

UNECE

Smart Sustainable Cities Profile

NUR-SULTAN, KAZAKHSTAN



UNITED NATIONS

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PREFACE

The Sustainable Smart City Profile of Nur-Sultan (Nur-Sultan City Profile) was developed as part of the “Strengthening capacities of selected CIS countries to implement urban-related SDGs through the Country Profiles on Urban Development, Housing and Land Management and innovative financing mechanisms” project. The objective of the project is to enhance the capacity of national, regional and local governments in two countries of the Commonwealth of Independent States (CIS) for the development and implementation of sustainable, inclusive and evidence-based urban policies and programmes. The project will support the implementation of recommendations of the UNECE Country Profiles on Housing and Land Management in Kazakhstan and Belarus, which were completed in 2017 and 2018, respectively. The implementation period for this project spans from April 2019 to 31 December 2020. In addition to Nur-Sultan, Grodno (Belarus) is also a beneficiary city.

The Nur-Sultan City Profile presents the outcomes of the city evaluation against the Key Performance Indicators (KPIs) for Smart Sustainable Cities (SSC), and proposes actions for the city to make progress towards achieving the SDGs. It provides guidance for the latter, including the development, review and implementation of urban policies, programmes, and projects, and for building partnerships with a view to reinforcing the implementation of the 2030 Agenda for Sustainable Development and SDG11 in Kazakhstan and in the UNECE region.

The KPIs for SSC are a public and freely available standard developed by the United Nations Economic Commission for Europe (UNECE) and the International Telecommunications Union (ITU) in the context of the United for Smart Sustainable Cities (U4SSC) initiative. U4SSC is coordinated by UNECE, ITU and the United Nations Human Settlements Programme (UN-Habitat), and is supported by 14 other United Nations agencies.

This City Profile was developed taking into account documentary data sources, including the U4SSC Verification Report – Nur-Sultan, Kazakhstan, the Country Profile on the Housing Sector: Republic of Kazakhstan (2018), and a survey¹ sent to the city administration enquiring about development priorities and the policies of the city, programmes and projects relevant to the areas covered by the KPIs for SSC. UNECE and the city of Nur-Sultan engaged in multiple bilateral meetings to discuss actions for improving the smartness and sustainability of the city.

This profile consists of five parts: Part I focuses on the geographical situation, the administrative and political framework, the population and demographic situation, and the socioeconomic conditions of the city; Part II outlines the legal and institutional framework for urban development at the local level, and the city administrative structure; Part III provides information about the outcomes of the evaluation of the city against the KPIs for SSC, and highlights the relevant actions and initiatives (e.g. policies, projects, and programmes) that the city is taking; and Part IV outlines the financial framework for urban development. The profile concludes with recommendations.

1 The survey was designed by UNECE, and was disseminated to the city to request information on the policies, projects and programmes that the city is currently implementing, as well as those it plans to implement, in relation to the economy, environment, society and culture.

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EXECUTIVE SUMMARY

Nur-Sultan (previously called Astana) is a dynamic city that has made considerable progress towards smart and sustainable development and the implementation of the 2030 Agenda for Sustainable Development (2030 Agenda) over recent decades. Built on a steppe, it has experienced rapid population and economic growth, driven by the oil and gas industries and a construction boom. It has become a testing ground for developing and implementing innovative solutions and technologies in Kazakhstan.

Nur-Sultan, and Kazakhstan as a whole, have set ambitious goals to deliver smart and sustainable urban development. This led to the development of new institutions, and forward-looking policies and legislation, such as the Kazakhstan 2050 Strategy for Development² and a smart city programme in Nur-Sultan. Projects being implemented under these programmes include setting up “smart street lighting” to promote energy efficiency and climate neutrality, and the implementation of “smart health clinics” which resulted in improved quality of medical services, such as the provision of diagnostic tests. Furthermore, improvements have been made to the accessibility of public services, with the Smart Astana Mobile App and, more generally, with the transfer of public services to digital format. The development of infrastructure projects and housing programmes constitute other important steps towards making Nur-Sultan a smart and sustainable capital city.

To support the commitment of the city to the implementation of the 2030 Agenda and to accelerate progress towards achieving SDGs, the evaluation of the city against the KPIs for SSC was carried out in 2019 and 2020. It revealed that a high level of employment (only 4.7 per cent of the workforce is unemployed) and access to information and communication technology (ICT), electricity, water and sanitation infrastructure, and education are at the basis of the economic development³ of the city. There is good access to public spaces and nature, and ample public recreational space. The evaluation also notes the low poverty rate (only 0.87 per cent of residents live in poverty), low levels of wealth inequality (measured by the Gini coefficient), and good access to healthcare services.

The KPI evaluation of Nur-Sultan suggests a range of development priorities, including improving the solid waste management system, public building sustainability (by employing certification measures and ICTs such as smart water meters, smart electricity meters and smart air conditioning systems), urban and spatial planning, access to decent-quality, affordable housing for all, and access to and availability of good-quality urban data.

An improved solid waste management system could lead to a reduction in resource and energy consumption, and in the emissions of harmful substances. Both reductions are essential to ensure climate-neutral urban growth. Buildings in Nur-Sultan account for a large portion of greenhouse gas (GHG) emissions and resource usage of the city. As buildings assessed and certified against sustainability criteria usually perform better in relation to the use of energy, water, production of solid waste and many other areas, the city is encouraged to use ICTs to improve public building sustainability, and employ relevant certification measures.

Urban planning is an important element of the political agenda in Nur-Sultan; therefore the city is encouraged to further develop and implement integrated approaches to urban planning that support economic prosperity, socio-cultural progress, and environmental sustainability. It is also encouraged to allow for the reconciliation of competing interests, limit car dependency, focus on climate robustness to ensure resilience against climate change, and upscale already-existing good practices. There is also a need to take a “nuanced view” on housing (which entails understanding that housing is a primarily a “local” issue), assess the level of housing affordability in the city, improve legislation on housing management to make owners and agencies responsible for proper maintenance, create plans to develop a non-commercial rental housing sector, and develop and implement measures to stimulate the long-term financing of affordable housing for all.

The sustainable and smart development of Nur-Sultan requires coherent mechanisms for urban governance that are able to respond to the demand for urban infrastructure investments. Partnerships with the business community and the use of innovative financing mechanisms are also encouraged, as they can serve as accelerators of progress towards sustainable development.

² *Kazakhstan 2050 Strategy*. Available at: <https://kazakhstan2050.com/>.

³ For more information please see the U4SSC Verification Report: Nur-Sultan, Kazakhstan (June 2020).

There is also a need to produce better urban data in support of evidence-based policy- and decision-making in areas such as air quality, waste management, housing, electricity supply, transport, innovation, water and sanitation, and environmental quality. The ability to collect and analyse data plays a key role in designing efficient and effective urban interventions and in improving quality of life, and ensures the equal redistribution of economic benefits of urbanization. Last but not least, as the 2030 Agenda, with its SDG11 and other urban related goals, paves the way for cities to become the drivers of change, Nur-Sultan is encouraged to review progress towards achieving the SDGs and to further develop innovative policies, projects and programmes.



Nur-Sultan, featuring the famous Baiterek Tower on Nuzhol Boulevard

PART I

GENERAL OVERVIEW

Nur-Sultan, the capital of the Republic of Kazakhstan, is located in the north-east of the country, in the Akmola region. The city, formerly known as Astana, was renamed in 2019 in honour of the First President of the country – Nursultan Nazarbayev. Nur-Sultan became the capital of Kazakhstan in 1997 due to the limited opportunities for growth of the previous capital, Almaty, which is surrounded by mountains. Nur-Sultan has more potential for territorial expansion that, combined with the political will to make the city smart and sustainable, led to unprecedented economic growth⁴.

Nur-Sultan is located on low floodplain terraces and is divided by the River Ishim. In addition to the Ishim, the Sarybulak and Akbulak, significant tributaries of the River Ishim, also run through Nur-Sultan. There are numerous freshwater and saltwater lakes within a 25-30 kilometre (km) radius around the city.

Over last few decades the city has grown rapidly, and the population currently stands at over 1.1 million. In 2017, the city occupied 800 km² of land⁵. It is predicted that the population of Kazakhstan will reach 24 million by 2030, and much of that growth will occur in Nur-Sultan. The GDP of the city is over USD 1 billion and, in 2017, its population density was over 1,300 people/km², compared to 2,500 people/km² in Almaty and 6.6 people/km² in Kazakhstan as a whole. This highlights an uneven population distribution across the country. Nur-Sultan has experienced a high level of migration from rural to urban areas since 2001. In 2016, 57 per cent of the population lived in urban areas, and this share is expected to grow to 70 per cent by 2050.

Improving the smartness and sustainability of Nur-Sultan is a key objective for the city administration. The President ordained a Road Map in 2013 “to improve quality of life and to speed up the modernization of the infrastructure in Astana, as well as to enhance its level of public safety”⁶,

in the context of which the “Smart Astana” programme is being implemented. Inspired by previous smart cities programmes in such cities as Amsterdam (Netherlands), Boston (United States of America) and Oulu (Finland), the Astana Smart City Roadmap is based on six pillars of a smart city: economy, management, life, mobility, people and environment. It is coordinated by the Astana Innovations JSC, a company entirely owned by the city.

The programme consists of four smart pilot projects: smart health clinics (polyclinics), smart street lighting, smart payments and smart schools; and various initiatives linked to these projects. Technology is at the centre of these projects and initiatives. The projects aim to centralize information in order to optimize the management of resources for the city, businesses and citizens. The programme is financed by the Development Bank of Kazakhstan, the Government Fund for the Development of Entrepreneurship, the private sector and foreign direct investment, among others⁷. Additionally, the Public Services Digitalization Department and Astana Innovations JSC are actively engaged in the digitalization of all spheres of life in the city, which reinforces the implementation of Decree No. 827 on the Approval of the State Programme “Digital Kazakhstan”.

4 UNECE, *Country Profiles on the Housing Sector: Republic of Kazakhstan*, 2018.

5 After 81.19 km² of territory was added to the city from the Akmolinskaya region on 7 February 2017, which did not include any settlements.

6 UNECE, *Country Profiles on the Housing Sector: Republic of Kazakhstan*, 2018., p. 116.

7 UNECE, *Country Profiles on the Housing Sector: Republic of Kazakhstan*, 2018., p. 118.

PART II

LEGAL AND INSTITUTIONAL FRAMEWORK FOR URBAN DEVELOPMENT

Urban development in Nur-Sultan is the responsibility of the Government of Kazakhstan and the Akimat of the city (City Hall).

The Government defines the legal and institutional mechanisms for urban development in the country, including the roles and responsibilities of local governments⁸. It develops the General Scheme of the Republic of Kazakhstan, which is the most important urban planning document in the country. The Scheme contains the basic blueprint for the long-term and sustainable development of the country. Approved by Resolution of the Government of the Republic of Kazakhstan No. 1434 of December 2013, the General Scheme provides decision-making guidance to state and business structures in the country, including information on areas such as industry, population distribution, engineering, transport, social and recreational infrastructure of national significance, environmental conservation, and territory functional zoning.⁹

In July 2001, the Law on Architectural, Urban Planning and Construction Activities in the Republic of Kazakhstan was passed. Article 47 pertains to General Plans of Settlements, and dictates that cities must have general plans.¹⁰ The development and building of settlements is thus carried out on the basis of these plans. All 87 cities in the country are covered by the general

plans, including the 14 regional centres and the cities of Nur-Sultan¹¹ and Almaty.¹² The process of developing a general plan includes a consultation with individuals and legal entities who are invited to make proposals for changes to decisions that affect either public or private interests.¹³ Based on the general plans and upon provisions in relevant urban planning, architectural and construction documentation, planning permissions are granted.

Under Presidential Decree No. 67 of March 2006, a strategic plan for the sustainable development of the city up to 2030 was approved. It defines the main areas of activity for the sustainable development of the capital city. It was developed by Astana Innovations JSC. With the support of the Akimat, four Smart City pilot projects were created: Smart Health Clinics, Smart Schools, Smart Street Lighting, and Smart Payments. Financing from investment funds is a key feature of their implementation. Lastly, the Government has recently taken steps to amend the legal framework and to improve access to resources and resource management, with a view to addressing housing challenges in the country.

⁸ More information about the structure of the city can be found on the city website, at <http://astana.gov.kz/ru/page/rukovodstvo-goroda>.

⁹ National report of the Republic of Kazakhstan on Housing and Sustainable City Development, 2016, p.13.

¹⁰ Law No. 242-II on Architectural, urban planning and construction activities in the Republic of Kazakhstan. Available at: https://online.zakon.kz/document/?doc_id=1024035#pos=72;-88.

¹¹ General Plan. Available at: <http://astana.gov.kz/ru/page/genplan>.

¹² National report of the Republic of Kazakhstan on Housing and Sustainable City Development, 2016, p.16.

¹³ National report of the Republic of Kazakhstan on Housing and Sustainable City Development, 2016, p.17.

PART III

EVALUATION OF THE CITY PERFORMANCE AGAINST THE KEY PERFORMANCE INDICATORS FOR SMART SUSTAINABLE CITIES

To support the commitment of building a smart and sustainable Nur-Sultan, UNECE carried out an evaluation of the city performance against the Key Performance Indicators (KPIs) for Smart Sustainable Cities (SSC). The KPIs for SSC are a United Nations standard on SSCs, which was developed by UNECE and ITU in 2015.¹⁴

The KPIs for SSC have been tested and implemented globally in over 150 cities.¹⁵ In the period 2019-2023, UNECE foresees the evaluation of 17 Norwegian cities, as well as Grodno (Belarus), Bishkek (Kyrgyzstan), Tbilisi (Georgia), Tirana (Albania), Podgorica (Montenegro), Almaty (Kazakhstan), and Nur-Sultan (Kazakhstan).

The KPIs for SSC consist of 91 indicators at the intersection of the three dimensions of sustainability (economy, environment, and society) and ICTs. The KPIs are outlined in the Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.¹⁶ In the evaluation process,

the KPI values are independently verified to ensure that the data is accurate. The outcome of the data verification process is provided by the city of Nur-Sultan in the U4SSC Verification Report – Nur-Sultan, Kazakhstan.

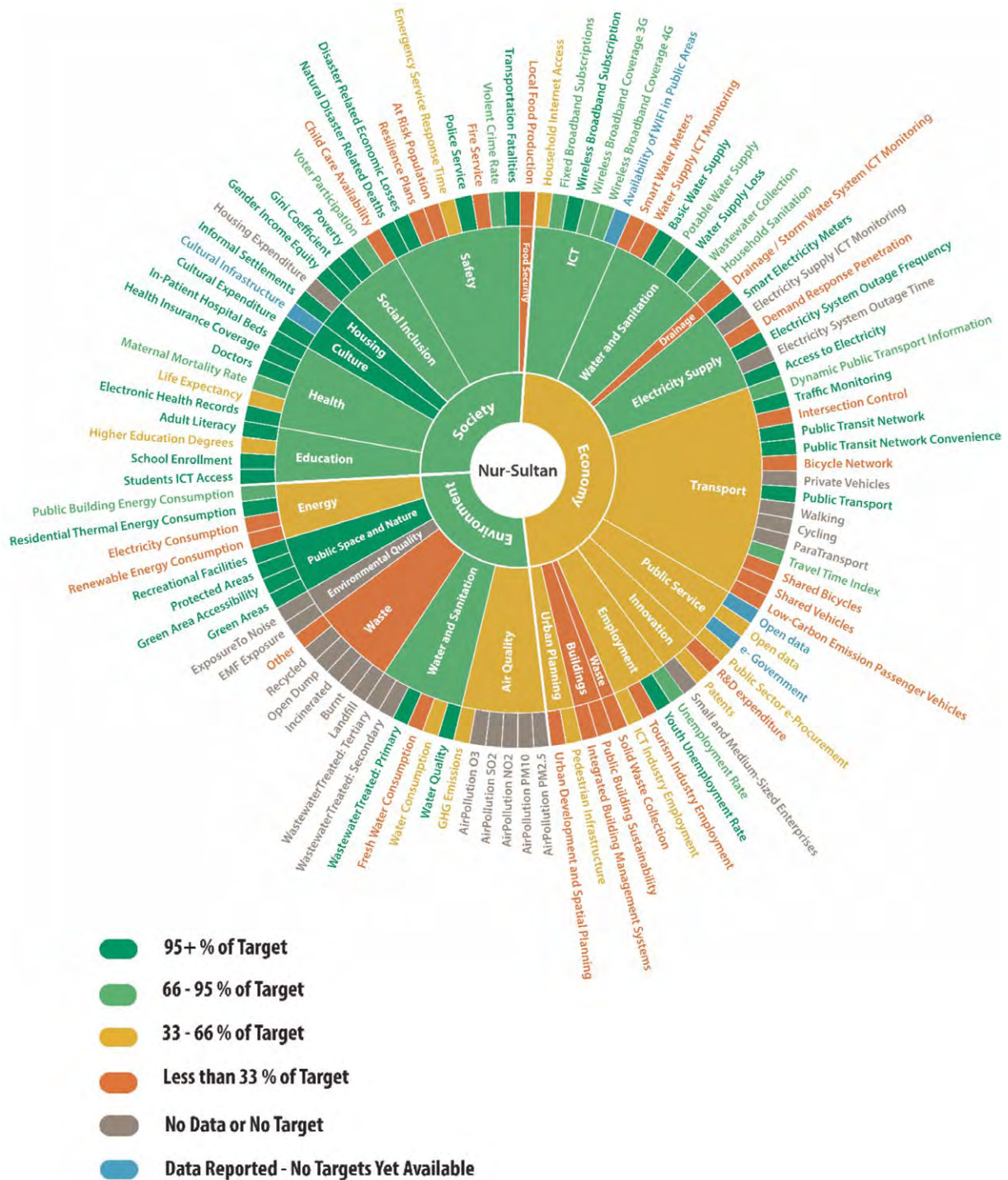
In line with the Verification Report, the graph below visualizes the performance of the city against the KPIs for SSC. Follow-up discussions in this section outline the performance of Nur-Sultan in relation to the three dimensions of the KPIs and the relevant city actions, with a view to identifying the challenges to, and opportunities for, making the city smarter and more sustainable.

¹⁴ The KPIs for SSC standard was endorsed by the UNECE Committee on Urban Development, Housing and Land Management in 2016 (ECE/HBP/2016/4) and was brought under the U4SSC initiative. The U4SSC brings together 16 United Nations agencies and supports the evaluation of the performance of cities using the KPIs for SSC and the implementation of SSC solutions through the development of guidelines, studies, city action plans, and capacity-building events.

¹⁵ These include Voznesensk (Ukraine), Goris (Armenia), Pully (Switzerland), Dubai (United Arab Emirates), Singapore (Singapore), Shanghai (China), Buenos Aires (Argentina), and Moscow (Russia).

¹⁶ U4SSC, Collection Methodology for Key Performance Indicators for Smart Sustainable Cities. Available at: <https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf>.

PERFORMANCE OF NUR-SULTAN AGAINST THE KEY PERFORMANCE INDICATORS



Source: U4SSC Verification Report: Nur-Sultan, Kazakhstan (June 2020).

Economy – an overview

The key economic activities for the city are trade, transport, communications and construction. The city is a leader in construction and in the production of metal building products, ready-to-use concrete and related building products.¹⁷ Since 2013, it has been a leader in terms of the volume of commissioned residential buildings. It ranks second among the regions and cities of the country (after Almaty) in terms of contribution of the trade sector to gross economic output¹⁸ and retail turnover.¹⁹

The unemployment rate in the city for the fourth quarter of 2019 was 4.4 per cent. The average monthly wage in Nur-Sultan is 308,000 tenge (USD 725). 688 out of 1,000 people have internet access at home. The growth rate of the economy by various industries is as follows (the size of the industry in January 2020 as a percentage of the same industry in January 2019): manufacturing: 100 per cent; construction: 131 per cent; transport: 111 per cent; agriculture: 99 per cent; trade: 101 per cent; and communications: 116 per cent. Small and medium enterprises (SMEs) account for a significant share of the gross regional product of the city.

The economic development of the city is focused on improving competitiveness, the development of innovative products and a vibrant manufacturing sector (including the production of building materials, and food processing), strong tourism and a thriving SME sector. It is driven by a Special Economic Zone (SEZ) called Astana – A New City²⁰, which was created to attract investors and to develop new competitive industries, and Astana Technopark OJSC²¹, which provides premises for over 100 business owners

and 150 tenants who are involved in the production of equipment, metalwork, and consumer goods.

In order to enhance the economic development of the city, Nur-Sultan continues to modernize public sector services, develop open data platforms and e-government services, improve ICT infrastructure and electricity supply, develop transport, and upgrade the water and sanitation infrastructure. Urban planning lies at the heart of municipal interests. The city collaborates with the Urban Development Centre to implement collaborative approaches to spatial planning, including the planning of public spaces.²² The Public Services Digitalization Department and Astana Innovations JSC work together to digitalize all spheres of the city life, and the Smart Cities projects are supported by the Ministry of Digital Development, Innovation, and Aerospace Industry.

KPI evaluation results – economy dimension

The high values of indicators, such as ICT infrastructure, access to electricity, and access to water and sanitation infrastructure, highlight that there is a strong basis for socioeconomic development in Nur-Sultan.²³

As far as the ICT infrastructure is concerned, the wireless broadband subscriptions indicator is particularly high, at over 100 per cent, as are the levels of 3G and 4G wireless broadband coverage, serving 88 per cent and 75 per cent of the city, respectively. Similarly, indicators pertaining to water and sanitation infrastructure were generally high-performing, as the number of city households with potable water supply is high, at 95 per cent. Additionally, the wastewater collection rate is 92 per cent, and 95 per cent of households have adequate sanitation.

The KPI evaluation results suggest there could be room for improvement regarding: (i) waste collection and management infrastructure; (ii) public building sustainability; (iii) development of urban and spatial plans; and (iv) drainage. Solid waste collection is low, with only 4.1 per cent of households served by solid waste collection services. The percentage of public buildings certified as sustainable and the percentage of public buildings with

17 Industrial production in the city concentrates on building materials, food and drink products, and engineering. The city also produces a relatively high share of metal building structures, radiators and central heating boilers, and handling and lifting equipment.

18 The combined regional product of the two cities – Almaty and Nur-Sultan – makes up more than half of the total trade of Kazakhstan.

19 Sputnik Kazakhstan, *The volume of retail trade in May was 35% higher than in April in Kazakhstan*. Available at: <https://ru.sputniknews.kz/economy/20200624/14302486/obem-roznicnoy-torgovli-may-aprel.html>.

20 The SEZ is advantageous due to a special legal regime that provides it with tax and customs benefits, and the various projects that are being implemented in the SEZ territory.

21 Following the liquidation of the Tselinselmash company, the 67 hectares of space that the company originally occupied is now home to the business incubator Astana Technopark OJSC.

22 Nur-Sultan Akimat, *The master plan “Nur-Sultan is a comfortable city” was discussed with the public and representatives of business communities*. Available at: <http://astana.gov.kz/ru/news/news/21461>.

23 For more information, please see the U4SSC Verification Report: Nur-Sultan, Kazakhstan (June 2020).

integrated building management systems are also low; both indicators scored only 7 per cent when, ideally, these indicators should be as high as possible. Only 1.4 per cent of the drainage and storm water system is monitored by ICTs. Evaluation results indicate that only 21 per cent of households have smart water meters installed, and only 12 per cent of the water distribution system is monitored by ICTs.

Both length and convenience of the public transport network scored high. The length comes to 214 km per 100,000 inhabitants, and 69 per cent of the population has a public transport stop within 500 metres of their residence. The ICT-based traffic monitoring indicator showed that 71 per cent of major streets are monitored with ICTs, and 95 per cent of urban public transport stops have dynamically available information. The indicators scoring low in the transport dimension include shared bicycles and vehicles, the presence of low-carbon emission passenger vehicles, and the length of the bicycle network.

Regarding urban planning, 2 per cent of the city is designated as pedestrian zones, and the city has none of the five thematic city-level urban planning documents suggested by the “urban development and spatial planning” indicator. Lastly, the indicators related to innovation and innovative industry practices scored relatively low, with only 0.5 per cent of GDP being spent on research and development, and only 21 patents per 100,000 inhabitants.

Environment – an overview

A better environment is one the key goals of the city. In 2017, a comprehensive plan of measures to improve the environment of Astana in 2018-2022²⁴ was adopted and carried out. In order to decrease the environmental impact of buildings, the city has worked on improving energy efficiency in the housing sector. This is especially salient for Nur-Sultan, and Kazakhstan in general, where the old housing stock exhibits low energy efficiency (where thermal energy is generated by central heating)²⁵ and the climate is particularly harsh.

In Kazakhstan, energy for the housing sector is responsible for more than half of GHG emissions. The production of



Emerald Towers, the tallest building in Nur-Sultan



Talan Towers

²⁴ “Comprehensive Plan of Measures to Improve the Environment of the City of Astana 2018-2020” (unpublished).

²⁵ As a result, the consumption of heat energy in Kazakhstan is significantly superior to comparable countries (around 240 kW/m² per annum, against 82 kW/m² in Sweden or 120 kW/m² in Germany) - Country Profiles on the Housing Sector: Republic of Kazakhstan (2018), p.78.

electric and heat energy in 2015 came to 44 million tonnes of oil equivalent, and 72 per cent of this energy production came from coal. As Nur-Sultan is in the north-central region of the country, it relies even more heavily on these energy sources due to higher demand in winter.

As more and more modern and energy-efficient buildings are being built in the city, a system called Sergek was introduced to monitor the flow of vehicles along the transport arteries, in order to systematize and reduce traffic, therefore reducing GHG emissions. Nur-Sultan also introduced a smart street lighting system that implements energy-saving LED lamps, which are 35 to 40 per cent more energy-efficient than the traditional models. Additionally, the city has taken steps to improve its waste management, including engagement with residents on waste separation and recycling, monitoring of the city landfills, and waste removal. In relation to this, Astana Innovations will continue to support the Akimat in its activity aimed at amending strategic documents on solid waste management, including those on the use of solid waste for energy generation.

Forests are an important part of political agenda in Kazakhstan, as demonstrated by the draft Master Plan for the Development of the Forestry Sector of the Republic of Kazakhstan until 2030. The Master Plan aims to increase forest coverage and strengthen forest ecosystem biodiversity, among others.²⁶ In March 2020, Nur-Sultan hosted a meeting to continue work on the draft Master Plan, and to carry out a participatory review of its content, in collaboration with UNECE/FAO Forestry and Timber Section and other partners.²⁷ Moreover, Nur-Sultan has an extensive green belt exceeding 15,000 hectares, with over 11.5 million trees and shrubs. This green belt is home to thousands of animals, and its area has continued to grow under the Reconstruction of Green Spaces and Creation of Forest Culture project.²⁸

The city of Nur-Sultan has taken steps towards developing and implementing innovative technologies that optimize water consumption, reduce GHG emissions, reduce waste-processing costs, and reduce energy-consumption costs using renewable energy sources. The technologies will be

tested in over 100 neighbourhoods in the city (through the Smart Neighbourhood project), and a methodology will be developed based on the test results, as well as the requirements needed for the city to subsequently apply them.

KPI evaluation results – environment dimension

The evaluation of Nur-Sultan against the KPIs for SSC revealed strong performance in terms of the protection of, and access to, public spaces and nature, and water and sanitation infrastructure. There are 1,500 hectares of green areas per 100,000 inhabitants. For instance, some 20 per cent of the area of Nur-Sultan is protected natural area, and plenty of recreational facilities are available, with 1,428 hectares of public recreational space per 100,000 inhabitants.

Regarding the water and sanitation infrastructure, the evaluation revealed that over 99 per cent of households have access to potable water, and all wastewater undergoes primary treatment. Residential thermal energy consumption is 24.89 gigajoules per year per capita, and the rate of public building energy consumption is also relatively low, at 58.60 kilowatt-hours (kWh) per m² per year. Water consumption is relatively high, at 250 litres per day per capita, as is freshwater resource consumption, at 90 per cent annually. None of the energy of Nur-Sultan comes from renewable sources, and electricity consumption levels are high, at over 3,100 kWh per year per capita.



UNECE Executive Secretary Olga Algayerova, planting a tree in Nur-Sultan with Yerlan Nysanbayev, Vice Minister of Ecology, Geology and Natural Resources of Kazakhstan

26 UNECE, *UNECE and FAO support Kazakhstan's development of forest sector Master Plan*. Available at: <https://www.unece.org/info/media/news/forestry-and-timber/2020/unece-and-fao-support-kazakhstan-development-of-forest-sector-master-plan/doc.html>.

27 UNECE, *National Forest Policy Dialogue for Kazakhstan*. Available at: <http://www.unece.org/index.php?id=53695>.

28 Akimat, *Green belt of Astana*. Available at: http://astana.gov.kz/en/page/zelenyy_poyas_astany.



The Palace of Peace and Reconciliation

There are some data gaps in the environment dimension of the evaluation. For instance, on air quality, only GHG emissions were reported, at a relatively high level of 7.8 tonnes of carbon dioxide (CO₂) equivalent per capita. Regarding environmental quality, data on exposure levels to noise and to electromagnetic fields (EMFs) were not reported. Lastly, in spite of limited access to information on the collection and processing of solid waste in Nur-Sultan needed for the KPI evaluation, already-existing documentary data strongly suggest that this is an area requiring attention.²⁹

Society and culture – an overview

Quality of life depends on a range of factors, including access to decent-quality affordable housing, healthcare, education, safety and security. Although Nur-Sultan boasts the highest housing provision rate in Kazakhstan, at 29 m²/person — ahead of Almaty (27 m²/person) — the city has been facing a shortfall in housing supply, which mirrors a national dynamic whereby the demand for affordable

housing in the country exceeds supply.³⁰

This can be traced to two factors: a reduction in the growth of the housing supply following the disengagement of the construction efforts of the State during the mid-1990s; and the rise of internal migration from rural areas to cities.

The social development priorities of Nur-Sultan include the provision of healthcare and education. A recent example is an internet access programme for educational establishments, which provided an internet connection to all schools in the city. The city continues to ensure access to decent-quality, affordable housing and improving safety and food security. Every year, millions of square metres of housing and social facilities are built in the city. The city addresses the needs of, for example, teachers and doctors, who are given preferential access to the housing stock. In 2020, Nur-Sultan will see about 1,000 apartments distributed among the city residents, in line with the Housing Programme of Kazakhstan and the Decree on the Approval of the State Programme of Regional Development for 2020-2025.

²⁹ For more information, please see ‘The organization of municipal solid waste collection, disposal and recycling in Kazakhstan’ https://www.e3s-conferences.org/articles/e3sconf/abs/2020/19/e3sconf_btses2020_01010/e3sconf_btses2020_01010.html; and <https://www.strategy2050.kz/en/news/53651/>

³⁰ These trends resulted in a significant issue in terms of access to housing for urban Kazakhstani. A 2011 assessment showed that, out of the 8.4 million working citizens, 6.0 million could not afford to buy housing in market terms. This challenge has not been addressed. In 2016, about 14 per cent of the population (or 2.5 million people) was still in need of housing. Country Profiles on the Housing Sector: Republic of Kazakhstan (2018).



The Nur-Sultan Opera House

KPI evaluation results – society and culture dimension

The evaluation of the city's performance against the KPIs for SSC highlights social development. Nur-Sultan performed well in the areas of education, social inclusion and equality, cultural expenditure, and healthcare access. Indicators related to housing (access to decent-quality, affordable housing) scored well, as did those pertaining to safety and security.

Education access and enrolment were among the areas of this dimension that performed well. Virtually 100 per cent of students have access to ICTs, and school enrolment is very high. The rate of literacy in adults is 100 per cent, and the frequency of higher education degrees in the population was reported at 67 per cent. Social inclusion and equality also performed well, with a low Gini coefficient, a very low percentage of the population living in poverty (0.87 per cent), and no recorded difference in income between men and women. The proportion of the population taking part in elections is also relatively high, at 53 per cent, and the only indicator in this area to score low is childcare availability, with only 0.65 per cent of children having access to preschool childcare.

Cultural expenditure is high, with 5 per cent of the operating budget of the city being spent on cultural-related activities. Likewise, indicators relating to healthcare and access thereto performed well, as the entire population has healthcare coverage. Nur-Sultan also has high levels of in-patient hospital beds and physicians, at 333 beds and 443 doctors per 100,000 inhabitants (higher than

most European countries³¹). One hundred per cent of the population have electronic health records. However, maternal mortality rates need improvement, at 29 deaths per 100,000 live births, and life expectancy is relatively low, at 76.21 years, compared to the average European life expectancy of 81.5 years.

The KPI Verification Report points to the fact that there are very few traffic fatalities (0.46 per 100,000 inhabitants); the population is served by a high rate of around 400 police officers per 100,000 inhabitants; and the violent crime rate is relatively low, at 183 incidents per 100,000 inhabitants. However, some indicators in the safety section did not perform quite as well. For instance, the average response time of emergency services is 9.2 minutes, slightly longer than international averages,³² and the city has not implemented resilience plans with risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction. The fire service is less well-staffed (14 firefighters per 100,000 inhabitants) than the police force. Regarding housing safety and quality, only 0.87 per cent of the population lives in inadequate housing. There is no data on the percentage of household income spent on housing. Ideally, this figure should not exceed 25 per cent of a household's income.

31 Eurostat, *Healthcare personnel statistics – physicians*. Available at: <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/37382.pdf>.

32 Statista, *Average answer time of calls made to emergency services in selected European countries in 2019*. Available at: <https://www.statista.com/statistics/794483/average-answer-time-of-calls-made-to-emergency-services/>.

PART IV

FUNDING AND FINANCING FOR URBAN DEVELOPMENT

The sustainable development of Nur-Sultan requires both the mobilization of financial resources for development and the strengthening of the financing system, including public finance management.

The Government of Kazakhstan has made considerable progress towards the harmonization of strategic and budgetary planning, with a view to delivering urban investments more efficiently. It made steps to improve the efficiency of public debt management, improve inter-budgetary relations, and expand the tools and approaches for public-private partnerships.³³ The city succeeded in the delivery of public-private partnerships in relation to social inclusion and infrastructure development projects,³⁴ such as kindergartens, advanced training schools and medical centres.

Kazakhstan has maintained its attractiveness to investors, and consistently strengthens its competitiveness, and it benefits from foreign direct investment (from countries such as the Netherlands, the United States, and Switzerland).³⁵ At the end of 2018, 27 projects worth USD 3.1 billion were commissioned with foreign investor participation. Construction and engineering work commenced on 22 projects (USD 4.2 billion), investment decisions were taken on 39 projects (USD 8.6 billion), and new investors were attracted for 64 projects (USD 9.7 billion). A package of measures was adopted to improve the investment climate, according to the Organisation for Economic Co-operation and Development, and this resulted in investment-friendly amendments being introduced into the legislation (including simplified permit systems, taxation, customs control, and migration and visa regimes).³⁶

The Sustainable Cities for Low-Carbon Development project is one of the flagship projects implemented by the United Nations Development Programme (UNDP) and financed by a Global Environment Facility grant.³⁷ Its aim is to create and test a financial mechanism that attracts extra-budgetary investments and stimulates the introduction of low-carbon technologies in urban systems, through subsidizing the interest rates of commercial loans.³⁸ There is also growing interest in the development of green finance, which also employs public-private partnerships (subject to establishing a flexible and fast process for allocating public funds, and clear criteria for evaluating the technologies that are being introduced).³⁹

However, the country faces challenges in ensuring access to sustainable finance. Funding and financing of urban infrastructure and services from the public budget is limited, and might be further limited by reallocating funds to cope with the COVID-19 pandemic. There is a need to further explore opportunities to deliver successful public-private partnerships, and to develop an investor-friendly legislative framework while removing unnecessary legal barriers. More importantly, there is a need to develop a new long-term investment strategy for Nur-Sultan based on the new policy benchmarks and city action plans emerging as a result of the KPI evaluation.⁴⁰

The budget of Nur-Sultan in 2011 was 357 billion tenge (USD 841 million), of which 69 per cent was transfers and loans from the central budget, and 27 per cent was revenues of the city. In 2011, investments in fixed assets amounted to 818,000 tenge (USD 1,925) per resident, and private investment in housing construction amounted to 89.1 million tenge (USD 209,683) per 1,000 residents. In the same year, 429 million tenge (USD 1.01 million) per 1,000 residents was deposited in banks, and 358.7 million tenge (USD 844,147) was given by banks as loans. The average per capita income in Nur-Sultan was 3.7 million tenge (USD 8,707).

33 Kazakhstan Voluntary National Review, 2019, p.130.

34 Ibid.

35 Ibid.

36 Ibid.

37 Global Environment Facility. Available at: <https://www.thegef.org/>.

38 Kazakhstan Voluntary National Review, 2019, p.100. Available at: https://sustainabledevelopment.un.org/content/documents/23946KAZAKHSTAN_DNO_eng_4.Juli19.pdf

39 Kazakhstan Voluntary National Review, 2019, p.103.

40 UNECE (2020), draft Guidelines on Tools and Mechanisms to Finance Smart Sustainable Cities Projects.



The Khan Shatyr Entertainment Centre

PART V

RECOMMENDATIONS

Kazakhstan is a dynamically developing country that has made considerable progress in the implementation of the 2030 Agenda for Sustainable Development. It has reinforced its legal, institutional and policy frameworks, and developed policies, projects and programmes to make its cities smarter and more sustainable.

Nur-Sultan has experienced population growth, rapid economic development (driven by the gas and oil industries, and investment in innovative technologies, for example) and a construction boom over the last two decades. It developed a range of measures to accelerate progress towards SDGs, including a smart street lighting system that promotes energy efficiency and climate neutrality, and smart health clinics that improve the quality of medical services through the automation of internal and external processes. Nur-Sultan made public services more accessible; it developed the Smart Astana Mobile App, and transferred public services into digital format. Affordable housing projects and programmes, as well as policies and technologies that aim to improve energy efficiency, constitute other important steps towards making Nur-Sultan an SSC.

The city successfully collaborated with UNECE in the context of the U4SSC. It committed to working on problems facing the business community, implementing pilot projects to test innovative solutions, developing methodologies and technical standards, and learning from international best practices, with a view to improving smartness and sustainability.

Nur-Sultan was evaluated against the KPIs for SSC in 2019 and 2020. Outcomes of the evaluation are presented in the U4SSC Key Performance Indicators Verification Report.

The evaluation recommendations are presented below:

1. *Improve solid waste management.*

Effective and efficient waste management in the city is a prerequisite for sustainable development. Solid waste treatment and waste collection have considerable influence on quality of life and the environment.

The production of waste not only consumes resources (e.g. land) and energy but has a negative impact on air quality. Landfills emit a significant amount of methane and,

when burned, waste contributes to CO₂ emissions. Both methane and CO₂ are GHGs, the emission of which should be decreased, in line with international standards such as the United Nations Framework Convention on Climate Change (2016). Inefficient waste management can have a negative impact on the local climate by blocking drainage and causing flooding.

As solid waste pollution causes adverse effects on the environment and health, the city should increase the volume of waste recycled, while simultaneously decreasing the amount of waste put into open-air dumps, incinerated, burnt or disposed into landfills. There is a need to: (i) develop infrastructure and technologies that enable the use of waste for energy generation; (ii) promote sustainable material cycles via design control; and (iii) encourage residents and businesses to sort and recycle their solid waste⁴¹.

Local waste management policies should also be climate-neutral, based on the principles of circular economy, and reflect the capacities of organizations directly managing the solid waste collection and processing. Solid waste management should be included in sustainable housing strategies and policies, as this waste is generated during housing construction and demolition, and from household usage⁴²; this suggests particular attention should be paid to the waste production of the construction sector.

There is a need to promote solutions that allow for the integration of waste management with water and energy management. Initiatives aiming to optimize water consumption, reduce GHGs and energy consumption, and decrease waste-processing costs should be promoted and scaled-up.

2. *Improve public building sustainability, by applying certification measures and ICT.*

Improving public building sustainability has a direct impact on improving the quality of the environment and improving the quality of life in cities. Buildings account for a significant proportion of GHG emissions and resource use in a city so it is essential to measure their impacts using sustainability assessment tools and certification schemes⁴³. Buildings

41 [Climate Neutral Cities: How to make cities less energy and carbon intensive and more resilient to climatic challenges \(2011\).](#)

42 [Geneva UN Charter on Sustainable Housing \(2015\).](#)

43 [A variety of tools is available to assess the sustainability impacts of buildings. They include BREEAM, LEED, CASBEE, BOMA BEST, BCA Green Mark, and Passive House.](#)

assessed and certified against sustainability criteria usually perform better in relation to the use of energy, water and production of solid waste, and can also have a higher rate of recycling and better comfort for occupants.

The use of ICT in buildings (such as smart water meters, smart electricity meters and smart air-conditioning systems) promotes efficient energy and water consumption and can induce savings. Smart buildings (i) improve safety by detecting, for instance, fire, water, gas leaks or theft; (ii) protect health by ensuring appropriate temperature, light intensity, air condition parameters and others, which are also particularly important for the elderly; and (iii) offer a more dynamic utilization of space (e.g. by measuring relevant needs and availability). Lastly, as ICT enables the collection of data concerning building performance and the behaviour of the inhabitants, it can contribute to better decision-making by building operators, managers and policymakers, and improve the allocation of resources.

Nur-Sultan is encouraged to further implement policies and solutions that decrease the impact of buildings on the environment and increase the quality of life of building users by employing relevant ICT solutions and sustainability assessment measures, also in collaboration with the private sector. This is especially important given the particularly difficult climate conditions in the city, and in the country in general, such as cold winters and long, hot summers. Efforts to improve the sustainability of public housing, especially multi-apartment buildings, by investing in energy-efficient housebuilding and renovation should be expanded.

3. Promote an integrated approach to urban and spatial planning.

Urban planning is the backbone of the sustainable and smart development of cities. It helps to ensure that urbanization continues in a sustainable manner, with the greatest benefit for all. Effective urban planning supports economic prosperity and sociocultural progress, and contributes to the improvement of environmental sustainability. Good planning can optimize economies of scale, and allow for sustainable mobility, while protecting the environment and encouraging inclusion.

It is therefore essential to develop urban development and spatial plans and strategies at the local level, and ensure that they are based on the best possible data and evidence, and that they promote (i) “compact” development as opposed to urban sprawl; (ii) high connectivity of places; (iii) the integration of various urban functions and mixed land use; (iv) social inclusiveness; and (v) resilience to climate change.

As urban land expansion rates are higher than or equal to urban population growth rates⁴⁴, it is essential that urban planning promotes compact development, and a high level of integration of urban functions and land, including residential planning and transport planning. Urban planning in Nur-Sultan should therefore be executed in an integrated manner, and provide an opportunity for the reconciliation of competing interests. Participatory approaches to urban planning piloted at the local level should be scaled up.

As urban areas are increasingly exposed to natural and human-induced disasters and climate change, urban planning should increase city resilience by: limiting car dependency, providing an integrated system of green spaces, and implementing measures requiring that all major capital investment decisions be subject to a climate robustness test.

Effective urban planning relies on a diversity of cultural activities and urban heritage, and the promotion of a tailored approach to development. As, on average, half of city space is used for residential purposes, planning for housing plays a particularly important role in this process (as discussed in the following recommendation).

4. Improve access to decent-quality, affordable housing for all.

Improving access to decent-quality, affordable housing in cities requires a nuanced, holistic view of the housing needs of the city. Programmes aiming to providing housing must take into account the dynamics of the housing market (e.g. housing demand), the socioeconomic characteristics of the population, the location of settlements, housing affordability, the energy efficiency of buildings, and the quality of the housing stock, including its maintenance. For instance, a high level of migration to urban areas can constrain access to affordable rental housing for middle-income earners and disadvantaged groups. It is essential for the city to not only produce data about housing affordability, such as the average expenditure of households as a proportion of total household income, but also to invest in developing other tools and methodologies for measuring housing affordability in general, and with reference to particular vulnerable groups, such as the elderly, and young families.

To ensure the provision of decent-quality, affordable

⁴⁴ United Nations Digital Library, *United Nations system-wide strategy on sustainable urban development*. Available at: <https://digitallibrary.un.org/record/3825445?ln=en>.

housing in Nur-Sultan, it is essential to (i) improve governance and financing for affordable housing, particularly to define the powers and functions of national and regional authorities in the implementation of specific housing programmes, and to increase the role of local authorities in the implementation of housing policies⁴⁵; (ii) improve the legislation on housing management and maintenance in order to make apartment owners and condominium management agencies responsible for the proper maintenance and operation of multi-apartment buildings; (iii) create plans and strategies to develop a non-commercial rental housing sector to meet the housing needs of households that are not entitled to housing from the communal housing stock and who cannot afford to purchase houses; and (iv) develop and implement measures to stimulate long-term financing for affordable housing for all.

The city is also encouraged to build on the successful collaboration with UNECE. This involves (i) further invest in improving access to a high-quality and affordable transport infrastructure, and water and drainage infrastructure and technologies; (ii) reinforce the implementation of energy-efficiency programmes and projects; and (iii) take steps to improve food safety and security.

5. Improve urban governance for sustainable development, and the access and availability of urban data.

The 2030 Agenda for Sustainable Development requires coherent multilevel mechanisms for urban governance, to address different territorial realities. Partnerships with the business community and the use of innovative financing mechanisms are also encouraged, as they can serve accelerators of progress towards sustainable development.

As improving sustainable development depends on the access and availability of urban data, Nur-Sultan is encouraged to produce urban data on:

- i. air quality, especially through the online monitoring of O₃, SO₂, NO₂, PM10, and PM2.5 emissions;
- ii. waste: the proportion sent to sanitary landfills; burnt in open areas; incinerated; disposed of in open dumps; recycled; and other;
- iii. housing: housing expenditure;
- iv. electricity supply: ICT monitoring of the electricity supply, electricity system outage time;

- v. transport: share of journeys taken by private vehicles, walking, cycling, or paratransit;
- vi. innovation: prevalence of SMEs;
- vii. water and sanitation: level of wastewater treatment at the tertiary and secondary levels;
- viii. environmental quality: exposure to noise and to EMFs.

Data plays a key role in designing efficient and effective urban interventions, and in improving quality of life. For instance, measuring and addressing the high level of noise in the city is important, as prolonged exposure to excessive noise can lead to hearing loss. Low air quality is associated with health issues, such as the development of respiratory illnesses. It has particularly negative effects on the physical and cognitive development of children.

Improving access to high-quality urban data cannot be achieved without improving methodologies and standards for collecting and managing these data. In this context, policymakers are encouraged to work towards standardized methods for collecting and aggregating municipal data to establish national estimates on urbanization, thus improving access to open source data. Throughout this process it is also essential to address the issues of privacy. Efforts should also be made to improve the capacities of urban data producers, especially the national statistical offices and other organizations that make up the national statistical systems, including local and national governments, to produce, collect, manage, analyse and disseminate data.

⁴⁵ Country Profiles on the Housing Sector: Republic of Kazakhstan (2018).

RESOURCES

For more information on the strategies to improve waste management, including an overview of good practices, please see the UNECE guidelines: *Guide for Circular Cities, Climate Neutral Cities: How to make cities less energy and carbon intensive and more resilient to climatic challenges* (2011); the *UN Geneva Charter on Sustainable Housing* (2015); *Country Profiles on the Housing Sector: Republic of Kazakhstan* (2018); and *Social Housing in the UNECE Region* (October 2015).

Further information about improving building sustainability, including an overview of good practices, can be found in the UNECE guidelines: *Framework guidelines for energy-efficiency standards in buildings* (2017); *Good practices for Energy-Efficient Housing in the UNECE region* (2013); *Geneva UN Charter on Sustainable Housing* (2015); *Innovation Policy for Green Technologies: Guide for Policymakers in the Transition Economies of Europe and Central Asia* (2013); *Resilience to disasters for sustainable development* (2019); *Standards for Disaster Risk Reduction* (2015); and *Climate Neutral Cities: How to make cities less energy and carbon intensive and more resilient to climatic challenges* (2011).

More information on ways to improve urban planning at the local level, including an overview of good practices,

can be found in: *International Urban and Territorial Planning Guidelines* (UN-Habitat, 2015); *UN Geneva Charter on Sustainable Housing* (2015); *Resilience to disasters for sustainable development* (2019); *Climate Neutral Cities: How to make cities less energy and carbon intensive and more resilient to climatic challenges* (2011); and *Guidance on land-use planning, the siting of hazardous activities and related safety aspects* (UNECE, 2017).

For more information on improving the production, collection, management and use of data for evidence-based urban policies and decision-making, including an overview of good practices, please see UNECE/UN-Habitat *Guidelines on evidence-based policies and decision-making on sustainable housing and urban development*. The *Collection Methodology for Key Performance Indicators for Smart Sustainable Cities* can serve as a reference point while designing an approach to data collection, as it indicates the sources of data to inform the KPIs for SSC.

Further information on ways to improve access to decent-quality, affordable housing can be found in: *Country Profiles on the Housing Sector: Republic of Kazakhstan* (2018); *Geneva UN Charter on Sustainable Housing* (2015); *Social Housing in the UNECE region* (2015); among others.



CONTACT

For any questions or inquiries on the Sustainable Smart Cities Profile programme, please contact Ms. Gulnara Roll, UNECE, at gulnara.roll@un.org.



Information Service
United Nations Economic Commission for Europe

Palais des Nations
CH - 1211 Geneva 10, Switzerland
Telephone: +41(0)22 917 12 34
E-mail: unece_info@un.org
Website: <http://www.unece.org>

Smart Sustainable Cities Profile

Nur-Sultan, Kazakhstan

The UNECE Committee on Urban Development, Housing and Land Management is an intergovernmental body representing all 56 UNECE member States. We provide countries with a forum for compiling, disseminating and exchanging information on housing, urban development and land administration.

The Smart Sustainable Cities Profile provides an analysis of the city performance on urban development activities, including business and economy, social issues, urban planning, governance, energy, infrastructure, and so forth. The Smart Sustainable Cities Profile identifies areas where action is required, and makes relevant practical and financial recommendations to enhance the quality of life by creating livable, green, more connected and inclusive cities.

For further information on our work, please visit our website www.unece.org/housing

Information Service
United Nations Economic Commission for Europe

Palais des Nations
CH - 1211 Geneva 10, Switzerland
Telephone: +41(0)22 917 12 34
E-mail: unece_info@un.org
Website: <http://www.unece.org>