborate and implement a detailed concept for the further development and routinisation of the monitoring process.

The first SCWFS monitoring cycle largely ran according to plan and delivered a full set of results. Although the evaluation of the process is still to come, initial findings, especially with regard to the choice of indicators and the data management, already point to more efficient handling and cooperation among the institutions and persons involved.

Choice of indicators

In the first monitoring cycle, the chosen indicators and sets of indicators provided a good framework for evaluation of the objectives. However, in the discussions several suggestions for improvement were made regarding the design of the indicators. These ranged from more precise definition of the existing indicators to suggestions for further indicators to deliver a more comprehensive overall picture. When the Framework Strategy is reviewed, the indicators also need to be adjusted in line with any revised wording of the objectives.

- ⚙ Review the indicators defined for the existing SCWFS objectives.
- ⚙ Where necessary, adjust the indicators to reflect revised wording of objectives in the course of any future review of the Framework Strategy.



“Given the dynamic nature of technological development and the fast pace of the IT industry in particular, the indicators and key figures must be regularly reviewed and adjusted as part of an ongoing process.”

Gerhard Hartmann, City of Vienna, Municipal Department for Automated Data Processing, Information and Communication Technologies (MA 14)

Data management

The monitoring process very clearly showed the high added value of and need for an exchange of current data beyond the respective municipal institutions. It was found that people were often insufficiently familiar with the data pools and extensive reporting systems of the City of Vienna³¹, hence accessing this information was more difficult. There are also instances where similar or identical data are collected by several municipal institutions in parallel. In many cases the identification of suitable indicators in the design phase of the monitoring process was also highly time-consuming, because there is currently no central overview of the various reports and data produced by the City of Vienna, which means that accessing the City's data pools is difficult. Many participants said they would like a clear overview and centralised access to the City of Vienna's existing data pools.

The online reporting tool used for data collection and objective evaluation, which was jointly developed by the Smart City Wien Project Unit and the Municipal Department for Automated Data Processing, Information and Communication Technologies (MA 14), provided good support for the documentation process but still has substantial potential for improvement.

- ⚙ Further improvement of the online reporting tool (usability, comment and forum functions, data protection through user rights management, output options) and integration into the city-wide “data warehouse”.
- ⚙ Overview of the data and reports available in the City of Vienna on the basis of the information collected in the SCWFS monitoring process.
- ⚙ Swift development of a central data platform with appropriate access for the whole of the municipal authority, as initiated by the Competence Centre for Process Management and ICT Strategy in the Chief Executive Office. Integrate the SCWFS monitoring process using the data management experiences from the monitoring cycle and coordinate the monitoring requirements with regard to structure and data model.

Dialogue and cooperation

The format of the objective evaluation teams prompted expert discussion beyond the boundaries of individual municipal institutions and administrative groups, which often does not take place to the necessary extent in day-to-day working life. The participants also expressed a strong need for continuation and intensification of this cooperation. Despite the great number of persons and municipal institutions involved, the effort required on the part of individual actors was kept as manageable as possible.

- ⚙ Detailed analysis of municipal departments, institutions and enterprises that should be more strongly involved in the monitoring process, the review of the SCWFS and the implementation of the SCWFS.
- ⚙ Ensure the continuity of personnel involved in the monitoring process.



“The Smart City Wien Framework Strategy is clear evidence that you have to work in an interdisciplinary way if you want to create lasting benefits and innovative solutions.”

Ilse Stockinger, Vienna Public Utilities

Monitoring interval

Within the framework of the evaluation and routinisation of the monitoring process planned for 2018, the future interval between SCWFS monitoring cycles should also be determined. In order for the monitoring process to evolve into an effective support for the management of the SCWFS and to maintain the momentum of the Smart City Initiative, there are plenty of arguments in favour of shorter intervals. The aim here should be that the individuals involved in monitoring can perform the necessary steps autonomously and in an efficient, time-saving manner. Experience has shown that retraining or refresher training is required with longer intervals.

- ⚙ Determine the time intervals for data collection, analysis and evaluation of objectives.
- ⚙ Perform a comprehensive cost-benefit analysis.



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INDICATORS AND DATA SOURCES

The table of indicators used in the SCWRS monitoring process and their sources is available for download in PDF format at:

🔗 https://smartcity.wien.gv.at/site/files/2017/12/Ind_Quellen.pdf

GLOSSARY

20-20-20 targets of the European Council for 2020:

The European Union has set itself ambitious targets in the fields of energy and climate policy. The so-called "20-20-20 targets" oblige 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 energy consumption from renewable sources.

https://ec.europa.eu/clima/policies/strategies/2020_en

Air pollutant emissions: Air pollutant emissions refers to the emission of certain substances into the atmosphere and stratosphere, primarily as a result of human activities – mainly transport and manufacturing industry. The increasing volume of air pollutant emissions is having a direct impact on humans and the environment.

Climate neutrality: This term defines the reduction and compensation of greenhouse gas emissions and/or processes or certain conditions that have no lasting negative effect on the global climate. Various products are often also referred to or advertised as "climate neutral". The most consistent form of climate-neutral energy use is the utilisation of greenhouse gas-free energy sources such as sunlight, wind and hydropower.

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

<https://www.wien.gv.at/umwelt/klimaschutz/programm/>

CO₂: Carbon dioxide, the most important greenhouse gas, mainly results from the incineration of the fossil fuels coal, petroleum and natural gas. Throughout the Smart City Wien Framework Strategy and Monitoring Report the term CO₂ is used synonymously with CO₂ equivalents for reasons of legibility.

CO₂ equivalent: The global warming potential of different greenhouse gases, e.g. methane, nitrous oxide (laughing gas) or fluorinated (F) gases, varies. The CO₂ equivalent value describes the global warming potential of a gas across an observation period (usually 100 years) as compared to CO₂. The quantity in tonnes of the gas in question thus emitted is multiplied by the factor by which the global warming potential of the gas exceeds that of CO₂. The result is the emission volume in tonnes of CO₂ equivalents. The uniform presentation of the global warming potential allows the emissions of different greenhouse gases to be compared. In Vienna, 94% of all greenhouse gas emissions (expressed in CO₂ equivalents) in 2009 were due to CO₂; methane, laughing gas and F gases accounted for only 6%.

Combined Heat and Power (CHP): Combined heat and power (also known as co-generation) is the simultaneous production of power and heat, with power in most cases being directly used to generate electric energy. As a rule, the heat generated is used for heating purposes, either by feeding it into a heating grid or directly on site. The combined use of power and heat results in high overall efficiency, which in turn entails primary energy savings. The major proportion of thermal power in Austria is generated in CHP plants.

Data providers: Data providers are those actors and/or organisational units which provide and/or pre-process the respective parameters and/or data for the defined indicators, including a corresponding interpretation.

Deprivation: Deprivation describes a state of hardship and want. Financial deprivation is the inability to achieve a defined minimum standard of living for financial reasons.

Dimensions and thematic fields of the SCWFS: The three dimensions of the Smart City Wien Framework Strategy (SCWFS) are "Resources", "Quality of Life" and "Innovation". The thematic fields of the SCWFS are each subordinated to one of these dimensions. The four thematic fields "Energy", "Mobility", "Buildings", and "Infrastructure" are components of the "Resources" dimension. The "Innovation" dimension comprises the three thematic fields of "Research, Technology and Innovation (RTI)", "Economy" and "Education". "Social inclusion", "Health" and "Environment" are grouped together under the "Quality of Life" dimension.

Direct investments: Capital investments made by an investor to establish or maintain a sustainable economic relationship with a company in another country with the intention of exerting a tangible influence on the management of that company. Direct investments can be "active" and "passive": in the former case an Austrian invests in a foreign company; in the latter case foreign investors invest in Austrian companies.

Early school leavers: According to the EU definition, 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 have at least completed an apprenticeship or a multi-year vocational school before leaving the education system, whereas 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.

Ecomobility: Ecomobility refers to modes of transport which are environmentally friendly in terms of pollutant and noise emissions and use of space, and their active integration into transport networks: walking, cycling (including public bike rental schemes such as "Citybike"), public transport (suburban trains, underground, trams, buses) and, in the wider sense, taxis, car-sharing and car pools.

E-government: The term "e-government" (electronic government) is synonymous with modern, efficient public administration. In concrete terms, it stands for the use of information and communication technologies (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.

Electronic reporting tool or provisional online tool: This innovative ICT-based platform was launched to support comprehensive execution of the SCWFS monitoring process and extensive involvement of the actors. The tool facilitates data collection and evaluation of the individual objectives, making them more efficient and less prone to error. It runs on WordPress, and data can be input automatically by the individual participants. Individual access rights were assigned at the start of the project.

Energy Framework Strategy 2030: The Energy Framework Strategy was adopted by Vienna City Council on 15 December 2017 and is designed to secure the basis for achievement of the City of Vienna's energy and climate goals and serve as a platform for detailed implementation programmes in the energy sector. The Vienna Energy Framework Strategy bridges the gap between the SCWFS objectives with their long-term decarbonisation pathway and the short-term operational concepts and measures of the respective departments, municipal institutions and associated organisations. Goals not only include the expansion of renewable energies and the utilisation of waste heat, but also cover the entire field of reliable supply and system security, which is important for Vienna as a business hub, as well as economic and socially compatible design of the energy grid and energy efficiency. The central focus is on ensuring that all energy policy goals are sustainable, socially inclusive, forward-looking, and guarantee a safe and reliable energy supply for the City of Vienna.

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, it describes the effects of a CO₂-free energy system and the political framework necessary to attain this goal. Member States should take the necessary energy policy decisions on this basis and thus be able to create a stable business environment for private investments.

https://ec.europa.eu/clima/policies/strategies/2050_en

European Union Emissions Trading System (EU ETS): The "EU ETS" is the EU-wide emissions trading system and has been in operation since 2005. An emission allowance must be surrendered for every tonne of CO₂ emitted. Since the number of emission allowances is fixed across the EU and is annually reduced, the system guarantees emission reductions in the long run without imposing specific emission targets on individual market participants. The scarcity of allowances, combined with their tradability, has created a functioning market for emissions allowances. The "carbon price" determined by supply and demand is a yardstick that shows which carbon reduction measures are more economical than paying for allowances.

https://ec.europa.eu/clima/policies/ets_en

Final energy consumption: Final energy is the energy generated from the conversion of primary sources of energy, such as coal, lignite, crude oil, natural gas, hydropower or wind. In this process, the primary energy is converted into a form that consumers can use, e.g. electricity, heat or fuels.

Grey energy: "Grey energy" refers to the (considerable) amounts of energy consumed (and the respective "grey" CO₂ emissions produced) over the entire life-cycle of a product (incl. raw material production, transport, storage, disposal). Relocating production of goods to other regions and countries also shifts the associated CO₂ emissions to these new locations. This way, if traditional, production-based CO₂ accounting is used as standard, these emissions disappear from the country's own emissions account, even though they continue to be caused there as a result of consumption of the goods.

Gross final energy: Gross final energy is the energy remaining after the losses resulting from the 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 energy consumption of power plants.

Gross regional product: The gross regional product is the regional counterpart to the gross domestic product (GDP). It is usually presented in nominal terms (using the market

prices of the respective year) and is used to analyse regional economic development as well as making 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.

Indicator structure of the SCWFS monitoring process:

Indicators are parameters based on measurable proxy values to describe subject matter that is otherwise hard to grasp. To facilitate the evaluation and documentation of the SCWFS objectives, an indicator structure was designed to provide a structured overview of the individual objectives and their indicators. Indicator sets were elaborated for those objectives that cannot be mapped with a single indicator. These sets comprise two or more indicators to be used for evaluating the respective SCWFS objective. A profile was created for every SCWFS objective, containing information on the objective and its designated indicators (e.g. definition of the indicator, prescribed calculation method, unit, etc.) as well as pertinent data sources.

"Innovative Vienna 2020" – Research, Technology and Innovation Strategy:

With this strategy, the City of Vienna has set itself the task of joining the ranks of the leading European centres for research, technology and innovation (RTI). At the beginning of each year a work programme is defined for the implementation of the RTI strategy, which was adopted in 2015.

<https://innovation2020.wien.gv.at/site/>

Modal split: The modal split is a key parameter in transport and mobility planning and describes how traffic is distributed among the available modes of transport. It is frequently also referred to as choice of transport mode.

Motorised individual transport (MIT): Motorised individual transport refers to engine-powered modes of transport that largely allow users to decide freely when to travel and which route to take. Motorised individual transport includes passenger cars and motorcycles.

Multimodality: In simple terms, multimodality describes a situation in which more than one mode of transport is or can be used to make a journey or transport goods.

Near-zero-energy standard: This standard refers to the exclusive construction of near-zero-energy buildings, which is stipulated by the EU for all new public buildings from 2018 onwards and for all buildings from 2020 onwards. Near-zero-energy buildings are characterised by very low energy requirements, with a considerable share of these requirements to be covered by renewable energy sources either on site or close by. This standard can be met either through stricter specifications for the building shell (very low heating requirements) or through increased use of renewable energy sources.

Noise Action Plan: People in Vienna regard noise as a major burden on the environment. Vienna's Noise Management Action Plan (launched in 2008) defines and subsequently implements measures to reduce traffic noise. The range of measures available to combat urban noise is wide and varied. Examples of measures implemented include the construction of sound walls and noise barriers, subsidies for the installation of soundproof windows, traffic-calming measures, and the use of state-of-the-art soundproofing technologies on the public transport network.

<https://www.wien.gv.at/umwelt/laerm/stadtgebiet/laermkarten.html>

Noise emissions: Noise emissions are sounds that impair people's physical, psychological and social well-being. The perception of noise is subjective, varying greatly from person to person, and noise exposure can give rise to manifold physical and psychological effects. A distinction is made

between noise effects on hearing and effects on the body as a whole.

NUTS (Nomenclature des unités territoriales statistiques): The NUTS classification (nomenclature of territorial units for statistics) is a hierarchical system for dividing up the territory of the EU into spatial reference units for the purposes of official statistics. NUTS regions are the basis for the quantitative assessment of regions by the EU and are used, for example, to compare data within the framework of EU Cohesion Policy.

<http://ec.europa.eu/eurostat/en/web/nuts/overview>

Objective evaluation team: The members of the objective evaluation team are actors in the SCWFS monitoring process who assess attainment of the respective objective together with the reporter. The team is composed of experts with substantial expertise in the area covered by the respective objective. Team members for each objective were suggested within the framework of the SMART.MONITOR exploratory project, but the final decision on the composition of the team lay with the reporter. The joint work on the evaluation of the objective is essential, as this is the only way to bring wide-ranging expert know-how into the monitoring process and ensure interdisciplinary cooperation.

Open government data: Open government data describes the idea that public data collected by administrative bodies should be made freely accessible. These data should be made available to the public in machine-readable form to allow automatic data processing. Open standards for interfaces and software allow greater transparency, participation and collaboration. In addition to the technical interfaces, the administration must also provide a legal framework. Examples of such public data include geodata, traffic data, environmental data, budget data and statistical data. No personal data are published.

Paris Agreement on Climate Action: The Paris Agreement signed in 2015 is an agreement between 195 member states of the United Nations Framework Convention on Climate Change (UNFCCC) which sets out a global action plan to avoid climate change as a follow-up to the Kyoto Protocol.

Primary energy: Primary energy is the energy that is harvested directly from natural resources, such as coal, lignite, crude oil, natural gas and renewable energy sources. In most cases, primary energy and/or primary energy carriers need to be converted into secondary energy carriers (e.g. coke, briquettes, electricity, district heating, heating oil, petrol and so on) in power stations, oil refineries, etc.

Rainwater management: Rainwater management allows precipitation falling on built-up areas and sealed surfaces to be kept within the natural water cycle, thus relieving the burden on sewers. This can have a positive effect on temperature, air quality and climate.

R&D ratio – spending on research and development: R&D (= research and (experimental) development) stands for creative activities conducted systematically using scientific methods with the aim of expanding knowledge and developing new applications for it. Statistics Austria conducts regular surveys on R&D in Austria, asking enterprises and university institutions as well as public institutions engaged in R&D (federal government, federal provinces, municipalities, chambers, etc.) about their research and development activities and spending on staff, ongoing material expenditures and investments that are directly linked to these activities. The R&D ratio includes all spending on R&D, thus measuring the input, but does not allow any conclusions to be drawn as to the quality of the output (new technologies, products, etc.).

Renewable energies: This term defines energy sources that are constantly renewed or replenished and hence

are permanently available. Renewable energies include sunlight, wind, hydropower, biomass, geothermal heat and waste. Renewable energy sources are carbon neutral, so their use does not negatively impact the climate. Even with renewable energy sources, however, sustainable use is only assured if the consumption rate does not exceed the renewal rate.

Reporters: Reporters are those actors in the SCWFS monitoring process who coordinate reporting on the SCWFS objectives. Each objective is allocated a reporting office. The role of the reporters is to ensure the full, timely submission of the parameters and assessments. Owing to the sometimes very broad definition of the objectives, the assessments have to be drawn up together with a team of experts: the objective evaluation team. These discussions to evaluate the attainment of the objective and exchanges within the evaluation team and with the reporter about the respective SCWFS thematic fields constitute an important aspect of the SCWFS monitoring process.

SCWFS: Abbreviation for Smart City Wien Framework Strategy.

SCWFS goals and objectives: The SCWFS goals and objectives are those defined in the Smart City Wien Framework Strategy. The 51 goals and objectives of the SCWFS comprise three types: headline goals, primary objectives and sub-objectives. The full list of goals and objectives is provided in the appendix "Indicators and data sources".

Headline goals: The headline goals of the SCWFS are the three overriding goals that are directly assigned to the three dimensions.

Primary objectives: The primary objectives of the SCWFS are the objectives assigned to the respective thematic fields. Each thematic field has between three and five associated primary objectives.

Derived sub-objectives: Sub-objectives are components of primary objectives. Primary objectives consisting of two clearly separable targets - in most cases in two separate sentences - are sub-divided into two sub-objectives. Sub-objectives are treated in exactly the same way as primary objectives.

SMART.MONITOR: The aim of the exploratory project SMART.MONITOR was to elaborate a monitoring concept for the Smart City Wien Framework Strategy. Key steps included the development of indicators for the objectives defined in the Framework Strategy and the design of a monitoring process. SMART.MONITOR was subsidised under the "City of Tomorrow" programme of the Federal Ministry of Transport, Innovation and Technology (bmvit).

<https://www.wien.gv.at/stadtentwicklung/projekte/smartcity/smart-monitor/>

STEP 2025 – Urban Development Plan Vienna 2025: Urban development planning deals with regional spatial planning issues. One focus is the elaboration of the Urban Development Plan for Vienna (STEP), which is drawn up at intervals of approx. ten years. The current version of the Urban Development Plan dates from 2014, and will be reviewed and updated at roughly five-year intervals.

<https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008379b.pdf>

Thematic Concept for Green and Open Spaces: The Thematic Concept for Green and Open Spaces was developed in conjunction with STEP 2025 and approved by Vienna City Council on 19 December 2014. It defines the relevant goals of STEP 2025 in greater depth and sets the agenda for the City of Vienna's green and open space planning activities in the coming years.

<https://www.wien.gv.at/stadtentwicklung/studien/pdf/>

Urban Energy Efficiency Programme (SEP): SEP I was adopted by Vienna City Council in 2006 and comprised guidelines for energy consumption policy up to 2015. Since the adoption of SEP I, however, the framework for energy efficiency policy at European and national level has evolved considerably. The topic of energy efficiency is gaining in importance, and implementation of the measures is increasingly becoming mandatory. Against this background, work is already under way on the development of a successor programme, "SEP 2030", to create a framework for future energy efficiency measures in Vienna.

<https://www.wien.gv.at/stadtentwicklung/energie/sep-endbericht.html>

Urban Heat Islands Strategic Plan: Vienna's Urban Heat Islands Strategic Plan was drawn up under the leadership of the Municipal Department for Environmental Protection (MA 22) together with scientific experts and numerous specialist departments of the City of Vienna. The Strategic Plan gives detailed descriptions of various possibilities for cooling of urban heat islands. It contains precise information regarding the effect of individual measures on the climate in the city and the respective neighbourhood, and also provides details of benefits and possible obstacles associated with implementation of the various measures and the likely installation and maintenance costs.

<https://www.wien.gv.at/umweltschutz/raum/uhi-strategieplan.html>

Urban Mobility Concept for Vienna: The Urban Mobility Plan for Vienna is a faithful implementation of the vision for the city as defined in STEP 2025. Mobility options in Vienna should be inclusive, healthy, compact, green, robust and efficient. The focus is on "community mobility". In the coming years, Vienna's transport policy will continue its strong emphasis on promoting ecomobility (walking, cycling and public transport).

<https://www.wien.gv.at/stadtentwicklung/studien/pdf/b008443.pdf>

Vienna Geriatrics Concept: Happily, an increasing number of Viennese citizens are living to a ripe old age. However, this also means that there is a growing need for care for the elderly, especially patients suffering from dementia or multi-morbid patients in geriatric centres and care homes. At the same time, provision of care by family members is gradually declining. Vienna's Geriatrics Concept is tackling these new care challenges, aiming at a shift towards close-to-home care structures and an increase in the quality of care. This means an end to large-scale facilities and a shift towards manageably-sized buildings with a maximum of 350 beds. For people who are suffering because of their age or due to health problems, it means creating an environment where they feel at ease and well looked after.

http://www.wienkav.at/kav/texte_anzeigen.asp?id=37307



PROCESS
PARTICIPANTS

Martina **Ableidinger** Ursula **Adam** Helmut **Augustin** Herbert
Bartik Gernot **Barton** Christina **Bässler** Gabriele **Berauschek**
Gerhard **Berger** Norbert **Bichl** Daniel **Blauensteiner** Willibald
Böck Alfried **Braumann** Christian **Buchhas** Andreas **Bürkl**
Michael **Cervený** Renate **Cizl** Eva **Czernohorszky** Kalojan
Daskalow Josef **Dirmüller** Maria **Ebetsberger** Anna **Fellhofer**
Marlies **Fellinger** Michael **Fink** Christine **Fohler-Norek** Tanja
Fruhmann Renato **Gherghinescu** Birgit **Ginzler** Julia
Girardi-Hoog Daniel **Glaser** Alexander **Göltz-Morpurgo** Martin
Groyß Johannes **Guschelbauer** Michael **Hagler** Kristina **Hametner**
Christian **Härtel** Gerhard **Hartmann** Dieter **Häusler** Rainer
Hauswirth Erich **Hechtner** Martina **Hempel** Ursula **Heumesser**
Pia **Hlava** Johannes **Hofinger** Ina **Homeier** Clemens **Horak**
Dagmar **Hoyer** Ulrike **Huemer** Matthias **Hümmelink** Gerald
Hutterer Karin **Jary** Marion **Jost** Arlene **Junker** Eva **Kail** Gerhard
Kainz Ingrid **Kammerer** Andreas **Keclik** Thomas **Keller** Stephanie
Kiessling Andrea **Kinsperger** Walter **Kling** Klaus **Kramer**
Michaela **Krejcir** Eva **Krennbauer** Manuela **Krumpschmid**
Ingrid **Kunz-Henrichs** Donia **Lasinger** Stefan **Leeb** Kurt **Luger**
Johannes **Lutter** Brigitte **Lutz** Thomas **Madreiter** Rainer **Mahr**
Theodora **Manolakos** Andrea **Mautz-Leopold** Christian **Medits**
Thomas **Meisl** Manfred **Mühlberger** Pamela **Mühlmann**
Andreas **Müller** Kirsten **Müllner** Alexandra **Münch-Beurle** Gerhard
Nagel Wolfgang **Nowak** Sabine **Ohler** Robert **Oppenauer**
Sonja **Österreicher** Eva **Pangerl** Daniela **Piegler** Christian **Pöhn**
Herbert **Pöschl** Claudia **Prinz-Brandenburg** Nicole **Puzsar**
Katarina **Radosavljevic** Otto **Rafetseder** Henriette **Raimund**
Aarno **Rapottnig** Andrea **Rauscher** Michael **Rederer** Barbara
Reinwein Josef **Resinger** Eva **Reznicek** Astrid **Ringbauer** Herbert
Ritter Christian **Rolland** Michael **Rosenberger** Felix **Rupp** Michael
Sattler Martin **Scheibengraf** Michael **Schindler** Bernhard **Schmid**
Waltraud **Schmid** Jana **Schultheiß** Rene **Schweiger** Georg **Sedlbauer**
Alfred **Silber** Barbara **Slotta** Peter **Stanzl** Ilse **Stockinger**
Monika **Stumpf-Fekete** Gregory **Telepak** Hubert **Teubenbacher**
Claudia **Throm** Daniela **Turner** Heinz **Tizek** Julia **Tollmann** Andreas
Tomenendal Herlinde **Toth** Andreas **Trisko** Tobias **Troger**
Andreas **Tschismasia** Stefan **Tunkel** Elisabeth **Unger** Bernd
Vogl Edith **Waltner** Matthias **Watzak-Helmer** Peter **Wieser** Isabel
Wieshofer Judith **Wiesinger** Angelika **Winkler** Patrick **Wolf**
Gerald **Wötzl** Christian **Wurm** Denise **Zak** Ursula **Zappe** Karin
Zauner-Lohmeyer Josef **Zeininger**

