energoneatkaRĪGA 2030

RIGA
SUSTAINABLE ENERGY AND CLIMATE ACTION PLAN FOR 2022–2030

Riga State City

SUSTAINABLE ENERGY AND CLIMATE ACTION PLAN

for 2022–2030

Version 2

April 2022

Contents

Summary

The Riga State City Energy and Climate Action Plan of Riga for 2030 ('ACTION PLAN') is the main strategic planning document of the Riga City Municipality for the medium-term energy and climate adaptation sector. It has been prepared taking into account the fact that in 2008 the Riga City Municipality joined the initiative of the European Covenant of Mayors ('Covenant'), which more than 10 thousand local governments in Europe have joined so far. The Covenant stipulates that the municipalities within the Covenant undertake to not only achieve significant CO_2 emission reduction goals by 2030 (at least a 40% reduction compared to the 1990 base year), but also to achieve climate neutrality in the long term, by 2050.

In order to achieve these goals, Riga City Municipality has developed a PLAN, using the methodology of the Pact. The PLAN consists of 14 sections, including a brief overview of European, national, and regional guidelines for energy and climate policy, and the linking of the PLAN with the development planning documents of Riga State City. A separate section of the PLAN is devoted to strategy, including vision, commitments, and goals, as well as the coordinating and organisational structures and financial aspects. The PLAN identifies 7 sectors (e.g., municipal infrastructure, energy production, transport, etc.), providing a description of the current situation, the main challenges, and the measures to be implemented to achieve the goals set in the PLAN.

In general, the energy goals are for reducing CO_2 emissions, adapting to climate change, and reducing air pollution. In order to achieve the goals, the PLAN has identified 112 measures that will generate a total of 1,289 GWh in energy savings, provide 1,350 GWh of renewable energy and reduce CO_2 emissions by 509 thousand tonnes. The overall goal of the PLAN is to reduce CO_2 emissions in Riga State City by 30% compared to 2019, in order to ensure progress towards climate neutrality by no later than 2050.

17 different measures have been identified for the municipal infrastructure under the direct control of the municipal government, such as continuous improvement and certification of the energy management system, procurement of 100% renewable energy in municipal buildings, renovation of municipal buildings, modernisation of street lighting, improvements in the efficiency of the use of municipal vehicles and others. The goal of the municipal sector is to achieve climate neutrality in 2030, by reducing emissions and partially compensating them, and motivating market participants to generate energy from renewable energy sources.

ACTION PLAN SUMMARY

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GOALS FOR 2030.

1. ENERGY: MINIMISE ENERGY CONSUMPTION BY PREVENTING INEFFICIENT USE OF ENERGY
2. CO2 EMISSIONS: ACHIEVE THE MAXIMUM SHARE OF RENEWABLE ENERGY SOURCES IN MUNICIPAL INFRASTRUCTURE
3. ENERGY POVERTY: ENSURE THAT HOUSEHOLDS CAN AFFORD THE ENERGY SOURCES THEY NEED FOR A COMFORTABLE LIFE
4. ADAPTATION TO CLIMATE CHANGE: CLIMATE-RESISTANT** RIGA

112 MEASURES **7 SUBJECT GROUPS:**

- ENERGY PRODUCTION
- TRANSPORT
- APARTMENT BUILDINGS
- ADAPTATION TO CLIMATE CHANGE AND URBAN PLANNING
- CLIMATE POLICY NEUTRALITY
- MUNICIPAL INFRASTRUCTURE
- ENVIRONMENTAL COMMUNICATION

SOME EXAMPLES OF MEASURES:

CLEAN ENERGY: RENEWABLE ENERGY SOURCES IN THE RIGA HEATING SUPPLY

PROCUREMENT OF 100% RENEWABLE ENERGY FOR MUNICIPAL NEEDS

RENOVATION OF 2000 MULTI-APARTMENT BUILDINGS

MITIGATION OF STREET FLOODING DURING HEAVY RAINFALL

CREATING A CLIMATE-NEUTRAL RIGA 2050 PLATFORM

ELIMINATION OF POLITICAL OBSTACLES AND BARRIERS. REVIEW AND DEVELOPMENT OF NEW SUPPORT MECHANISMS

MAIN BENEFITS (EXPECTED):

- **1,285 GWh** ENERGY SAVED
- **1,363 GWh** ENERGY PRODUCED FROM RENEWABLES
- **502 $ktCO_2$** REDUCED CO2 EMISSIONS
- **120 thousand** RESIDENTS INVOLVED
- **10 thousand** COMPANIES INVOLVED
- **2.5** BILLION EUROS IN INVESTMENTS
- **20 thousand** SCHOOLCHILDREN INVOLVED
- IMPROVED CITY INFRASTRUCTURE

*A CITY WITH 'ZERO' NET IMPACT ON THE CLIMATE. IT CAN BE BROUGHT TO A MINIMUM BY REDUCING THE VOLUME OF EMISSIONS AND CAPTURING THE REMAINING AMOUNT.

**CITY. RESISTANT TO THE EFFECTS OF CLIMATE CHANGE. THIS INCLUDES FLOODS AND HEAT WAVES.

Abbreviations Used

RES	Renewable energy sources
ALTUM	AS 'Attīstības finanšu institūcija Altum'
AS	Joint-Stock company
CH_4	Methane
CO_2	Carbon dioxide
COVID-19	A disease caused by a coronavirus
CSDD	Road Traffic Safety Directorate
CSB	Central Statistical Bureau of the Republic of Latvia
CHS	Central heating system
FOCA	Flat Owner Cooperative Association
EMS	Energy management system
EU	European Union
ESP	Energy service provider
EV	Electric vehicles
EUCF	European City Facility
EUR	Single currency of the European Union
GDP	Gross domestic product
ICT	Information and communication technologies
IPCC	Intergovernmental Panel on Climate Change
$ktCO_2$	One thousand tonnes of CO_2 emissions
LBN	Latvian construction standard
LIAS2030	Latvia Sustainable Development Strategy 2030
UL	University of Latvia
LEGMC	Latvian Environment, Geology, and Meteorology Centre
CM	Cabinet of Ministers
N_2O	Dinitrogen oxide
MCP	Mandatory components of procurement
PSF	Pre-school facility
PPP	Public and private partnership
USSR	Union of Soviet Socialist Republics
PV	Photovoltaic solar panel
RCC	Riga City Council
REA	Riga City Municipality Agency 'Riga Energy Agency'
REF	Riga Energy Efficiency Fund
ACTION PLAN	Riga Sustainable Energy and Climate Action Plan 2030
RPR	Riga planning region
RTU	Riga Technical University
RNP	SIA 'Rīgas namu pārvaldnieks'
GHG	Greenhouse gas emissions
SIA	Limited company
Stratēģija2030	Long-term energy strategy 2030 for Latvia: competitive energy for the public
SC	Shopping centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
MEPRD	Ministry of Environmental Protection and Regional Development
SFRS	State Fire and Rescue Service
SES	State Environmental Service

Definitions of Terms

Alternative fuel	Fuel or energy that at least partially replaces petroleum products in the supply of vehicles and has the potential to contribute to the decarbonisation of transport and improve the environmental performance of the transport sector. Alternative fuels include: ● electricity; ● hydrogen; ● biofuel as defined in Article 2(i) of Directive 2009/28/EC; ● natural gas, including biomethane in gaseous state (compressed natural gas, CNG) and liquid state (liquefied natural gas, LNG). [1]
Circular economy	Circular economy is a model of production and consumption that envisages sharing, renting, reusing, repairing, renewing, and recycling existing materials and products over the longest possible period of time. This extends the lifecycle of products.[2]
Renewable energy sources	Renewable energy sources (wind energy, solar energy, hydroelectricity, ocean energy, geothermal energy, biomass, and biofuels) are alternatives to fossil fuels that help reduce greenhouse gas emissions, diversify the energy supply and reduce dependence on unsafe and volatile fossil fuel, mainly oil and gas, markets.[3]
Biodiversity	The diversity of the species and ecosystems of all living beings (plants, animals, fungi and microorganisms) on Earth.[4]
Central heating system	A set of heating sources, heat transmission and distribution lines and heat energy users that produce, transform, transmit, distribute, and consume heat energy in a coordinated manner.[5]
CO_2 equivalent	A metric measure used to compare GHGs based on their global warming potential by converting the amount of other gases into an equivalent amount of carbon dioxide with the same global warming potential.[6]
CO_2 capture	A process, in which carbon dioxide is removed from the atmosphere and sequestered for long periods of time.[7]
Decentralised heating system	The heating and hot water supply system not connected to the central heating system, using individual or local solutions for heating and hot water.
European Green Deal	The European Commission's Strategy for Growth, which seeks to transform the European Union into a fair and prosperous society with a modern, resource-efficient, and competitive economy, in which net greenhouse gas emissions are reduced to zero by 2050 and economic growth is decoupled from resource consumption.[8]
Energy efficiency in buildings	Relative amount of energy that describes the consumption of energy required for the heating, ventilation, cooling, lighting, and hot water supply of the given building under operating conditions typical to the building type. [9]
Building indoor climate	Indoor ambient temperature, relative humidity, air movement speed. An optimum indoor climate is a set of physical factors of the indoor air, which

[1]Source: Alternative fuel development plan 2017–2020
[2] Source: https://www.europarl.europa.eu/news/lv/headlines/economy/20151201STO05603/aprites-ekonomika-definicija-nozime-un-ieguvumi
[3] Source: https://www.europarl.europa.eu/factsheets/lv/sheet/70/renewable-energy
[4]Source: Biological diversity, World Nature Fund and Environmental Education Fund, http://www.videsfonds.lv/documents/metodiskais-materi-ls-biolo-isk-daudzveid-ba.pdf
[5]Source: Energy Law
[6]Source: Latvian Strategy for Achieving Climate Neutrality by 2050
[7]Source: https://www.ipcc.ch/sr15/faq/faq-chapter-4/
[8]Source: Riga Development Programme 2022–2027
[9]Source: Law on the Energy Performance of Buildings

	enables the exchange of heat between the human body and its surrounding environment, ensuring the normal functioning of various body systems.[10]
Energy poverty	A household user's inability to maintain an adequate temperature in their home or to use the services provided by energy supply companies, or to pay for these services due to low energy efficiency or because the fee for these services accounts for a high proportion of the household's income.[11]
End energy consumption	Energy consumption in industry, transport, households, service sector, and agriculture. It does not include the supply of energy to the transformation sector, and the energy sector itself.[12]
Energy savings	The amount of energy saved, determined by measuring or estimating consumption before and after the implementation of one or more energy efficiency improvement measures.[13]
Energy user	A natural individual or legal entity that buys from companies supplying energy and consumes a specific type of energy or fuel for its own needs, or uses it for energy supply, or other types of business activity.[14]
Energy supply	Commercial activity in the field of energy, which requires licensing or registration, and which involves the production of electricity or heat energy; the purchase, transformation, storage, transmission, distribution, or trade in, electricity, heat energy or natural gas (including liquefied natural gas and biomethane).[15]
Energy audit	Activities that are carried out to obtain information on the structure of energy consumption in buildings or groups of buildings, processes or equipment, and to determine and assess economically feasible energy saving opportunities, the results of which are summarised in a report.[16]
Energy efficiency	The degree of efficiency in the use of energy resources, expressed as a share of the type, quality, and quantity of the final product relative to the consumption of energy resources.[17]
Energy efficiency service contract	Provision of energy services with a guaranteed end result.[18]
Energy management system	Set of interrelated processes that is used to create an ACTION PLAN and define energy efficiency goals and procedures for achieving those goals.[19]
Sustainable growth	Balanced development that meets modern necessities, meets the current social and economic needs of the population, contributes to the well-being of society, and ensures compliance with environmental requirements without jeopardising the fulfilment of the needs of future generations.[20]
Specific energy consumption	Energy consumption per unit, for example, the specific energy consumption of a building is shown per m^2.
Climate change	Changes found in climate (e.g., through statistical tests) with changes in mean values and/or variability in characteristics that stretch over a long period of time, usually a decade or more. Climate change can occur as a result of various internal natural processes, or as a result of external forces, such as solar activity cycles, volcanic eruptions, and long-term anthropogenic changes in the composition of the atmosphere and in land use.[21]

[10]Source: https://mcliepa.lv/telpas-mikroklimats-ventilacija/
[11]Source: Energy Law
[12]Source: Energy Efficiency Law
[13]Source: Energy Efficiency Law
[14]Source: Energy Efficiency Law
[15]Source: Energy Law
[16]Source: Energy Efficiency Law
[17]Source: Energy Efficiency Law
[18]Source: https://www.effect4buildings.se/lv/finansu-riku-rokasgramata/energoefektivitates-ligums/
[19]Source: Energy Efficiency Law
[20]Source: Environmental Protection Law
[21]Source: Latvian Strategy for Achieving Climate Neutrality by 2050

Climate neutrality	A state, in which human activity has a 'zero' net effect on the climate system. To achieve such a state, one must balance GHGs and carbon dioxide capture.[22]
Cogeneration	A process, in which electricity and heat energy are simultaneously produced for beneficial use.[23]
Mobility points	Transport hubs of different levels, the main task of which is to provide convenient connections for different modes of transport for every user, offering alternative ways of travel (including shared vehicles) and reducing the need to use private road transport.[24]
Resilience to climate change	The ability of a system, such as a city or neighbourhood, and its elements to anticipate, perceive, adapt, or recover from climate change and its consequences, including the preservation, restoration, or even improvement of basic structures and functions.[25]
Covenant of Mayors	The Covenant of Mayors is the world's largest urban movement for local climate and energy action.[26]
Greenhouse gases	CO_2, CH_4, N_2O, nitrogen trifluoride (NF_3) and fluorine-containing gases or F-gases, SF_6 (sulphur hexafluoride), PFCs (perfluorocarbons), HFCs (fluorocarbons).[27]
Greenhouse effect	The process of heating the air in the atmosphere, which occurs because the layer created by the water vapour and greenhouse gases in the atmosphere prevents the Earth from reflecting the heat received from the Sun (in the form of infrared radiation), as a result of which the heat accumulates in the lower layers of the atmosphere, creating and contributing to climate change.[28]
Heat island	A part of a city that has a higher temperature than other parts of the city. Built-up areas absorb more solar radiation than natural surfaces, and dense parts of a city have significantly higher ambient temperatures than the less-dense peripheries.[29]
Low-emissions zone	A city area where a set of measures is implemented to reduce the emissions caused by road transport.[30]

[22]Source: Latvian Strategy for Achieving Climate Neutrality by 2050
[23]Source: Energy Law
[24]Source: Riga Development Programme 2022–2027
[25]Source: Latvian Plan for Climate Change Adaptation for up to 2030
[26]Source: https://www.pilsetumerupakts.eu/par-paktu/pakta-iniciat%C4%ABva/pirms%C4%81kumi-un-att%C4%ABst%C4%ABba.html
[27]Source: Latvian Strategy for Achieving Climate Neutrality by 2050
[28]Source: Latvian Strategy for Achieving Climate Neutrality by 2050
[29]Source: Latvian Plan for Climate Change Adaptation for up to 2030
[30]Source: Latvian Strategy for Achieving Climate Neutrality by 2050

Foreword

Mārtiņš Staķis, Mayor of Riga. A third of our country's population lives in Riga, and the amount of housing and the density of traffic in Riga is the highest in Latvia. The same is true with regard to energy consumption and its impact on the environment. So as our Team Change Riga begins its work, the municipal government is finally paying more attention to these issues. In order to promote the sustainability of our economy and foster business development at the same time, we have set a plan to restore Riga's infrastructure plan as our priority. This takes place in concert with improvements in the urban environment, implementing investment projects aimed at climate neutrality. Riga is on its way to becoming the first climate-neutral capital in the Baltics: our city is an example of how a reduction in greenhouse gas emissions can be complemented by social policy goals. The implementation of climate and energy efficiency tasks should be a priority in all policy areas. To achieve this, we have developed the Riga Sustainable Energy and Climate Action Plan 2030. In this plan, we set the most ambitious tasks for ourselves, the municipal government, and for the city as a whole; the main goals have been put in place in relation to the renovation of buildings and the transport sector.

Selīna Vancāne, Deputy Chairwoman of the Housing and Environment Committee, Head of the Climate Neutrality Commission. This road map for Riga to achieve ENERGY INDEPENDENCE includes measures for the more efficient and smarter use of resources in order to promote the well-being of the city's residents without causing an additional impact on the environment. The quality of the environment in Riga has a very direct impact on people's health and well-being, which in turn affects the society as a whole, both socially and economically. In order for this road map to be alive and usable, we have set up the Climate Neutrality Work Group at Riga City Council, which, together with professionals, scientists, NGOs, and decision-makers, coordinates the process of its implementation. However, the biggest role in mitigating climate change lies with you, a citizen of Riga! Riga's climate ambitions also depend on the understanding and actions of all of its residents, because the kind of Riga we will live in the future depends on all of us collectively, and each of us individually!

Jānis Ikaunieks, Head of the Riga Energy Agency. The Sustainable Energy and Action Plan has been developed in close cooperation with the units and companies of Riga City Council, as well as the general public. During its preparation, we had 18 working groups, involving more than 280 specialists from various fields. In November 2021, Riga Energy Agency also organised a public discussion of the ACTION PLAN, during which 162 recommendations and/or proposals for improvements were received. The ACTION PLAN is aimed at reducing energy consumption, reducing CO_2 emissions, reducing air pollution, and harmonisation with other environmental goals, as well as defining measures to adapt to climate change. The measures identified were evaluated viewing their lifecycle as a whole, and not only as individual stages. Environmentally-friendly solutions included in the ACTION PLAN will not only enable the achievement of our climate goals, but will bring benefits to the budget of the city and its residents throughout the lifecycle of these solutions.

1 Description of Riga

Area

The capital of Latvia, Riga, was founded in 1201, and is located in the central part of Latvia, on the southern coast of the Gulf of Riga (Baltic Sea), at the mouth of Latvia's largest river, the Daugava, in the Gulf of Riga. Although the area of Riga only occupies 0.5% of the total area of Latvia, a third of the total population of Latvia lives in the city, making it the largest city in both Latvia and the Baltic states.[31]

The territory of Riga City Municipality is divided into:

- **6 administrative territorial units**: Central District, Kurzeme District, North District, Vidzeme Suburb, Latgale Suburb, Zemgale Suburb;
- **58 neighbourhoods** (see Figure 1.1).

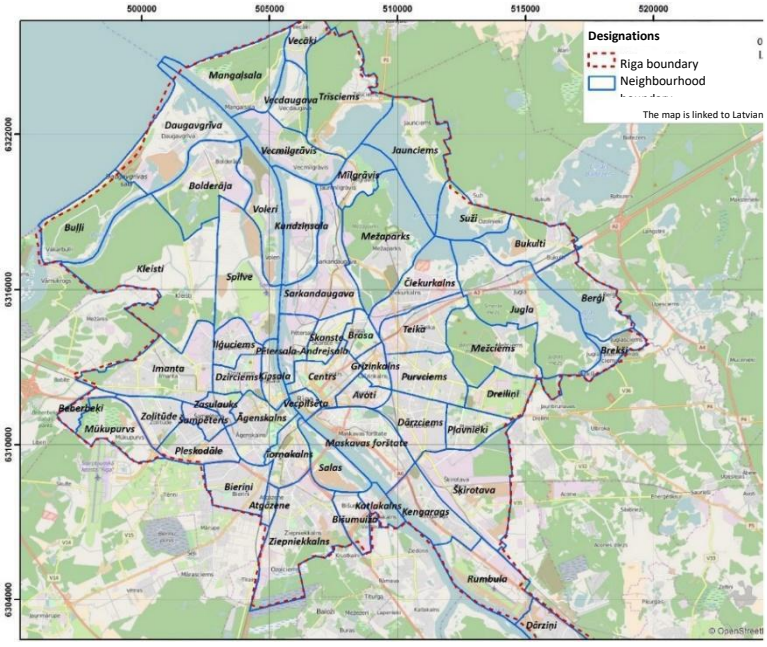


Figure 1.1. Map of Riga neighbourhoods[32]

[31]Source: CSB, https://data.stat. gov.lv/pxweb/lv/OSP_PUB/START__POP__IR__IRS/IRS030/
[32]Source: https://www.rdpad.lv/rtp/izstrade/

According to the 2030 land planning of Riga, Riga has a large proportion of green areas. The city includes 41% of natural areas, of which 16% are water and 25% are greenery and nature zones.[33] According to the 2020 annual report of the State Forestry Service, the Riga City Municipality manages 5,494.33 ha of forest land.[34] Approximately 84% of this area has been transferred for management to SIA 'Rīgas meži'.[35] There are several protected natural areas in Riga: nature reserves (Krēmeri, Vecdaugava, Jaunciems), a part of the Piejūra nature park, and other natural sites (protected trees).[36]

Population

Since the 1990's, there has been a gradual decrease in the population of Riga, and most of Latvia. Since 1991, the population has fallen by 32%. This can be partly explained by a decrease in the birth rate and people moving to Riga suburbs. At the beginning of 2021, the population of the city of Riga was 621,120 people.[37]

Riga is multi-ethnic, mostly represented by Latvians (47.2% in 2021) and Russians (36% in 2021).[38]

In 2020, the largest number of people lived in neighbourhoods with Soviet-era apartment buildings: Purvciems (55,024 residents, 9%), Ķengarags (45,783, 7%), and Imanta (43,835, 7%). less than 4% of the total population live in other neighbourhoods[39].

Culture

The culture of Riga has been developing for more than 800 years. The city's traditions, art, architecture, fashion, and everyday life are recognisable in the country, and beyond. The best-known cultural events include national holiday celebrations, Song and Dance Festivals, and Riga City Festivals.

The UNESCO World Heritage Committee has recognised the universal value of the historic centre of Riga. The city is characterised by a medieval and later urban structure, art nouveau architecture and 19th century wooden architecture. This cultural heritage must be taken into account when setting energy efficiency targets for the building sector.[40]

Education and Research

The largest number of Latvia's higher education institutions is concentrated in Riga, almost all of which are accredited and internationally recognised bodies. People from Riga and other regions of Latvia study in Riga, as well as foreign students, and one can study in foreign languages.[41] In 2020, 3 universities, 9 universities and academies, and 2 branches of foreign universities operated in Riga.[42]

Economy

The economy of Riga is an important part of the economy of Latvia. This is because of the size of Riga's GDP, the number of workers, companies, amounts of investment, and other indicators[43]:

- 341,600 or 34.8% of all economically active residents of Latvia live in Riga;
- A total of 480,100 people are employed in Riga, which is 46% of all people employed in Latvia;
- of all people employed in Riga, 35.1% are residents of Riga;

[33] Source: https://www.rdpad.lv/rtp/izstrade/
[34] Source: https://www.vmd. gov.lv/valsts-meza-dienests/statikas-lapas/publications-un-statistika/meza-statistikas-cd?nid=1809#jump
[35]Source: https://www.rigasmezi.lv/lv/mezi/par_meziem___fakti_/meza_apsaimniekosanas_plans/?doc=10346
[36] Source: https://ozols.gov.lv/pub
[37] Source: CSB, https://data.stat. gov.lv/pxweb/lv/OSP_PUB/START__POP__IR__IRS/IRS030/
[38] Source: CSB, https://data.stat. gov.lv/pxweb/lv/OSP_PUB/START__POP__IR__IRE/IRE030
[39] Source: https://apkaimes.lv/statistika/iedzivotaju-skaits/
[40]Source: https://www.rdpad.lv/wp-content/uploads/2014/11/Rigas_Pasreizejas_situacijas_raksturojums.pdf
[41]Source: https://www.rdpad.lv/wp-content/uploads/2014/11/Rigas_Pasreizejas_situacijas_raksturojums.pdf
[42]Source: https://www.riga.lv/lv/media/3955/download
[43]Source: https://www.riga.lv/lv/media/3955/download

- 60% of economically active companies are in Riga and its suburbs;
- 57% of investments are made in Riga;
- In 2018, Riga's GDP was EUR 16.395 billion (EUR 25,820 per capita), or 56% of Latvia's total GDP;
- sectors with the greatest added value[44] include retail (16%), real estate transactions, (11%) and transport and storage (10%)[45] (see Figure 1.2).

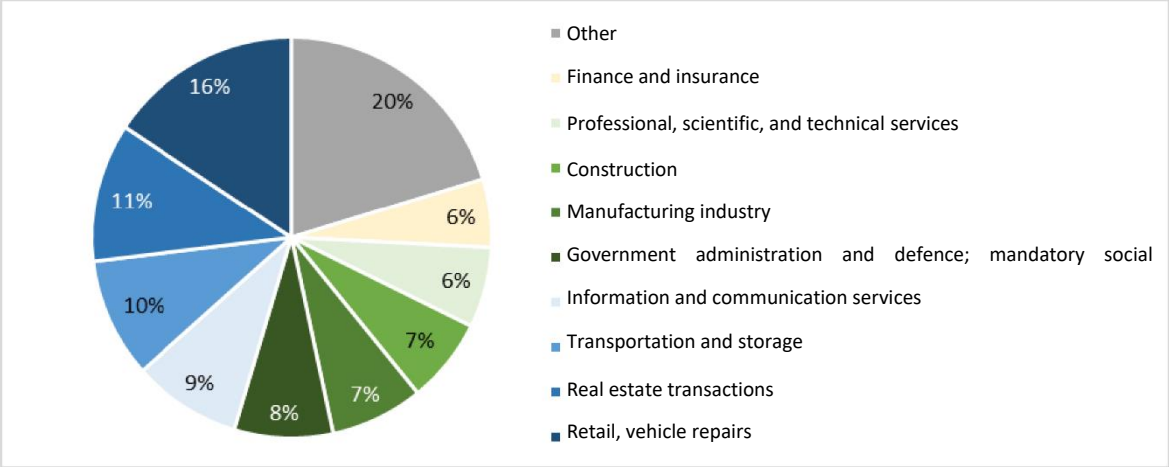


Figure 1.2. Added value by types of business in Riga, 2018[46,47]

Housing Stock

In 2020, the total area of Riga's housing stock was 20.1 million m^2 or 33 m^2 per capita. The amount increased by 14% since 2012.[48] Riga's housing stock makes up 26% of the country's total. The number of new flats put up on the market has increased every year since 2010. In 2020, 1,358 new flats with a total floor area of 133.6 thousand m^2 or 0.7% of the total area of the housing stock of that year were handed over for use.[49]

Approximately 70% of all buildings in Latvia were built between 1946 and 1990. A large part of Riga neighbourhoods were created in this period.[50] In 2016, the Riga Architect Office commissioned the study 'Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia'. The study concluded that the overall technical condition of multi-apartment buildings in Riga could be viewed as satisfactory; a number of typical defects were identified, the elimination of which is necessary for improving the engineering condition of the buildings, for increasing energy efficiency, and for a better indoor climate and quality of life of the residents.[51]

[44] Value added is the difference between the total value of goods and services and the value of the intermediate product used in their production.
[45] Source: CSB, https://stat. gov.lv/lv/statistikas-temas/valsts-ekonomika/ikp-gada/tabulas/ikr020-pievienota-vertiba-un-tas-struktura
[46] Source: CSB, https://stat. gov.lv/lv/statistikas-temas/valsts-ekonomika/ikp-gada/tabulas/ikr020-pievienota-vertiba-un-tas-struktura
[47] The 'Others' section includes other sectors, each of which accounts for less than 5% of the total.
[48] Source: CSB, https://data.stat. gov.lv/pxweb/lv/OSP_PUB/START__NOZ__BU__BUF/BUF010
[49] Source: CSB, https://data.stat. gov.lv/pxweb/lv/OSP_PUB/START__NOZ__BU__BUE/BUE020c
[50] Source: Identification and inventory of residential areas in Riga as part of the revitalisation project for residential areas, Riga City Council Urban Development Department, https://sus.lv/sites/default/files/media/faili/revitalizacija_arho_0.doc
[51] Source: http://www.pilsetasarhitekts.riga.lv/index.php/9-projekti/skumlapa/569-petijums-serijveida-daudzdzivoklu-namu-inzeniertehniskais-stavoklis-riga-ir-apmierinoss-nepieciesami-energoefektivitates-pasakumi-un-eku-renovacija

Air Quality

Air quality in Riga is affected by various emission sources: stationary emission sources, mobile emission sources, and area or unorganised emission sources. Air quality measurements and monitoring in Riga are conducted by the municipal government, VSIA 'Latvijas Vides, ģeoloģijas un meteoroloģijas centrs' and the Freeport of Riga Authority.

Between 2015 and 2019, the air quality standards or upper pollution assessment thresholds for several pollutants were exceeded in Riga. According to the Riga City Air Quality Improvement Action Programme 2021–2025, in 2019, a total of approximately 1,300 tonnes of nitrogen dioxide, 1,500 tonnes of PM 10 particles, 900 tonnes of PM 2.5 particles, 300 tonnes of benzene, and 94 kilograms of benzo(a)pyrene were emitted in Riga from all emission sources. Their breakdown is shown in Table 1.1.

Table 1.1. Key sources of pollution, emissions, and amounts (tonnes/year) in Riga, 2019

Pollution source group	Subgroup	NO_2	PM 10 particles	PM 2.5 particles	Benzene	Benzo-[a]pyrene
Stationary sources, t/year	Central heating system (Source: 'Rīgas siltums', REA)	34.77	47.92	5.27	0.00	0.00
	Industrial sources, companies[52]	44.23	443.08	219.73	36.00	-
	Individual heating systems of buildings	153	420	408	100	67
Mobile pollution sources, t/year	Road traffic, except bus traffic of SIA 'Rīgas satiksme'.	804	478	145	7	9
	SIA 'Rīgas satiksme' bus traffic	33	4.6	4.4	0.4	0.5
	Diesel train traffic	50	4.5	3	7	0.02
	Ship traffic	23	22	22	2	0.07
	Moored ships	118	97	97	9	0.1
Other sources, t/year	Emissions from activities not listed elsewhere	-	48	30	128	17
	Emissions from car engines starting/stopping	0.004	0.006	0	0.002	-
Central heating system part in each section		**2.8%**	**3.1%**	**0.6%**	**0.0%**	**0.0%**

The most important sources of NO_2 emissions in 2019 were road transport (63.4%), and individual heating (12%). The biggest sources of PM 10 particles were road transport (30.5%), industrial sources (28.3%), and individual heating (26.8%). For PM 2.5, it was individual heating (43.7%), industrial sources (23.5%), and road traffic (15.5%). From the point of view of air improvement, the ACTION PLAN pays significant attention to the reduction of pollutants generated by road transport and individual (decentralised) consumers.

Transport and Mobility

Riga and its suburbs have the highest traffic intensity in Latvia. The city of Riga is crossed by 7 main national roads and 3 regional roads, and Riga is the starting point for five local Tukums, Skulte, Valga,

[52] Included are the emissions of those companies that have received A, B, C polluting activity permits. TEC-1 and TEC-2 are not included.

Aizkraukle, and Jelgava/Liepaja train lines. The total length of the streets of Riga is 1,204 km.[53] In 2019, 35.6% of the population positively evaluated the quality of street infrastructure for transport.

The network of public transport routes in the city consists of 86 routes (6 trams, 18 trolleybuses, 51 buses, 11 express buses), with a total length of approximately 1,194 km. The structure of Riga's public transport routes is mainly aimed at connecting the city centre with the surrounding neighbourhoods, as the main passenger demand is specifically in the city centre.[54] In Riga, 7 bicycle paths, and several bicycle lanes have been created with a total length of 68.2 km.[55]

According to the Riga Development Programme 2027, in 2019, 42.4% of Riga residents chose to travel by private transport, 46.8% by public transport, 7.3% by foot, and 3.5% by bicycle.[56]

Daily trips between Riga and nearby municipalities (commuting migration) create congestion, traffic jams, and emissions. According to the project SUMBA INTERREG model, every morning, approximately 86,000 people move to Riga and approximately 29,700 leave Riga.[57] Figure 1.3 shows the average 24-hour intensity in Riga district in 2015.

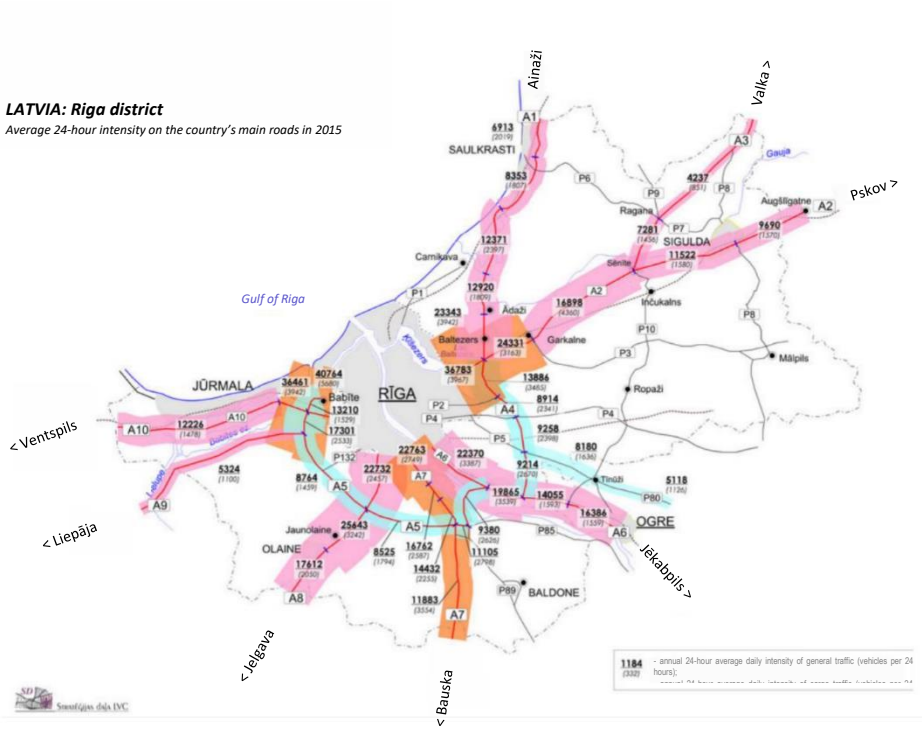


Figure 1.3. Annual average daily intensity on the key roads in Latvia, 2015[58]

The intensity of traffic in Riga has increased since 2015, which indicates the growing mobility of people in the city. A large part of the traffic in the city is caused by residents of Riga suburbs. As shown in Figure 1.4, the busiest national roads are the main national roads A10 (leading to Jūrmala) and A2

[53] Source: CSB, https://stat.gov.lv/lv/statistikas-temas/noz/transports/tabulas/tri010-pasvaldibu-celu-un-ielu-finansesanas-lidzeklu?themeCode=TR

[54] Source: Subject planning for transport development, Urban Development Department of Riga City Council, https://www.rdpad.lv/wp-content/uploads/2017/10/transporta/Transporta%20att%C4%ABst%C4%ABbas%20Tmp%20Paskaidrojuma%20raksts.pdf

[55] Source: National research on bicycle traffic and bicycle traffic infrastructure, VAS 'Latvijas Valsts ceļi', http://veloplans.lv/wp-content/uploads/2017/08/Velo-petijums_15012020.pdf

[56] Source: Riga Development Programme 2022–2027, https://www.riga.lv/lv/media/17522/download

[57] Source: Everyday Mobility Development Plan 2021–2027, https://sumba.eu/sites/default/files/2021-04/SUMBA_CMP_Latvian_FINAL.pdf

[58] Source: Subject planning for transport development, Urban Development Department of Riga City Council https://www.rdpad.lv/wp-content/uploads/2017/10/transporta/Transporta%20att%C4%ABst%C4%ABbas%20Tmp%20Paskaidrojuma%20raksts.pdf

(section leading to Garkalne). Compared to 2015, the traffic intensity on these roads rose by 13% on average by 2020. A more detailed description of traffic intensity in Riga is given in Section 10.1.2.

2 Guidelines for the Implementation of the Energy and Climate Policy

The ACTION PLAN has been developed in accordance with European Union (EU) and national policy planning documents. Figure 2.1 presents an overview of EU and national planning documents and goals related to the energy and climate sector.

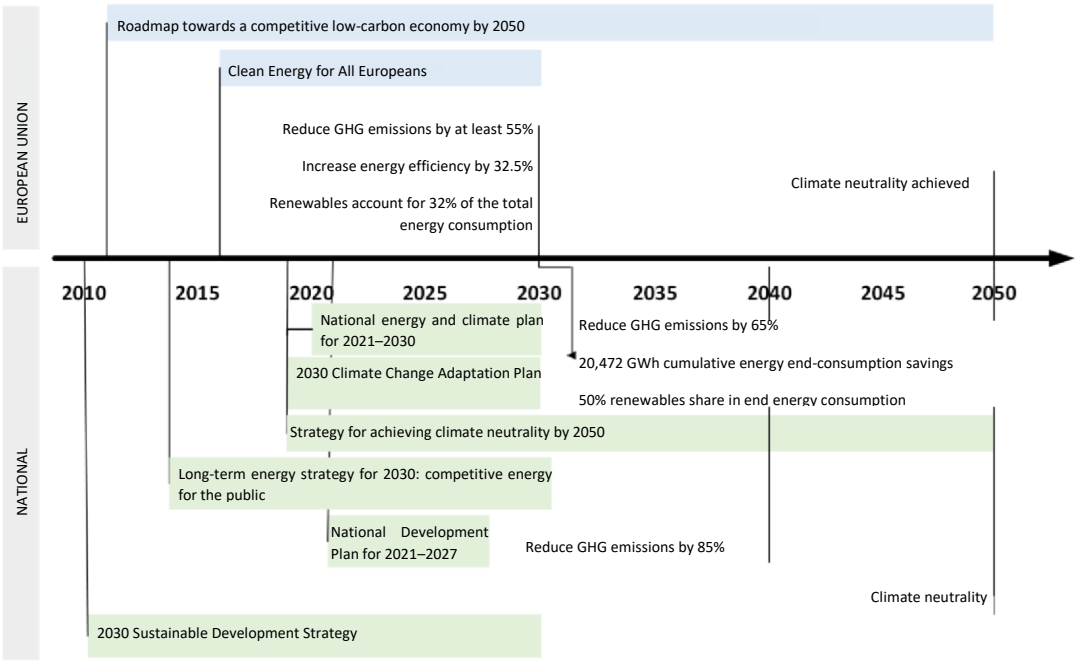


Figure 2.1. Overview of EU and national planning documents and goals related to the energy and climate sector (source of EU goals[59])

The following sections of the ACTION PLAN describe the main policy planning and implementation documents at the EU and Latvian level pertaining to energy, climate impact mitigation, and adaptation to climate change.

2.1 European Union Policy

2.1.1 Energy and Climate Impact Mitigation

Currently, the EU's climate and energy policy is based on **the European Green Deal.** The European Green Deal describes the EU's growth strategy, which aims to build a fair and prosperous society in the EU, improve the quality of life for current and future generations, and build a modern, resource-efficient, and competitive economy in which net greenhouse gas (GHG) emissions would be reduced to zero by 2050, and economic growth would be decoupled from resource consumption.[60]

At the EU level, the energy policy for the period up to 2050 is defined in the European Commission (EC) publication '**Roadmap for Moving to a Competitive Low-Carbon Economy in 2050**'.[61] Meanwhile,

[59]Source: https://ec.europa.eu/clima/policies/strategies/2030_en
[60]Source: https://eur-lex.europa.eu/legal-content/LV/TXT/PDF/?uri=CELEX:52020PC0080&from=LV
[61] Available here: https://eur-lex.europa.eu/legal-content/LV/TXT/PDF/?uri=CELEX:52011DC0112&from=LV

for the period up to 2030, the energy policy is defined in the EC publication '**Clean Energy for All Europeans**'.[62]

In the European Union, energy and climate mitigation policies consist of a large body of legislation that is regularly revised. The main forms of legislation followed during the development of the plan were:

- Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community;
- Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings;
- Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources;
- Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency;
- Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action;
- Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement;
- Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework;
- Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) 401/2009 and (EU) 2018/1999 ('European Climate Law');
- Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

The EU has identified three main aspects for achieving its energy goals: improving energy efficiency, increasing the use of renewables, and reducing GHG emissions. The objectives set for these fields shown in Figure 2.1. In addition to the already mentioned goals of Article 4(3) of Regulation No. 2018/842, and Commission Implementing Decision (EU) 2020/2126 of 16 December 2020 on setting out the annual emission allocations of the Member States for the period from 2021 to 2030 pursuant to Regulation (EU) 2018/842 of the European Parliament and of the Council, Latvia is required to reduce the amount of GHG emissions in the non-emissions quota trading sector by 6% compared to 2005 by 2030. At the moment, discussions are underway on increasing the target for the Regulation of the European Parliament and the Council, which amends Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030. Also, in the EU emissions quota trading sector, a reduction target of 43% compared to 2005 was set for the 2021–2030 period, divided into annual targets at the equipment level in accordance with Article 10(a) of Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments.

2.1.2 Adaptation to Climate Change

On 24 February 2021, the European Commission adopted a new **European Union strategy on adaptation to climate change**. The Forging a Climate-Resilient Europe strategy outlines how

[62] Available here: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1485341914564&uri=CELEX:52016DC0860%2801%29

EU member states can adapt to the inevitable effects of climate change and become resilient to them by 2050.[63]

In relation to adaptation to climate change, the development of the energy sector and reduction of climate impact at the municipal level is promoted by the Covenant of Mayors initiative, which began in 2008 after the adoption of the EU climate and energy legislation package. In 2014, the *Mayors Adapt* initiative was launched, the aim of which was to promote and support the adaptation of municipalities to climate change. In 2015, these two initiatives were combined into one, called Covenant of Mayors for Climate & Energy. This document requires municipalities that have joined this initiative to develop a Sustainable Energy and Climate Action Plan. In the Sustainable Energy and Climate Action Plan, each municipal government must include goals and measures aimed at reducing energy consumption, mitigating climate impact, adapting to climate change, and reducing energy poverty.[64] Riga joined the Covenant of Mayors initiative in 2008, becoming the first Latvian municipality to do so.

2.2 National Policy

2.2.1 Energy and Climate Impact Mitigation

The predominant long-term development planning document in the country, **Latvia Sustainable Development Strategy 2030** sets the principal goal for the energy sector in that it must ensure the country's energy independence by increasing its self-sufficiency in terms of energy resources, and integration into EU energy networks.

In the field of renewables and energy efficiency, the following priority long-term fields of action (possible solutions) have been determined:

1. energy security and independence;
2. renewables (biomass, straw, reed, wind, solar, biogas) use and innovation;
3. energy efficiency measures (renovation of apartment buildings, increasing the efficiency of heat energy production, investments in centralised heating supply systems, energy-efficient street lighting in cities, promotion of efficient energy consumption in households, inclusion of energy efficiency and product lifecycle analysis criteria in national and local government tenders);
4. energy-efficient and environmentally friendly transport policy (environmentally-friendly transport, pedestrian streets, cycle paths and green trails, improving the energy efficiency of electric transport and linking it with other forms of transport).

The country's top medium-term development planning document, **Latvia National Development Plan 2021–2027** defines the main priorities, among which one of the fields of action is Nature and Environment: Green Deal. Its main goals are the transition towards low-carbon, resource-efficient, and climate-resilient development, and the preservation of biological diversity.

Latvia's Strategy for Achieving Climate Neutrality by 2050 (information report) is a long-term policy planning document that must be implemented by horizontally integrating GHG and climate sustainability goals in all sectors of the economy. The main goal of the strategy is for Latvia to achieve climate neutrality by 2050. The document sets out two strategic goals: (1) reduction of GHG emissions in all sectors of the national economy; (2) increasing the capture of CO_2. To achieve climate neutrality, it is planned to use two basic approaches: technological solutions and lifestyle changes. The strategy recognises that local governments meeting the obligations set out in the existing laws and regulations play a decisive role in the country's progress towards climate neutrality.[65]

[63] Source: https://ec.europa.eu/clima/policies/adaptation/what_en
[64] Source: https://www.eumayors.eu/
[65] Source: https://www.zrea.lv/upload/attach/2%20Latvijas%20klimata%20neitralitates%20strategija%202050.pdf

Latvia's preliminary goal and the other requirements set by directives[66] are **included in the Energy Efficiency Law**, which took effect on 29 March 2016. The mandatory energy end-use savings target for 2030 is at 20,472 GWh (1.76 Mtoe, 73.7 PJ) in 2020.[67]

Section 5 of the Energy Efficiency Law establishes the following rights and obligations for the government and municipal sectors:

(1) Government bodies and municipalities are entitled to:
    1) develop and adopt an energy efficiency plan as a separate document or as part of the municipal land development programme, which includes certain energy efficiency goals and measures;
    2) implement an energy management system (EMS) separately or as part of the implementation of their energy efficiency plan;
    3) use energy efficiency services and conclude energy efficiency service contracts to implement energy efficiency improvement measures.
(2) The municipal governments of the national cities introduce a certified EMS.
(3) The local government of the municipalities with a land development level index of 0.5 or more and a population of 10,000 or more, and national direct governance institutions that own or possess buildings with a total heated area of 10,000 square metres or more must implement an EMS.

The provisions of the **Law on the Energy Performance of Buildings** derive from Directive 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings. The purpose of this law is to promote the efficient use of energy resources by improving the energy efficiency of buildings, and informing the public about the energy consumption of buildings. The law sets the minimum energy efficiency requirements for buildings that can be operated, designed, rebuilt, or renovated, and the requirements for the energy certification of buildings, heating systems, and air conditioning systems. Meanwhile, the conditions for local governments in terms of heating supply and energy poverty, are determined in the Energy Law.

On 23 January 2020, the **Latvian National Energy and Climate Plan 2021–2030** (NEKP2030) was approved. The long-term vision of the plan is to promote the development of a sustainable national economy in a sustainable, competitive, and safe way.

The long-term goal of the plan is to promote the development of a climate-neutral economy in a sustainable, competitive, cost-effective, safe, and market-based manner by improving energy security and public welfare.

Implementing the goal requires:

1) promoting the efficient use of resources, and their self-sufficiency and diversity;
2) ensuring a significant reduction in the consumption of resources, especially fossil and non-sustainable resources, and a simultaneous transition to sustainable, renewable, and innovative resource use, ensuring equal access to energy resources for all parts of society;
3) stimulating research and innovations that contribute to the development of the sustainable energy sector and to climate change mitigation.

According to NEKP2030, the mandatory national 2030 goal for Latvia is 20,472.02 GWh of cumulative savings in the end consumption of energy. The total estimated (desired) amount of funding for the

[66] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018

[67] Source: National Energy and Climate Plan for 2021–2030

implementation of the measures proposed for the action policies of the plan is EUR 7.36 billion, including:

- for improving the energy efficiency of buildings, EUR 1.73 billion;
- for improving energy efficiency and promoting the use of renewable energy technologies in heating, cooling, and manufacturing, EUR 1.66 billion.

In accordance with Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, as amended by Directive 2018/844 of 30 May 2018, and Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018, a **long-term strategy was developed for the renovation of buildings** in 2017. It was revised in 2020.[68] The purpose of the strategy is to mobilise investments in the renovation of the stock of public and private residential buildings, and commercial premises. The strategy stipulates that the renovation of multi-apartment buildings and increasing energy efficiency are some of the goals of the Latvian government's housing and energy policy. The strategy identifies cost-effective renovation approaches depending on the building type and the climatic zone, and the policy measures necessary to promote cost-effective, full renovation of buildings, including gradual and complete renovation.

Another important aspect to consider in energy and climate is **energy poverty**. Energy poverty affects around 11% of the EU population, i.e., 54 million Europeans. In 2018, 7.5% (8% in the EU) of all the Latvian population, or 9.8% of all Latvian households, were denied heating in their homes due to a lack of money.

NEKP2030 has a set goal to reduce energy poverty in Latvia below the average value in the EU by 2030, that is, to reach the indicator below 7.5% by 2030. At the EU level, measures to tackle energy poverty are set out in the Clean Energy for All Europeans package. Alleviation of energy poverty is included in the Latvian National Development Plan 2027 and in the long-term strategy for the renovation of buildings.

The currently relevant problem in Latvia, especially in Riga, is improving air quality and reducing pollution. The **Air Pollution Reduction Action Plan 2020–2030 was approved** on 16 April 2020. The plan was designed to reduce the negative effects of air pollution on the environment and human health, and to reduce costs and worktime lost due to health problems and doctor visits caused by air pollution.

In the transport sector, the draft **Transport Energy Law** was undergoing inter-ministerial approvals during the preparation of the plan.[69] The purpose of the law is to promote the circulation of transport energy that is safe for the health of humans and their environment, and to achieve the development of alternative fuel infrastructure and public awareness of available and usable forms of transport energy. The planned law will also affect municipal governments. According to the draft, Riga will be required to:

- determine such conditions for the use of vehicles in the municipality that promote the reduction of emissions caused by the use of vehicles;
- ensure that at least 50% of the transport energy used in the city's public transport is renewable in 2030;
- ensure that, starting from 1 January 2030, at least 50% of the vehicles purchased as part of municipal public procurement must be vehicles that use renewable energy.

The Transport Development Guidelines 2021–2027 are a medium-term policy planning document for the development of the transport sector, the goa of which is aimed at sustainably meeting the needs

[68] Available here: http://tap.mk. gov.lv/mk/tap/?pid=40487380
[69] Available here: https://www.em. gov.lv/lv/transporta-energijas-likums

of human mobility, while contributing to the economic growth of the country, including the development and accessibility of the business environment.

The actions of the guidelines include a series of measures important for the development of Riga and its metropolitan area. The guidelines state that *'Quick and efficient external and internal accessibility of the Riga metropolitan area will be ensured by moving towards creating a low-carbon, multi-mobility-supporting transport system with an emphasis on railway development, and affordable, accessible, and environmentally friendly public transport'*.

2.2.2 Adaptation to Climate Change

In the predominant long-term development planning document in the country, **Latvia Sustainable Development Strategy 2030** (LIAS2030), climate change is listed among the most significant challenges related to global processes affecting the national economy and ecosystems, ecosystem services, natural resources, and human capital. In terms of climate change risks, LIAS2030 emphasises the processes of coastal erosion and accumulation of sand on the Baltic Sea coast.

The Latvian National Development Plan 2021–2027 defines mitigating the impact of climate change as one of the tasks for action, implementing climate change adaptation measures and achieving improvements in equipment and infrastructure, in the governance of sectors of the economy, and in sustainable rainwater management, taking into account the latest scientific data and forecasts for achieving and strengthening climate resilience.[70]

On 17 July 2019, the **Latvian Plan for Climate Change Adaptation for 2030** was approved, setting 5 strategic goals:

1. The life, health, and well-being of people, regardless of their gender, age, and being part of other social groups, are protected from the adverse effects of climate change.
2. The economy can adapt to the negative effects of climate change and use the opportunities presented by climate change.
3. Infrastructure and building stock are climate-resistant and planned according to possible climate risks.
4. The nature, culture, and historical heritage of Latvia have been preserved and the negative impact of climate change on them has been minimised.
5. Information based on scientific arguments, including monitoring and forecasts, has been provided, contributing to the integration of aspects of adaptation to climate change into sectoral policies and land development planning documents, and to informing the public.

The plan defines potential climate adaptation measures for municipalities, including:

1) integrating the aspects of climate change, climate change mitigation and adaptation in the development and updating of land development planning and sectoral policy documents on all levels;
2) when developing municipal development programmes, ensuring detailed action and the inclusion of necessary climate change adaptation measures.

The Ministry of Environmental Protection and Regional Development has prepared Risk and Vulnerability Assessments and Adaptation Measures Identification Reports in six different areas:

- health and well-being;
- landscape planning and tourism;
- biodiversity and ecosystem services;

[70] Source: Latvia National Development Plan 2021–2027, https://www.pkc. gov.lv/sites/default/files/inline-files/20200204_NAP_2021_2027_gala_redakcija_projekts_.pdf

- agriculture and forestry;
- civil protection and emergency assistance;
- construction and infrastructure planning.[71]

2.3 Regional Policy

At the regional level, the predominant long-term development planning document is the **Development Strategy of the Riga Planning Region 2014–2030**[72], with the following vision:

'The prosperity of the Riga region, as a part of Europe, in the future world context is associated with values that are in demand on a global smart market, with energy-saving solutions, high-quality physical living space (cities, countryside, housing), and an integrated society (national goals, communities, cooperation). Social and economic well-being is expected as a result of activities based in culture, knowledge, tolerance, with a foundation of values, education, identity, creativity.'[73]

In the land development planning documents of the Riga Planning Region (RPR), the Riga metropolitan area is seen as a functionally closely connected space with economic and social movement, formed by Riga and nearby towns of various sizes (Jūrmala, Olaine, Jelgava, Baldone, Salaspils, Ogre, Tukums, and Sigulda) and the Riga suburban municipalities, regarding which there is pronounced commuter migration. 1.25 million people, or about 65% of Latvia's population, live in the Riga metropolitan area, and some 3/4 of Latvia's economic value is created here.

An **Action Plan for the Development of the Riga Metropolitan Area** has been developed based on the RPR strategy.[74] The Action Clan defines several priorities, including:

- Activities to improve the population structure of the Riga metropolitan area and the quality of the living environment in its populated zones, with the implementation of comprehensive and integrated development solutions:
  - Management and development solutions for degraded areas and unused buildings (including unfinished residential buildings, resort areas, industrial areas, etc.).
  - Supporting and strengthening of local resident communities.
  - Specialised infrastructure solutions.
- Improving mobility and the intensity of use of public transport:
  - Creation of a unified public transport network and system.
  - Creation of complex traffic hubs (mobility points).
  - Planning and integration of regional cycling paths and Riga/Riga suburb connections into existing cycling paths.
  - Development of transit corridors and connections to them; development of Riga suburban rail transport (railway, tram), and expansion of the network of bus routes.
  - The potential impact of the North Sea-Baltics transport corridor part of the Rail Baltica project on the municipalities of the area.
  - Development of the roads for accessing Riga International Airport.
- Actions to achieve coordinated and efficient management of the environment, natural resources and energy in the Riga metropolitan area:
  - Coordinated development of environmental infrastructure in the region.
  - Energy planning and adaptation to climate change.
  - Use of natural resources for recreation.
  - Development of circular economy.

[71] Available here: https://www.varam. gov.lv/lv/projekta-ietvaros-veikto-petijumu-nodevumi
[72] Available here: https://rpr. gov.lv/wp-content/uploads/2017/12/RPR-Ilgtspejigas-attistibas-strategija_2014-2030.pdf
[73] Available here: https://rpr. gov.lv/wp-content/uploads/2017/12/RPR-Ilgtspejigas-attistibas-strategija_2014-2030.pdf
[74]Available here: https://rpr. gov.lv/wp-content/uploads/2020/06/Rigas-metropoles-areala-ricibas-plans_Web-1.pdf

- Handling of environmental management affairs.

Mobility and organisation of transport are recognised as one of the main problems at the RPR level. The following Transport objectives have been determined for the Riga planning region **in terms of the spatial vision of mobility in the Riga metropolitan area**[75]:

- Strengthening of unified internal and external infrastructure networks.
- Creation of an integrated and functionally differentiated public transport network.
- Strengthening of international North-South, East-West connections and hubs.
- Creation of an integrated network of inland and coastal water lines.
- Development of intra-city transport and its connections.

The vision and the plan are complemented by the **Everyday Mobility Development Plan 2021–2027**[76], the aim of which is improving the capacity of sustainable mobility in the context of commuter migration between Riga, its suburbs, and the municipalities involved, given that the area affected includes the majority of the inner Riga metropolitan area.

[75] Available here: https://rpr. gov.lv/wp-content/uploads/2019/03/20190201_Mob_viz_Galazinojums.pdf
[76] Available here: https://sumba.eu/sites/default/files/2021-04/SUMBA_CMP_Latvian_FINAL.pdf

3 Link to Riga Development Planning Documents

The 2022–2030 Sustainable Energy and Climate Action Plan of Riga is the main policy planning document for the energy and climate sector. It has been drafted in accordance with other development planning documents of Riga City Council (RCC). The association of documents with the ACTION PLAN is shown in Figure 3.1.

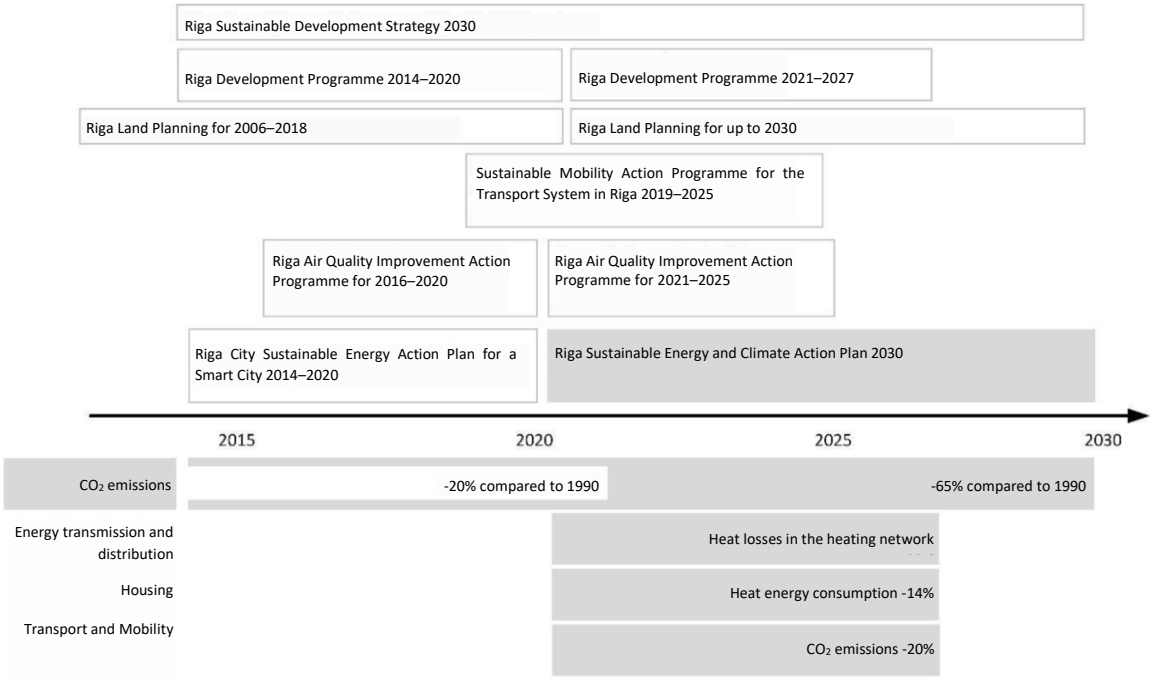


Figure 3.1. Linking the ACTION PLAN with RCC development planning documents

The following sections describe Riga's main development planning documents related to energy, air pollution, reduction of climate impact, and adaptation to climate change.

3.1 Riga Sustainable Development Strategy 2030

Riga Sustainable Development Strategy 2030[77] is a long-term land development planning document of the Riga City Municipality. The plan offers a vision of Riga, which envisages that in 2030, Riga will be:

'an internationally recognised metropolis for Northern Europe. Riga's rightful membership among major Northern European cities will be supported by the quality of life in the city, innovative economy, smart, resource-saving, and modern governance, with active participation of local residents.'

The Riga City Municipality has set four long-term development goals, including '**Comfortable and safe urban environment that is pleasant for local residents**'. The strategy places a special focus on the transport sector. Although the movement of pedestrians and cyclists is currently subordinated to car traffic, in the long term, the transport infrastructure must be built according to the following generally accepted hierarchy, especially in the city core and neighbourhood centres:

pedestrian –> cyclist –> public transport –> private car transport.

The goal is to develop Riga as a sustainable metropolis by restricting the entry of private vehicles into its centre, encouraging local residents to use public transport and bicycle transport. Apartment buildings also play an important role in Riga. The renewal of housing stock is one of the main factors for the development of this sector.

[77] Available at: https://www.rdpad.lv/wp-content/uploads/2014/11/STRATEGIJA_WEB.pdf

3.2 Riga Development Programme 2022–2027

The Riga Development Programme 2022–2027 is a medium-term development planning document for the city's municipal government. The development programme is a municipal tool for achieving the long-term development goals set in the Riga Sustainable Development Strategy 2030. The programme defines 9 priorities or fields of development, of which three are closely linked to energy and climate:

- Good environment quality and sustainable urban ecosystem for mitigating climate change to 'Create such quality of the environment that has a beneficial effect on the health and well-being of the local residents, and their desire to be physically, socially and economically active. Create and maintain a pleasant, diverse, and climate change-adapted environment, in which nature-based solutions contribute to the quality of the environment, as well as to the adaptation to and mitigation of climate change.'

As part of this development field, it is planned to implement comprehensive energy management, energy efficiency, and emissions reduction measures, increasing the share of renewable energy in the overall energy balance, supporting energy, climate, and environmental innovations, improving the energy literacy of the city's residents, and encouraging changes in their lifestyle.

- Availability of diverse and high-quality housing with the aim of: 'No less than 1,400 multi-apartment buildings undergoing comprehensive and high-quality renovation as part of the housing programme by 2027.'

In order to achieve this goal, the development programme envisages creating a competence centre in the municipality for housing, to develop and pursue a well-designed housing policy, to create an action programme, to set clear goals, and to determine the institutions in charge. The criteria of affordable and environmentally friendly housing will be taken into account in developing and implementing the housing policy, including energy efficiency, sustainable materials used in construction, principles of circular economy, and air quality. In renovating the outdated housing stock, it is planned to ensure adaptation to climate change, improve environmental health indicators, introduce extensive accessibility solutions, and significantly improve the quality of the living environment.

- Comfortable and environmentally friendly travel in the city: 'Promote climate-friendly and human-friendly mobility by making diverse modes of transportation available and creating the necessary infrastructure.'

The development programme aims to set the conditions for the part of society that does not need to travel by private car on a daily basis to be able to use comfortable, safe, and environmentally friendly vehicles, while improving the quality of air in the city, reducing the negative impact on the climate, and the load on the street infrastructure. In addition to infrastructure improvements, one must implement mobility management measures, promoting changes in travel habits.

3.3 Riga City Sustainable Energy Action Plans

The Riga City Sustainable Energy Action Plan for a Smart City 2014–2020 was a continuation of the first Riga City Sustainable Energy Action Plan (2010–2020), which aimed to: 'Bring the city closer to the status of a smart city by integrating innovative information and communication technologies in energy and transport.'

The ACTION PLAN included an initial review of CO_2 emissions for the 1990–2012 period, and scenarios for up to 2020. The plan's official CO_2 emission reduction goal was to reduce CO_2 emissions by 20% by 2020. The results of the plan's forecasts predicted that by 2020, the potential reduction in CO_2 emissions could be 55–60%.

According to the final monitoring report of the ACTION PLAN, the total amount of CO_2 emissions in Riga decreased by about 60% in 2020, as compared to 1990, or 27% compared to 2010. The fastest reduction in emissions (44%) compared to 2010 was achieved in the energy production sector.

3.4 Riga Mobility Vision of 2050 and Sustainable Mobility Action Programme for the Transport System in Riga 2019–2025

The Mobility Vision of Riga for 2050 is described in the **spatial mobility vision for the Riga metropolitan area**. According to the vision, development is based on improving public transport infrastructure and services, including creating mobility points and coordinating transport schedules. It is also planned to build new infrastructure networks that would connect the different neighbourhoods of Riga, and Riga to its suburbs. The vision also envisages reducing the use of private transport by developing bicycle and pedestrian infrastructure.

In order to implement Riga's mobility vision, a sustainable mobility action programme for the transport system in Riga has been developed. The action programme has been prepared for three periods: short term (2019–2025), medium term (2026–2030), and long term (2031–2050). The action programme details the principles and fields defined in the Riga Mobility Vision, setting steps, activities, and deadlines for achieving the goal set in the vision.

Sustainable Mobility Action Programme for the Transport System in Riga 2019–2025 has been developed in order to 'enable the mobility of people and the business environment, the accessibility of areas and the availability of facilities for a better quality of living environment.'

Some of the measures envisaged in the action programme are:

- For pedestrian infrastructure:
  - Increasing the convenience and priority of pedestrians in the city centre included as a task in all street reconstruction design.
  - Transit traffic permanently or seasonally restricted in certain streets where pedestrian traffic will be prioritised.

- For the improvement of bicycle infrastructure:
  - Bicycle infrastructure integrated as part of the rebuilding of streets, with the construction of bicycle paths and/or bicycle lanes and the installation of bicycle racks.
  - Installation of bicycle racks at education institutions, at public and municipal facilities, near street intersections.
  - Development of bicycle parking at railway stations, bus stations, car parks, and mobility points.

- For the development and organisation of public transport:
  - Coordinate and optimise routes and schedules, enabling connection with regional public transport, and with the planned mobility points that also include a system performing the parking building function.
  - Connect city public transport to railway and regional bus routes and schedules.
  - Create a management platform for the mobility services of Riga residents.
  - Public transport infrastructure development projects for connecting multi-apartment building neighbourhoods.

- For private transport:
  - Reduce its use, especially in the city centre and residential areas.
  - Development of the traffic control system (traffic control centre and traffic light system).

- Monitoring, control, and regulation of cab services.
- Promotion of carpooling.

In relation to electric transport infrastructure, the programme states that the Riga City Municipality has a coordinating function in this matter, and the installation of electric charging stations for cars or bicycles is basically not financed using municipal funds. The installation of charging stations is carried out by the developers of public buildings, and takes place in the car parks included in their projects. Existing construction standards do not set special requirements for electric charging stations.

3.5 Riga Air Quality Improvement Action Programme for 2021–2025

In the period from 2015 to 2019, the air quality standards and upper pollution assessment thresholds of several pollutants were found to be exceeded in Riga, as a result of which the Riga City Air Quality Improvement Action Programme 2021–2025 was prepared. It includes measures to reduce emissions of five pollutants: nitrogen dioxide (N2O), PM 10 and PM 2.5 particulate matter, benzene and benzo(a)pyrene.

The programme evaluates in detail the measures that can potentially affect air quality, dividing them into the following groups (examples of the measures planned are shown in the parentheses for the groups directly related to the ACTION PLAN):

- transport and traffic infrastructure (for example, measures to calm down and reduce road traffic in the city centre and residential areas);
- public transport (coordinate and optimise routes and schedules, ensuring connections with the planned parking building system, connection of city public transport with railway and regional bus routes and schedules);
- heating supply systems (create a register of heating equipment, and conduct measures aimed at connecting households to the central heating system, replacing existing inefficient equipment);
- stationary sources of pollution;
- shipping traffic in the port;
- air quality management, and education and awareness-boosting activities for the public.

4 Strategy 2022–2030

4.1 Vision

The European Union and Latvia set increasingly strict and binding energy and climate policy goals for all the parties involved. The goals of the existing policy do not limit the development of municipalities, but each municipal government must plan and implement development to be as sustainable as possible, with less impact on the climate. Therefore, the Riga City Municipality must also ensure that municipal institutions, local residents, and infrastructure can adapt to and are resilient towards the risks caused by climate change.

On 14 October 2020, Mayor of Riga, Mārtiņš Staķis, joined the EUROCITIES initiative on behalf of Riga for the second time and, together with other mayors of large European cities, urged the European Parliament to commit to higher climate goals by making significant investments in the public transport system, green infrastructure, renovation of buildings, and measures for improving the quality of air.

This initiative is in line with the commitment of the Riga City Municipality to achieve significant improvements in the field of environmental quality, waste management, sustainability of nature, and climate. Riga City Municipality is working hard to make Riga the first climate-neutral city in the Baltics.

The ACTION PLAN is the main strategic planning document of the Riga City Municipality for the energy and climate adaptation sector, which is revised every 2 to 3 years. The ACTION PLAN has been developed in accordance with the other strategic planning documents of Riga. The goals set in the plan are closely aligned with the long-term vision and strategic development goals of the Riga Sustainable Development Strategy 2030. The goals are set to contribute to boosting the city's competitiveness, improving the quality of life, and increasing the well-being of the city's residents.

The vision of Riga as a climate-neutral city. By 2030, the Riga City Municipality undertakes to implement the principles of climate neutrality in the municipal government's infrastructure first, but also to work on the application of these principles throughout the city. The most important areas for the city's development on the way to climate neutrality are shown in Figure 4.1.

In order to achieve the vision of a climate-neutral and climate-resilient Riga, the ACTION PLAN has identified 4 main target groups for 2030:

1. Energy goals.
2. CO_2 emission reduction targets.
3. Climate change adaptation goals.
4. Air pollution reduction goals.

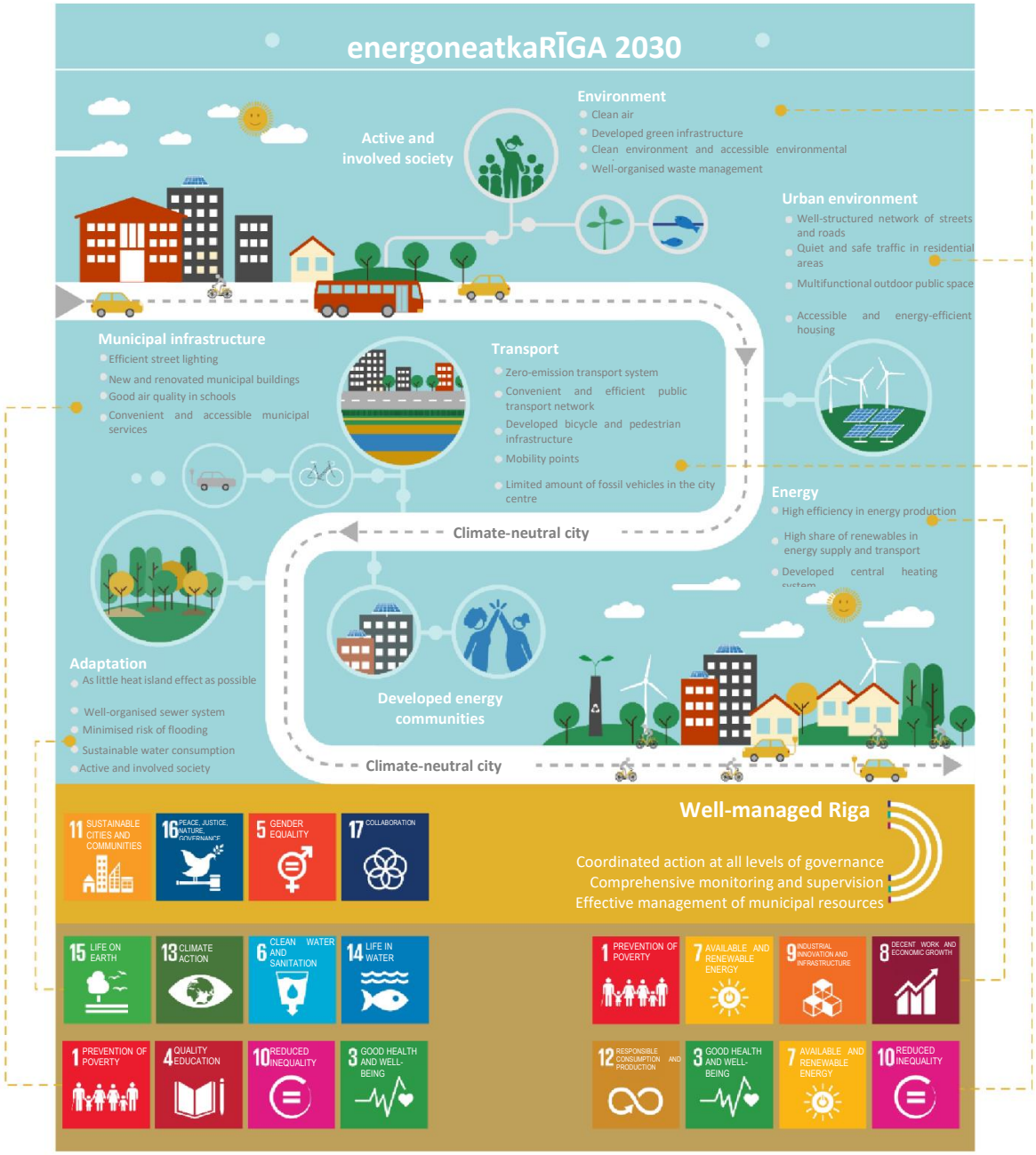


Figure 4.1. *Vision of a climate-neutral Riga*

4.2 Commitments and Goals

4.2.1 2030 Goals for the Energy Sector

Energy consumption in Riga fell by 3% from 2015, reaching 10,392 GWh in 2020 (see Figure 4.2). The 2020 decrease can be explained by the impact of COVID-19, and by the use of a more detailed source of input data, and the assumptions used in the calculations compared to 2015–2019. In 2020, heat energy consumption from centralised energy production was 27%, transport took up 28%, fuel consumption for decentralised heat supply was 26%, and electricity consumption was 19%.

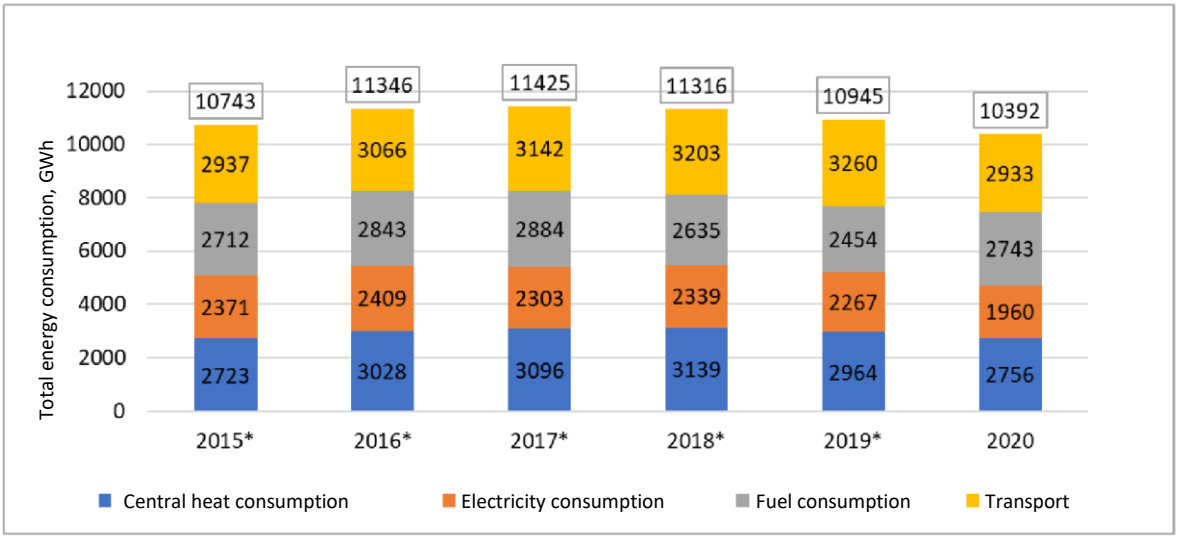


Figure 4.2. Changes in energy consumption in Riga, 2015–2020[78]

Figure 4.3 shows a more detailed breakdown of energy consumption by key sectors in 2020. The largest share in Riga's total energy consumption in 2020 was taken up by the housing sector (30%), while the service and industry sector occupied 29%, and the private transport sector, 26%. The municipal sector (water supply, street lighting, municipal buildings, and municipal fleet) accounted for 3%, public transport, 2%, and other consumers, 10%.

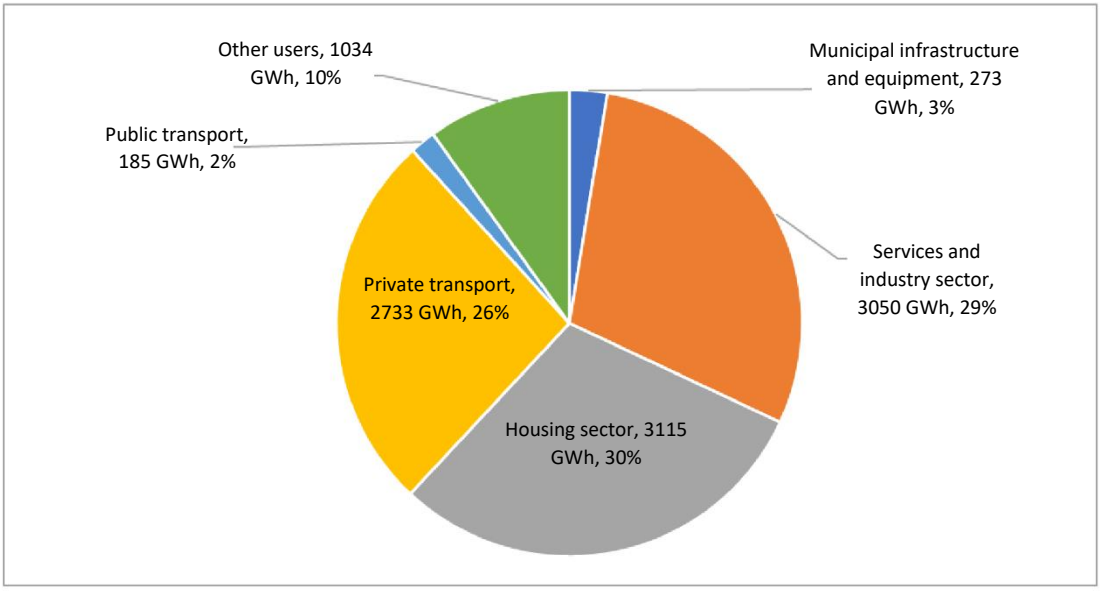


Figure 4.3. Breakdown of energy consumption in 2020

Reducing energy consumption, improving energy efficiency, and more widespread use of renewables are the main areas, in which Riga can sustainably move towards climate neutrality. Table 4.1 lists energy goals aimed at reducing energy consumption in municipal infrastructure and multi-apartment buildings, and increasing renewable energy sources in municipal infrastructure, heat supply, service, and transport sectors.

[78] *The 2015–2019 energy consumption data were taken from the 'Riga City Sustainable Energy Action Plan for a Smart City 2014–2020 final progress report for the calculation of CO_2 emissions in 2015–2020'.

Table 4.1. 2030 energy goals for Riga

Goal	Target value	Target year	Baseline value	Baseline year
Municipal infrastructure and facilities				
Implement, maintain, and certify an EMS in the municipal government according to the ISO 50001:2018 standard	Certificate	2022	No	2020
Reduce energy consumption in municipal buildings	-20%	2030	199,243 MWh	2019
Achieve climate neutrality in municipal buildings, in terms of heat energy consumed	100% renewables	2030	31%	2019
Increase the share of renewables-based electricity in the municipal infrastructure	100%	2030	54.36%[79]	2019
Reduce average specific electricity consumption, MWh/light	0.300	2030	0.597	2019
Reduce average specific electricity consumption, MWh/traffic light	2.300	2024	2.314	2019
Increase the share of renewable electricity in the use of street lights, traffic lights, and clocks	100% renewables	2030	54.36%[80]	2019
Increase the share of renewables in the energy used in the vehicles of municipal employees	100%	2030	1%	2019
Apartment buildings				
Renovate the stock of multi-apartment buildings in Riga	2,000 buildings	2030	159 buildings	2019
Reduce heat energy consumption in multi-apartment buildings connected to the central heating system of Riga	-20%	2030	2,123 thousand MWh	2019
Central heating supply				
Increase the share of renewables in the central heating system of Riga	≥66%	2030	31%[81]	2019
Reduce relative heat energy loss in heating lines	11.6%	2030	11.7%	2019
Decentralised heating supply/gas supply				
Reduce the share of decentralised heating supply	40%	2030	44%	2019
Increase the share of renewables in the decentralised heating supply of Riga	60%	2030	42%	2019
Reduce natural gas consumption in all sectors in Riga	-30%	2030	362,429 thousand m^3	2019
Electric power supply				
Increase the share of renewables-based electricity in Riga	>15%	2030	4%	2019
Transport				
Increase the share of renewables in the public transport sector	50%	2030	16%	2019
Reduce the share of private car users	37.4%	2030	42.4%	2019

[79] At the national level (source: https://www.em.gov.lv/lv/aer-energija); the proportion of renewable electricity produced in Riga is 4%
[80] At the national level (source: https://www.em.gov.lv/lv/aer-energija), the proportion of renewable electricity produced in Riga is 4%
[81] AS 'Rīgas siltums' 33% (331.98 GWh of 1,006 GWh), other sources 31% (672.08 GWh of 2,168 GWh)

4.2.2 CO_2 Emission Reduction Targets for 2030

Given that energy consumption has decreased by 6% since 2015, the amount of CO_2 emissions has fallen accordingly, reaching 1,628 $ktCO_2$ in 2020 (see Figure 4.4). In 2020, 44% of emissions were generated by the transport sector, 25% by the central heating system, 18% by fuel consumption in the decentralised heat supply system, and 13%, by electricity consumption.

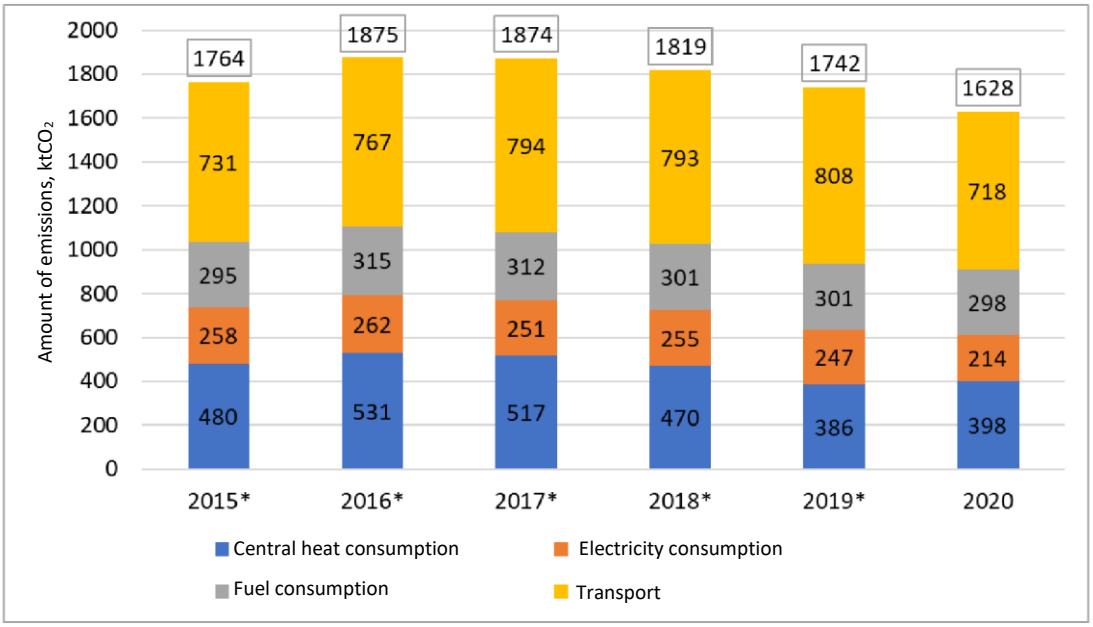


Figure 4.4. Changes in emissions produced in Riga, 2015–2020[82]

Figure 4.5 shows a more detailed breakdown of CO_2 emissions generated in 2020 by main groups of consumers. In 2020, 42% of the emissions were caused by private transport fuel consumption, 26% by the electricity and heating energy consumption in the housing sector, and 20% by the electricity and heating energy consumption in the manufacturing and service sector. The municipal sector (electricity and heating energy consumption of municipal institutions, electricity consumption by water management and lighting, and fuel consumption by municipal transport) accounted for 2%, and other sources, for 8%.

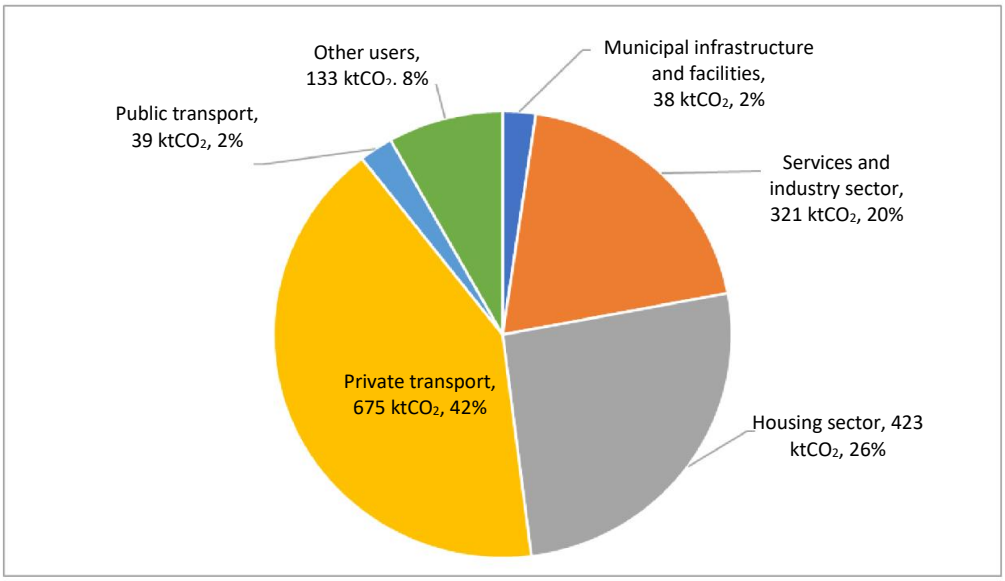


Figure 4.5. Breakdown of generated emissions in 2020

[82] *The 2015–2019 CO_2 emissions data were taken from the 'Riga City Sustainable Energy Action Plan for a Smart City 2014–2020 final progress report for the calculation of CO_2 emissions in 2015–2020'.

Compared to 1990, which Riga chose as the initial baseline year when it joined the Covenant of Mayors initiative in 2008, CO_2 emissions fell 60% by 2020. Table 4.2 shows the CO_2 emission reduction targets for 2030.

Table 4.2. 2030 CO_2 reduction targets for Riga

Goal	Target value	Target year	Baseline value	Baseline year
Reduce Riga's total CO_2 emissions	-30% -70%	2030	1,742 $ktCO_2$ 4,291 $ktCO_2$	2019 1990
Reduce CO_2 emissions in energy production	-30% -51%	2030	914 $ktCO_2$ 1,400 $ktCO_2$	2019 1990
Reduce CO_2 emissions in the transport sector	-30% +21.5%	2030	729 $ktCO_2$ 600 $ktCO_2$	2019 1990
Reduce emissions in the Riga City Council infrastructure	**-100%**	**2030**	**37.9 $ktCO_2$**	2019

The 2030 CO_2 reduction targets for Riga are indicated in comparison with 1990 and 2019. The biggest goals are set in the infrastructure of Riga City Council, and by 2030, it is expected to achieve climate neutrality not only by reducing emissions, but also partially compensating them.

4.2.3 Climate Change Adaptation Goals for 2025 and 2050

The purpose of the ACTION PLAN for adaptation to climate change is to make Riga's infrastructure resistant to the risks caused by climate change and to improve the well-being of the population in the future reality of climate.

4.2.4 Air Pollution Reduction Goals

Air pollution reduction goals in the ACTION PLAN are in accordance with those defined in the Riga City Air Quality Improvement Action Programme 2021–2025. All the goals and measures included in the ACTION PLAN will directly and indirectly reduce air pollution in Riga.

4.3 Coordinating and Organising Entities and Financial Aspects

4.3.1 Implementation, and Monitoring Process

The range of topics covered in the ACTION PLAN is all-encompassing, and the main fields are divided into 7 subject groups (see Figure 4.6). Some of these groups also have one or more additional topics, for example, the environmental communication group includes measures related to decentralised heat energy consumers, electricity consumption throughout the city, public buildings, and environmental communication in general. The climate neutrality policy group is a comprehensive subject group that includes measures aimed at achieving climate neutrality and removing key barriers at national and local levels. For example, the climate neutrality policy group includes issues related to the charging of the energy/CO_2 tax, the future of natural gas cogeneration plants, renovation of apartment buildings, and other matters.

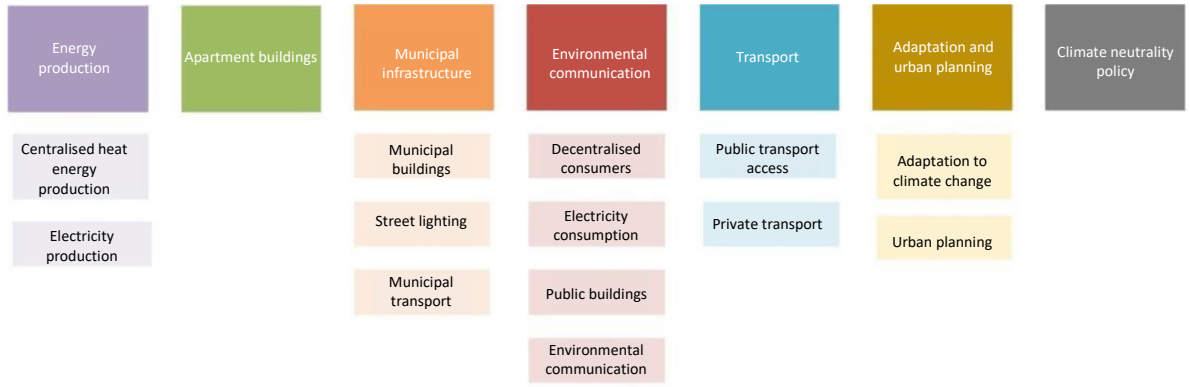


Figure 4.6. Main fields included in the ACTION PLAN

Figure 4.7 shows a potential ACTION PLAN coordination diagram based on the 7 main subject groups discussed above. The main political responsibility for the implementation of the plan rests with the chairman of the RCC, who has also set the goal of Riga's climate neutrality. In the context of the implementation of the plan, the climate neutrality work group operates as a monitoring entity, which makes sure that all subgroups carry out the planned activities, coordinates any other future opportunities for cooperation, and organises additional discussions on the measures, the implementation of which has not been agreed on in any of the subgroups.

In order to ensure the effective and transparent implementation of the measures included in the plan, one must create 7 work subgroups, each of which is responsible for one of the subject groups. Each subgroup will consist of several specialists who will be directly in charge of the implementation of the measures (for example, representatives of REA, RCC Urban Development Department, etc.), while the groups will be led by an executive director, a deputy executive director, the deputy council chairman, and/or head of REA. The climate neutrality policy subgroup will be headed by the council chairman or the head of the climate neutrality work group.

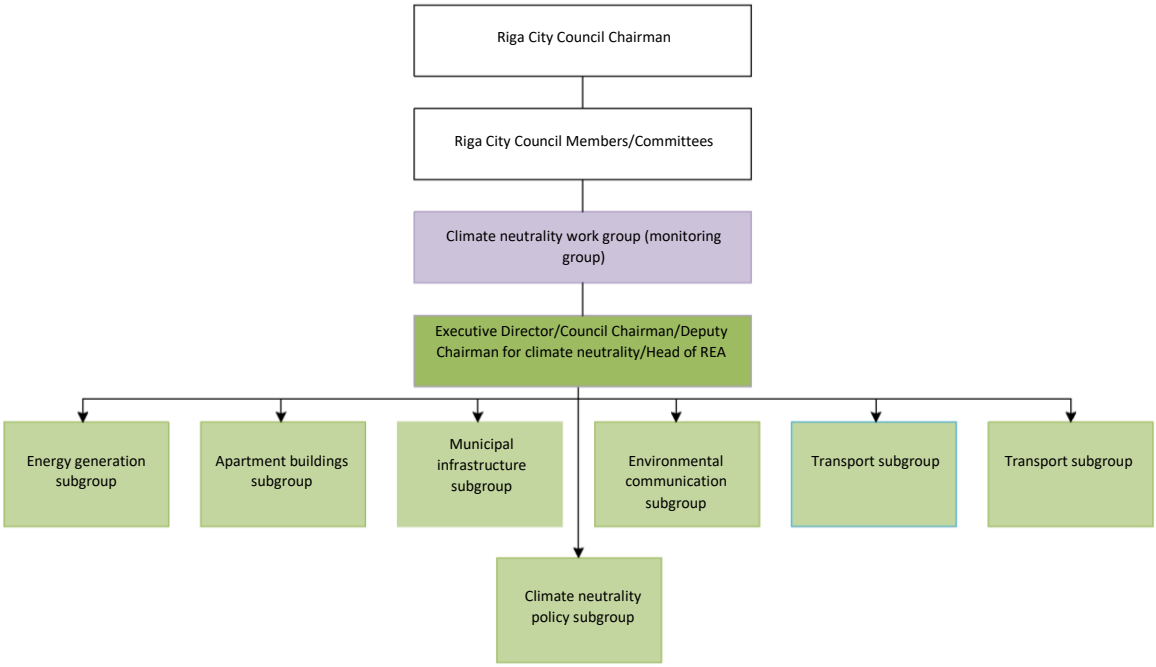


Figure 4.7. ACTION PLAN coordination diagram for the implementation and monitoring of measures

During the implementation of the measures, it is important to ensure synergy and sharing of information among all subgroups, especially interactions with the climate neutrality policy subgroup, which will be responsible for removing any regulatory obstacles in order to achieve the climate neutrality goal set for Riga. It is equally important to ensure that each subgroup is in synergy with the environmental communication subgroup (see Figure 4.8), as targeted communication is of critical

importance in achieving broader public involvement in the implementation of the measures planned in the ACTION PLAN in all sectors.

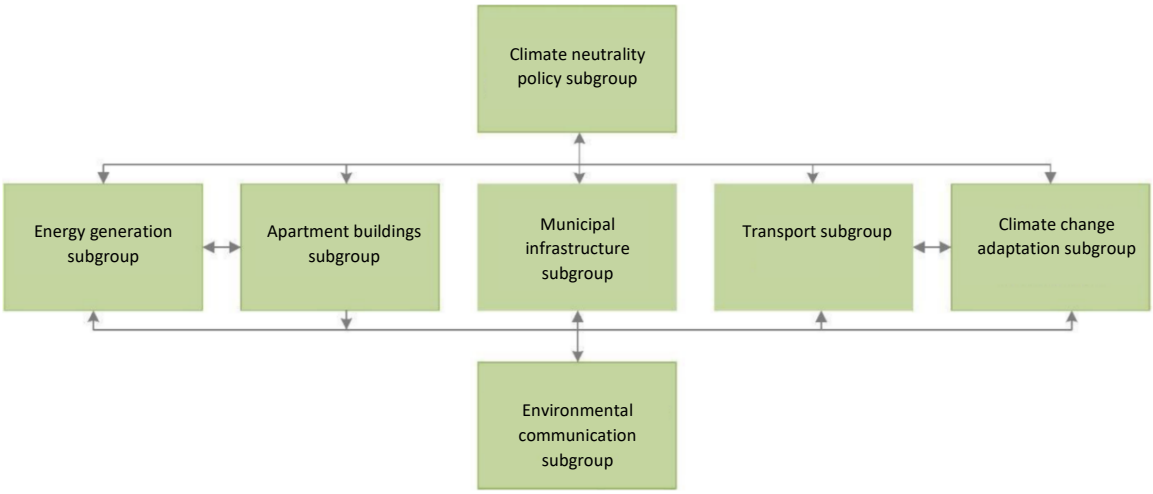


Figure 4.8. Cooperation and synergy among subgroups

The members of the subgroups must be selected taking into account the measures included in the plan and approved in each of the groups. It is important to take into account that a horizontal group of measures within the ACTION PLAN is urban planning, the basic conditions of which (see more in Chapter 6) must be taken into account in all other subgroups. It is equally important to ensure political support for the work of the subgroups, so that the implementation of measures does not stop due to a lack of funding.

The key overall tasks of each subgroup are:

- work on the relevant topic, towards climate neutrality;
- carry out the measures included in the ACTION PLAN for the relevant topic;
- find the necessary resources, including funding, for the implementation of the measures;
- if necessary, delegate the execution of the measures to other municipal institutions;
- monitor the implementation of the measures, and report on it to the climate neutrality work group;
- provide the policy subgroup with information about the necessary changes in laws and regulations in order for Riga to achieve climate neutrality in the sector/subject in question;
- recommend the next steps for revising the ACTION PLAN.

For the coordination and implementation of the ACTION PLAN, it is recommended to use an existing or create a new platform for coordinating internal activities and communication, and external communication with the public, in accordance with other activities defined in the environmental communication section.

4.3.2 Involvement of Stakeholders and Local Residents

The involvement of stakeholders mainly takes place through working groups, and Riga Energy Agency will be responsible for this. Also in the future, broader involvement of the stakeholders will take place by convening the climate neutrality work group. The work group meets at least once a month. The groups involved are shown in Table 4.3.

Table 4.3. Organisations involved in the drafting, implementation, and monitoring of the plan

Stakeholder group	Stakeholders involved	Level of involvement
Representatives of the municipal government unit and the working groups involved	7 subgroups; REA; members of the climate neutrality work group; Central Administration; RCC Urban Development Department; RCC Housing and Environment Department; RCC Property Department; RCC Traffic Department	High
Representatives of municipal companies	AS 'Rīgas siltums'; SIA 'Rīgas namu pārvaldnieks'; SIA 'Getliņi EKO'; SIA 'Rīgas pilsētbūvnieks'; SIA 'Rīgas nami'; SIA 'Rīgas satiksme'; SIA 'Rīgas ūdens'; SIA 'Rīgas meži'	High
National policymakers and policy implementers	Ministry of Economics; Ministry of Environmental Protection and Regional Development; Ministry of Finance; Ministry of Transport; State Construction Control Bureau	High
External stakeholders at the local level	AS 'Latvenergo', heating system operators, AS 'Gaso', AS 'Pasažieru vilciens', Social Service, other municipal institutions, etc.	Medium
Stakeholders at other levels of governance	LVGMC; HSE; EMS; SFRS Riga Regional Administration; RTU; UL; general public; NGOs; Riga planning region, industry associations (e.g., Latvian Heat, Gas, and Water Engineer Association), and industry NGO sector	Low

4.3.3 The Financial Resources Necessary for the Implementation of the ACTION PLAN

The ACTION PLAN includes 98 different measures, the partial implementation of which would also take place outside this plan, such as replacing equipment in boiler houses, providing more environmentally friendly public transport and a number of other actions (business-as-usual scenario). However, it should be understood that the implementation of the measure would in any case require financial resources. Thus, the investments required for the implementation of the measures included in the ACTION PLAN should be evaluated not only as investments in better energy efficiency and/or more use of renewables, but also as investments that essentially cover the basic needs of the municipality. For example, the renovation of 2000 multi-apartment buildings in Riga is, first of all, vital to restore the outdated and largely insufficiently managed housing stock, ensuring its safety, its compliance with regulatory requirements and the well-being of its residents. The need for energy efficiency is secondary to that.

Table 4.4 shows the total expected investments for the implementation of the measures of the ACTION PLAN. The investments are divided into two groups: investments for climate mitigation and climate change adaptation measures. They are also divided by the source of funding. The expected funding (of at least EUR 2.74 billion) may change significantly due to the technical solutions selected and other circumstances. The planned measures are described in more detail in Sections 6–13, and in Annex 4, with a list of all measures found in Annex 3 of the ACTION PLAN.

Table 4.4. Planned expected funding and funding sources for the implementation of the measures by 2030

Source of funding	Funding required for the implementation of the ACTION PLAN[83] (million €)	
	Mitigation measures	Adaptation measures
Municipal resources	261.7	3.8
EU funding, state co-financing, and other financial instruments	1,348.2	8.5
Private funding	829.3	-
Total	**2,439.2**	**12.3**

4.3.4 Financial Instruments for the Implementation of the ACTION PLAN

The funding necessary for the implementation of the measures included in the ACTION PLAN can be obtained from various funding sources:

- municipal budget for short-term and medium-term measures;
- private funds for long-term projects related to building and infrastructure renovation projects;
- EU structural fund financing for the transition to renewables and other long-term energy efficiency measures, as well as sustainable transport solutions;
- state co-financing;
- as well as other financial instruments, such as the EUCF.[84]

The funding for energy and climate measures is outlined in the National Energy and Climate ACTION PLAN. The available sources of funding are also listed on the website of the Covenant of Mayors (see Table 4.5).[85]

Table 4.5. Available sources of funding[86]

European structural and investment funds	European funding programmes	Project development assistance	Financial institution instruments	Alternative financing mechanisms
Cohesion Fund (CF)	Connecting Europe Facility (CEF)	European Energy Efficiency Fund (EEF)	European Fund for Strategic Investments (EFSI)	Resident cooperatives
European Agricultural Fund for Rural Development (EAFRD)	*JPI Urban Europe*	European Local Energy Assistance (ELENA)	EIB: municipal programme loans	Collective financing
European Maritime and Fisheries Fund (EMFF)	LIFE programme	LIFE CET project development assistance	Natural Capital Financing Facility (NCFF)	Energy Performance Contracts (EPC)

[83] The funding specified in the plan is for the full implementation of all the measures specified within it (the most optimistic scenario). The implementation of the measures will depend on the funding sources available at the moment in question. Some measures may not be implemented if the necessary funding is not available.
[84] For more information, visit: https://www.eucityfacility.eu/home.html
[85] For more information, visit: https://www.pilsetumerupakts.eu/atbalsts/finans%C4%93jums.html
[86] For more information, visit: https://www.pilsetumerupakts.eu/atbalsts/finans%C4%93jums.html

European Regional Development Fund (ERDF)	European territorial cooperation	JASPERS		Municipal green bonds
European Social Fund (ESF)	Urban Innovative Actions (UIA)			Financing with repayment included in the bills
	URBACT			Revolving credit funds
				Discount loans and guarantees
				Instrument for auctioning emission quotas

5 Emission Calculation Methodology

CO_2 emissions are divided into two categories in the ACTION PLAN: (1) energy-related emissions resulting from the amount of energy consumption, and (2) non-energy-related emissions coming from the wastewater and waste management, and forestry sectors. This section describes the emission calculation methodology for energy-related emissions. The methodology for calculating non-energy-related emissions is shown in Annex 2.

The 'Riga City Sustainable Energy Action Plan for a Smart City 2014–2020 final progress report for the calculation of CO_2 emissions in 2015–2020' contains the methodology for calculating energy-related emissions in 2015–2020. As part of the ACTION PLAN, more detailed input data were requested from all information sources available, and emissions were recalculated for 2020. The methodology of the 2020 emission calculations is described below, and it will also be used for monitoring the ACTION PLAN in the future.

Measures have been identified taking into account the current situation and consumption in each sector and group of consumers, compared to benchmarks or examples of good practice. The measures were proposed at the meetings of the work group for the development of the ACTION PLAN.

The total emissions of non-energy related sectors that generate GHGs are shown in Annex 2, but no specific measures are identified in the ACTION PLAN. In order to identify specific measures in the future, it is planned to improve the calculation methodology, to determine Riga-level emission factors, and to introduce a data monitoring system. This will enable an in-depth analysis of the current situation and identify measures to reduce and capture emissions.

5.1.1 Calculation Methodology

Base emissions is a quantitative indicator that determines the amount of CO_2 emissions caused by energy consumption in Riga during the baseline year. The indicator makes it possible to identify the main sources of CO_2 emissions and the ways of reducing them. The methodology developed by the Covenant of Mayors based on the 'How to develop a Sustainable Energy Action Plan' guidelines has been used to determine GHG emissions.

The emission measurement unit is tonnes of CO_2 emissions and is calculated based on the collected energy consumption data. For heat energy, emissions are determined using data on the amount of fuel consumed for the production of heat energy.

The equation is used to calculate emissions from the amount of fuel consumed (in the heating supply and transport sectors):

$$CO_2 = B * Q_d^z * EF, tCO_2, \text{ where} \quad (5.1)$$

CO_2 is the amount of CO_2 emissions produced, tCO_2
B is the amount of fuel consumed, 1000 m^3 (or t)
Q_d^z is the lowest heat for combustion of the fuel, MWh/1000 m^3 (or MWh/t)
EF is the fuel/electricity emission factor, tCO_2/MWh.

The equation is used to calculate emissions for the part of heat energy from energy sources that produce both heat energy and electricity at the same time[87]:

$$CO_{2CHPth} = \frac{\frac{P_{CHPth}}{\eta_{th}}}{\frac{P_{CHPth}}{\eta_{th}} + \frac{P_{CHPel}}{\eta_{el}}} * CO_{2CHPkopā} \quad (5.2)$$

$CO_{2_{CHPth}}$ is the amount of CO_2 emissions produced for the heat energy share, tCO_2
P_{CHPth} is the amount of heat energy produced, MWh
P_{CHPel} is the amount of electricity produced, MWh
η_{th} is the efficiency factor for individual heat energy production (90% assumed)
η_{el} is the efficiency factor for individual electricity production (46% assumed)
$CO_{2CHPkopā}$ is the total CO_2 produced in the cogeneration plant, tCO_2

Emissions from electricity consumed are calculated according to the following equation:

$$CO_2 = E_{pat} * EF, tCO_2, \text{ where} \quad (5.3)$$

E_{pat} is the amount of electricity consumed, MWh.

Information about the data used and emission factors for each sector is shown below.

5.1.2 Input Data for Emission Calculations

CO_2 emissions were calculated for three sectors in Riga:

1. for heating supply;
2. for electricity supply;
3. for the transport sector.

Heating Supply

CO_2 emissions of the heat supply sector have been calculated using equations (5.1) and (5.2). Data on consumers connected to the central heating system were obtained from AS 'Rīgas siltums'. Data on energy sources, from which heat energy is purchased for the needs of the central heating system of Riga, were obtained based on the information provided by AS 'Rīgas siltums'. Although AS 'Latvenergo' TEC-2 and SIA 'Energia Verde' are located outside the administrative territory of Riga, these cogeneration plants produce heat and electricity at the same time, and the heat energy is supplied to consumers in Riga. Therefore, the ACTION PLAN includes data on the fuel consumption of these plants, and on the amounts of heat energy and electricity produced. Data on these energy sources were collected from the GHG permit database of the State Environmental Service (VVD).[88]

[87] Source: https://www.covenantofmayors.eu/Covenant-technical-materials.html
[88] Source: https://registri.vvd.gov.lv/izsniegtas-atlaujas-un-licences/seg-atlaujas/

Data on consumers not connected to the central heating system are not collected in any database, so their number was calculated based on available information. Decentralised heat energy consumption covers two main sectors: (1) the manufacturing and service sector, and (2) the housing sector.

Energy consumption in the manufacturing and service sectors was calculated based on data from public reports of the Latvian Environment, Geology, and Meteorology Centre (LEGMC) 'Summary on air: fuel'.[89] The fuel consumption data for 2020 were obtained from these reports, for companies in Riga with A, B and C polluting activity permits (>0.2 MW) and which use fuel for the production of heat energy and electricity, and for production processes. In order to avoid double counting of fuel when calculating CO_2 emissions for the manufacturing and service sector, the amount of fuel that is consumed for energy sources that transfer heat to the central heating system of Riga, and the fuel that is used in companies participating in the EU in the emissions quota trading system were subtracted from the total fuel consumption. Information about the companies participating in the EU emissions quota trading system was obtained from the GHG permit database of the State Environmental Service.[90]

Currently, there are no specific data or information available about heat energy consumption and fuel breakdown in the parts of the housing sector not connected to the central heating system of Riga. To determine this amount for 2020, the following data and assumptions about the Riga housing sector were used:

- total floor area is 20,105 thousand m^2;[91]
- connected to the central heating system: 14,095 thousand m^2;[92]
- not connected to the central heating system: 6,010 thousand m^2 (30% of the total floor area);
- specific heat energy consumption (heating, hot water) in detached houses: 80.5 kWh/m^2 per year[93];
- share of fossil fuels: 61%.[94]

CO_2 emissions from natural gas consumption for the parts of the public sector not connected to the central heating system of Riga were also calculated. The calculations were made based on the information about the consumption of natural gas by households and other consumers in 2020, provided by AS Gaso. The consumption of natural gas according to the LEGMC 'Summary on air: fuel' public report was subtracted from the total consumption of natural gas by other consumers.[95]

Electric Power Supply

Annual data on electricity consumed in housing, services, agriculture, and industry sectors, and on street lighting and water supply, were obtained from AS 'Sadales tīkls'. Electricity consumption data for Riga's public lighting and traffic lights were received from the 'Rīgas gaisma' agency. Data were received from SIA 'Rīgas ūdens' on the consumption of electricity by sewer pumping stations, wastewater treatment stations, and water treatment stations under their management. Emissions from electricity consumed are calculated using equation (5.3). The emission factor values are shown in Table 5.1.

[89] Available here: http://parissrv.lvgmc.lv/#viewType=airSummary2&incrementCounter=4
[90] Source: https://registri.vvd.gov.lv/izsniegtas-atlaujas-un-licences/seg-atlaujas/
[91] Source: CSB, https://data.stat. gov.lv/pxweb/lv/OSP_PUB/START__NOZ__BU__BUF/BUF010
[92] Information provided by REA
[93] Based on the calculations of the average consumption of natural gas in 2020 (AS Gaso), and the breakdown of types of fuel used in households.
[94] Source: Development of a methodology for the assessment of air emissions from heating equipment used in households in cities with air quality problems, VARAM,
https://lvafa.vraa. gov.lv/faili/materiali/petijumi/2014/VARAM_202_2013/3_etapa_atskaite_F_ELLE.pdf
[95]Source: LEGMC

Transport Sector

The transport sector includes three subsectors:

- private transport (cars, light and heavy cargo vehicles, motorcycles and tricycles, mopeds (private and company vehicles), except for those defined below);
- public transport (buses, minibuses, trolleybuses, trams, railway);
- municipal transport (cars, light and heavy cargo vehicles, motorcycles).

Emissions from energy consumption in the transport sector were calculated based on the number of vehicles registered in Riga and assumptions about the average annual mileage and average vehicle fuel consumption. Data from the Road Traffic Safety Directorate (CSDD) on the number of vehicles in good technical order registered in Riga were used to determine the number of vehicles. Furthermore, VSIA 'Latvijas Valsts ceļi' data on traffic intensity on national and regional roads leading to Riga were used in order to take into account the impact of traffic entering Riga on CO_2 emissions.

The breakdown of the vehicles by the type of fuel used (petrol, diesel, autogas, natural gas, electricity) is based on the information about vehicles registered in Riga collected by CSDD. SIA 'Rīgas satiksme' provided data on the company's vehicles, their number by the type of fuel/energy consumed, fuel/energy consumption by types and vehicle categories, mileage, and the number of passengers transported, by vehicle category. Data on train mileage, passenger circulation, and fuel consumption were obtained from AS 'Pasažieru vilciens'. Data on Riga City municipal vehicles (number and fuel consumption) are obtained from the municipal departments, companies, and agencies of Riga. Data on the amount of fuel sold at fuel stations in Riga were obtained from the largest fuel suppliers.

5.1.3 Emission Factors

Emission factors are used to express emissions in numerical terms per unit of activity. Different emission records must use the same emission factor approach. The emission factors approved by the Intergovernmental Panel on Climate Change (IPCC) were used in the calculations for the ACTION PLAN (see Table 5.1 below). These are emission factors for fuel combustion based on the carbon content of each fuel.

The central heating system emission factor was calculated according to the guidelines of the Covenant of Mayors. The Latvian national standard electricity emission factor was used as the electricity emission factor, in accordance with the guidelines of the Covenant of Mayors.

Table 5.1. Emission factor in Riga (tCO_2/MWh)

Year	Electric power	Heating supply	Fossil fuels			
			Natural gas	Liquefied gas	Diesel fuel	Petrol
2020	0.109	0.145	0.202	0.225	0.267	0.249

6 Urban Planning

Urban planning as a theoretical process involves creating concepts, approaches, tools for engaging in practical urban planning. As a technical process, it includes the drafting of a practical action plan. As a political process, it builds the practice of zoning management, including the organising of public participation and decision-making.[96] The urban planning process is all-encompassing and multifaceted, and must take into account the needs related to the development of the city's infrastructure, and the needs of the city's residents, visitors, companies, and other stakeholders. Urban development is a process based on various prerequisites, regulated by the tools of land development planning. The land planning of the municipal government is a municipal development planning document, which serves as the basis for any activity performed with real estate, setting the requirements for the use and development of the land in the municipality.

Currently, urban planning faces many challenges in all cities in the world, which includes Riga: one has to deal with the consequences of the COVID-19 crisis and the future risks of climate change, while trying to reduce social and economic inequality. Despite the fact that the spread of COVID-19 continues to pose a major threat to the healthcare system, population, and economy, more and more cities in Europe are taking active steps to recover from the crisis in an environmentally harmless way, supported by EU initiatives such as the European Green Deal, the EU Urban Agenda, and the new EU cohesion policy.

Pandemic restrictions have considerably altered the daily habits of a large share of the population, which significantly affected various city systems and services. Many of these changes are already creating discussions about how to plan the urban environment in the future. It is important to identify these factors in order to be fully aware of both the opportunities and threats highlighted during the pandemic. A good example of how the pandemic has affected the energy sector is the increase in the number of pedestrians and cyclists during the pandemic restrictions, which indicates the need and opportunities for developing the urban environment in such a way that it can provide comfortable and safe conditions for these modes of transportation, which are also more environmentally friendly. Meanwhile, the number of people who travelled by private car to avoid using public transport for fear of contracting the virus also increased in many European cities, including Riga.[97] This, in turn, indicates the need to improve the quality, convenience, and safety of public transport, including air quality in these vehicles.

The experience of the COVID-19 crisis reflects well the fact that the most vulnerable groups of the population, who are completely dependent on various city services, such as public transport, suffer the most in a crisis. The same is true when it comes to the threats created by climate change, because as these climate threats manifest themselves, the people who do not have the financial and/or material resources to protect themselves will suffer the most.

The experience of COVID-19 should be used as a starting point for more effective progress towards climate neutrality and a sustainable urban environment. Fundamental changes are needed both in the city's mobility system, in order not to continue the autocratic development of the urban environment, and in the energy supply and housing sectors, in order to provide climate-neutral and economically accessible services for all citizens.

[96] Source: https://enciklopedija.lv/skirklis/4852
[97] Source: https://www.eea.europa.eu/publications/urban-sustainability-in-europe

There are various principles of sustainable urban development in urban planning practice. Within the discussions of the United Nations Human Settlements Programme (UN-HABITAT), 5 guiding principles were identified.[98]

The first principle is to provide sufficiently wide streets and create an efficient street network. The purpose of this principle is to create a city street network that enables convenient travel not only by private or public transport, but also by foot and using micromobility. A well-designed network of main and local streets, with different speed limits, significantly affects the development of neighbourhoods.

The second principle is to achieve a higher population density, as denser cities have several long-term economic, social and environmental benefits. One aspect is the more efficient use of land. In more densely populated areas, built-up land areas per inhabitant are much smaller than in scattered residential neighbourhoods. There is also less need for transport, which creates emissions, while shorter heating, water, and sewer line systems allow these services to be provided more cheaply and efficiently. It is also possible to provide various municipal and social services more efficiently and cheaper in denser areas.

The third principle is to create as many mixed-use areas as possible, creating less single-function urban areas, such as neighbourhoods where only commerce and various services take place, but virtually no one lives, or residential areas that lack economic activity, cultural venues, services, etc. Single-function zoning has many significant disadvantages, including the increased need to travel to receive the services needed on a daily basis. In contrast, diverse, mixed-use neighbourhoods, where municipalities, social and other services, and workplaces can be reached on foot or using micromobility, reduce the need to move outside the neighbourhood to meet every day needs. Thus, traffic flows and their emissions are also reduced.

The fourth principle envisages creating socially mixed neighbourhoods, providing housing for residents of different income levels, thus reducing inequality and social stratification. The third and fourth principles are complementary to each other.

The fifth principle is limiting the development of uniform zones, and promoting diversity in the use of existing zones, which in turn would improve economic efficiency and productivity. According to the principle, the share of uniform areas in neighbourhoods (for example, non-mixed industrial zones) should not exceed 10%.

The most significant challenges for the implementation of the measures are shown in Table 6.1.

[98] Source: https://unhabitat.org/sites/default/files/download-manager-files/A%20New%20Strategy%20of%20Sustainable%20Neighbourhood%20Planning%20Five%20principles.pdf

Table 6.1. The most important urban planning challenges in the context of the ACTION PLAN

Energy supply	Apartment, municipal, and public buildings	Adaptation to climate change	Transport sector
A large proportion of decentralised heat sources. A large proportion of fossil fuels in the energy supply. The impact of the operation of national energy supply sources (TEC1 and TEC2 thermal power plants) on the central heating system of Riga.	Old housing stock, which increases the demand for the construction of new residential buildings and blocks, and is also more exposed to the negative effects of climate change. Degradation of existing development leads to the depopulation of neighbourhoods.	Restrictions on the development of degraded areas (restriction on the use of potentially polluted areas, cost and complexity of remediation). The problem of ownership of the shared space in residential blocks: the possibility of improving the courtyards of multi-apartment buildings is limited, given that the land belongs to different owners. Green areas are fragmented and the most extensive green areas are located in the peripheral areas of the city, leaving the city centre at a high risk of overheating. Inefficiently managed green areas. There is a lack of tools for motivating land developers to create sustainable green areas.	Tendency for citizens to move to Riga suburban municipalities and use private transport to get to their workplaces in the city of Riga. Insufficient information on actual traffic flows. The railway system is not coordinated with the rest of the city's transport infrastructure, especially the public transport system. Low level of bicycle infrastructure development.

It should be noted that the opportunities and strengths of certain sectors can create challenges in other sectors. For example, insulating and renovating buildings reduces heat energy consumption, which in turn creates challenges for district heating operators, while measures to reduce the proportion of decentralised heating can contribute to the construction of new connections to the central heating system.

The long-term principles of urban planning must be taken into account in the implementation of all the other measures planned in the ACTION PLAN and in the long-term planning of Riga's development, such as those connected to heat supply planning, surveying and remediation of potentially contaminated sites, etc. By implementing the measures foreseen in the ACTION PLAN, a sustainable mobility system will be created in Riga, in which public transport, pedestrians, and cyclists will be prioritised, while road vehicles will mainly consume renewable sources of energy. Heat energy and electricity obtained from renewable resources will be provided to local residents, and an urban environment and buildings adapted to the climate of the future will be created.

7 Municipal Infrastructure

7.1 Description of the Current Situation

Municipal infrastructure in Riga consists of four main sectors:

- municipal buildings;
- public street lighting;
- water supply and sewer system;
- municipal transport.

The total infrastructure consumption of Riga City Municipality and its breakdown into main groups in 2020 is reflected in Figure 7.1. The heat energy consumption by municipal buildings takes up the biggest proportion in the overall energy consumption structure (58%). On the other hand, electricity consumption in water management accounts for 15%, in municipal buildings, 11%, and in street lighting, 11%. At the moment, no information is available about the consumption of heat energy and electricity in all municipal buildings, so the share of these sectors in the total consumption could be even higher.

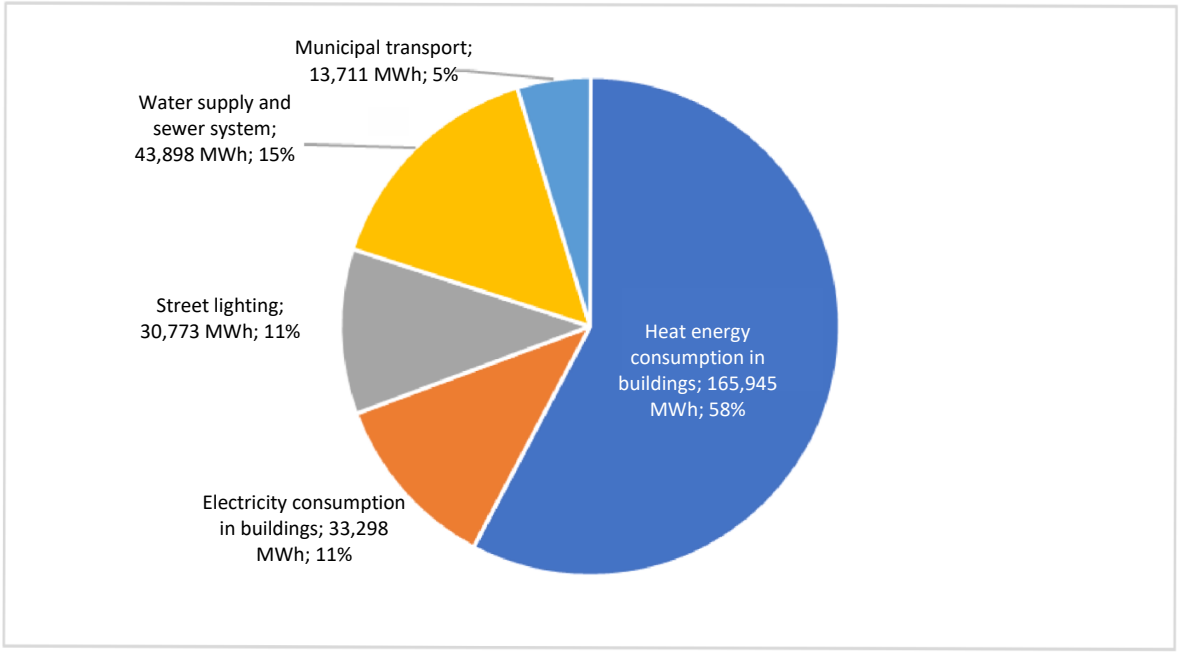


Figure 7.1. Total municipal infrastructure energy consumption in 2020

Given that the electricity fee is almost three times higher than the heat energy fee, the share of electricity costs in the total budget is higher. While heat energy accounted for 58% of total energy consumption in 2020, in terms of costs, heat energy consumption by buildings accounted for 33% in 2020 (see Figure 7.2). The total energy costs for all sectors in 2020 were at least EUR 25.4 million. Taking into account the fact that the heat energy fee rose by 28% at the beginning of 2022, energy costs will increase significantly in 2022.

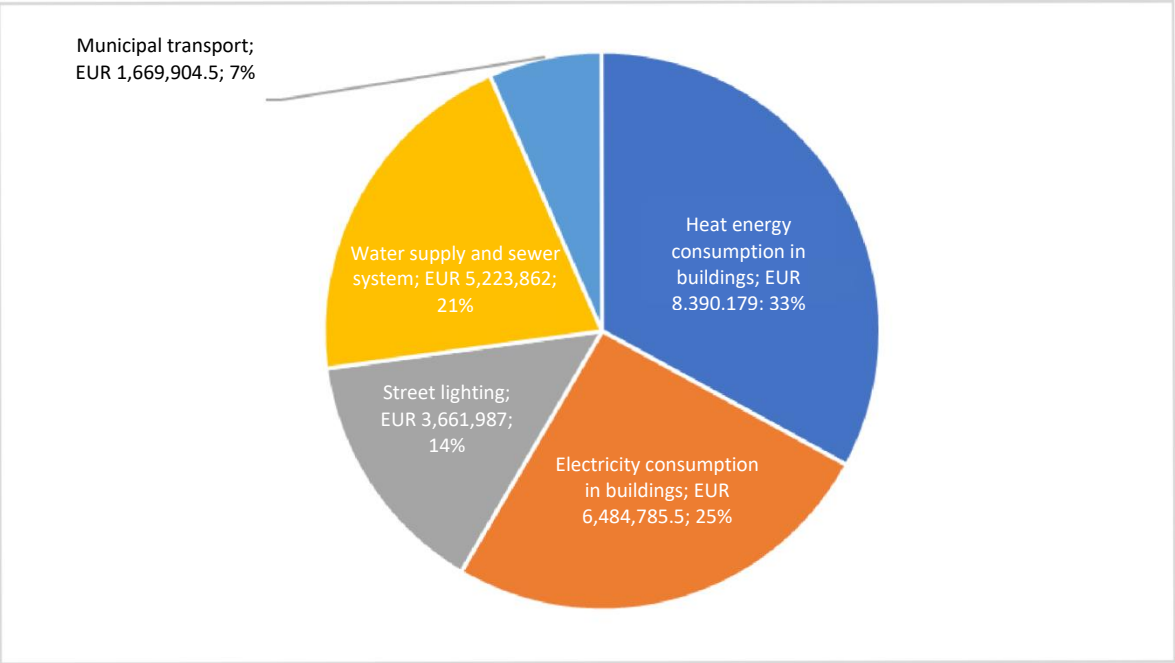


Figure 7.2. Municipality energy costs in 2020

7.1.1 Municipal Buildings

Table 7.1 summarises the data available on municipal buildings in Riga. Currently, data on municipal buildings (their number, condition, floor area, and energy (fuel) consumption) are not all collected in one place. The table below summarises the current data available from various information sources (RCC, AS 'Rīgas siltums', RCC Property Department, etc.).

Table 7.1. Key data about municipal buildings in Riga

Indicator	Values
Buildings/structures owned by the municipality[99]	4,188 units; 5.47 million m^2
including pre-school facilities	161; 316 thousand m^2
including schools	191; 866.2 thousand m^2
including administrative buildings	128; 102 thousand m^2
Number of municipal buildings connected to the central heating system, their floor area[100]	610; at least 1.49 million m^2
Number and floor area of municipal buildings with individual heating	No data
Condition of municipal buildings	
Renovated	No data
Partially renovated	No data
New	No data
Non-renovated	No data
Heat energy consumption in 2020[101] (data on buildings connected to the central heating system)	165,944.5 MWh
Heat energy consumption in 2020 for buildings with individual heating	No data
Electricity consumption in 2020	33,298 MWh[102]
Specific heat energy consumption in 2020[103]	144 kWh/m^2 per year

[99] Source: https://www.riga.lv/lv/rigas-nekustamo-ipasumu-objekti
[100] Source: AS Rīgas Siltums
[101] Source: AS Rīgas Siltums
[102] RCC Finance Department data on 1012 sites
[103] Based on the data provided by AS Rīgas Siltums for buildings whose average consumption exceeds 40 kWh/m^2 per year

Indicator	Values
Average specific electricity consumption in 2020[104]	31.6 kWh/m^2 per year (355 education institutions); 56.1 kWh/m^2 per year (19 office buildings)
Average energy costs for 2020	Heat energy[105]: EUR 12+ million; electricity[106] (1012 sites): EUR 6.5 million
CO_2 emissions	30,180 tCO_2/year

Several data sources are currently available for collecting data on municipal buildings; however, one of the biggest challenges for further analysis is accurate input data on the heated floor area of the buildings. Data on municipal buildings connected to the city's central heating system were provided by AS 'Rīgas siltums'. Figure 7.3 summarises the results based on the heat energy consumption data and heated floor areas provided by the company.

Figure 7.3 shows the specific heat energy consumption for heating and hot water (if hot water is provided) for schools and pre-school facilities connected to the Riga central heating system. In total, 260 buildings are included in the energy data analysis, of which 110 are schools, and 150 are pre-school facilities. Given that the floor area of pre-school facilities is smaller, the specific heat energy consumption for heating in these institutions is higher than in schools.

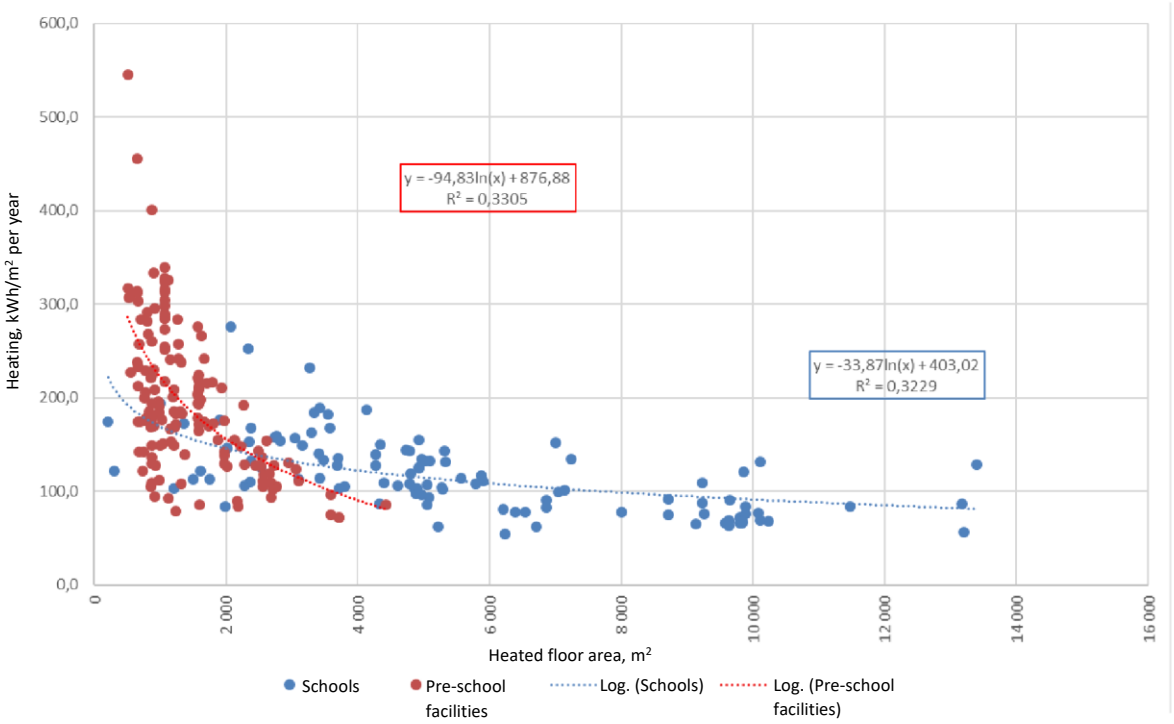


Figure 7.3. Specific heating consumption in Riga schools and pre-school facilities in 2020

Riga City Council has created and maintains a database for collecting data on the heat, electricity, and water consumption of each building, based on the information provided by the REA, according to utility bill data (see Figure 7.4). The following data are available in the database:

- heat energy consumption for 295 sites connected to the central heating system;

[104] RCC Finance Department and SLS building floor areas. REA updates the floor area values, which will probably change the average specific consumption
[105] Data on 355 sites
[106] It is assumed that the average electricity fee in 2020 was 140 EUR/MWh

- electricity consumption for 1,012 municipal sites managed by the RCC Property Department;
- water and sewer consumption in municipal sites managed by the RCC Property Department.

The database currently does not collect information about all municipal buildings. For example, no data are collected for buildings that use individual heating solutions, and buildings owned by another municipal institution.

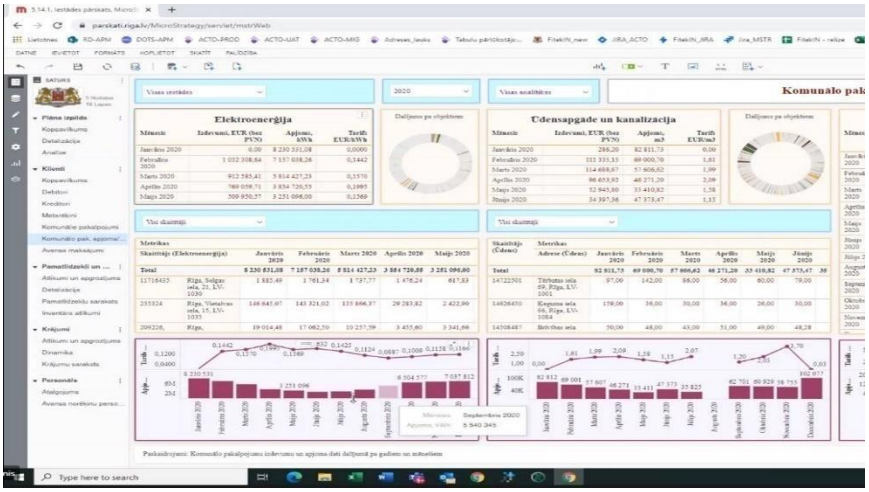


Figure 7.4. RCC database screenshot

7.1.2 Street Lighting

Public street lighting in Riga is provided by Riga City Municipal Agency 'Rīgas gaisma'. The main task of the agency is the operation, repairs, and improvement of the quality indicators of outdoor lighting infrastructure in city roads and streets, squares, parks, and other sites owned by the Riga City Municipality. A summary of street lighting for 2020 in Riga is given in Table 7.2 below.

Table 7.2. Key data on Riga street lighting, traffic lights, clocks, and transport units

Indicator	Values
Street Lighting	
Number of illuminated streets, parks, etc.	1,640
Number of lights installed	50,040
Capacity installed	7,500 kW
Number of poles	37 thousand
Length of cables and overhead lines	1,900 km
Number of electrical distribution units	Approx. 4,000
Total electricity consumption	30,773 MWh
Electricity consumption for street lighting	29,864 MWh
Electricity consumption per light	597 kWh/light
Average street lighting operating time (in 2019)	4,011 hours
Key types of lamps	11.1% LED, 88.8% sodium, 0.1% mercury
Total costs in 2020	EUR 7.040 million
Electricity costs for street lighting	EUR 3,547,542
Street lighting maintenance costs (repairs, installation of new lights, etc.)	EUR 3,488,734
Electric clocks	
Number of electric clocks managed	50
Electricity consumption for clock operation	Included in street lighting

Indicator	Values
Electricity consumption for hour of operation	Unknown
Electricity cost to operate the clocks	Included in street lighting
Clock maintenance costs (repairs, etc.)	Not allocated separately
Traffic lights	
Number of traffic light facilities managed	393
Traffic lights with LED lights	100% for vehicles; 85% for pedestrians
Electricity consumption for operating the traffic lights	909.2 MWh
Electricity consumption for operating 1 traffic light	2,314 kWh/traffic light
Electricity cost for operating traffic lights	EUR 115,154
Traffic light maintenance costs (repairs, etc.)	EUR 560,154
CO_2 emissions	
From electricity consumption	3,354 tCO_2/year

Based on the information provided by 'Rīgas gaisma', the average annual electricity consumption is 30 GWh (see Figure 7.5), but the specific electricity consumption per light decreased by 2% in 2020. This could be explained by the gradual replacement of sodium lights with LED lights.

Electricity consumption for traffic lights decreased by 3.3% in 2020, as compared to 2018. The average electricity consumption per traffic light was 2314 kWh in 2020. 'Rīgas gaisma' gradually replaces existing incandescent bulbs (70 W and 100 W) with LED bulbs (8 W and 12 W). Traffic lights with LED bulbs consume on average 1,900–2,316 kWh per year (previously 8,000–8,500 kWh/year). Decisions on the replacement of traffic light bulbs are made by the RCC Traffic Department.

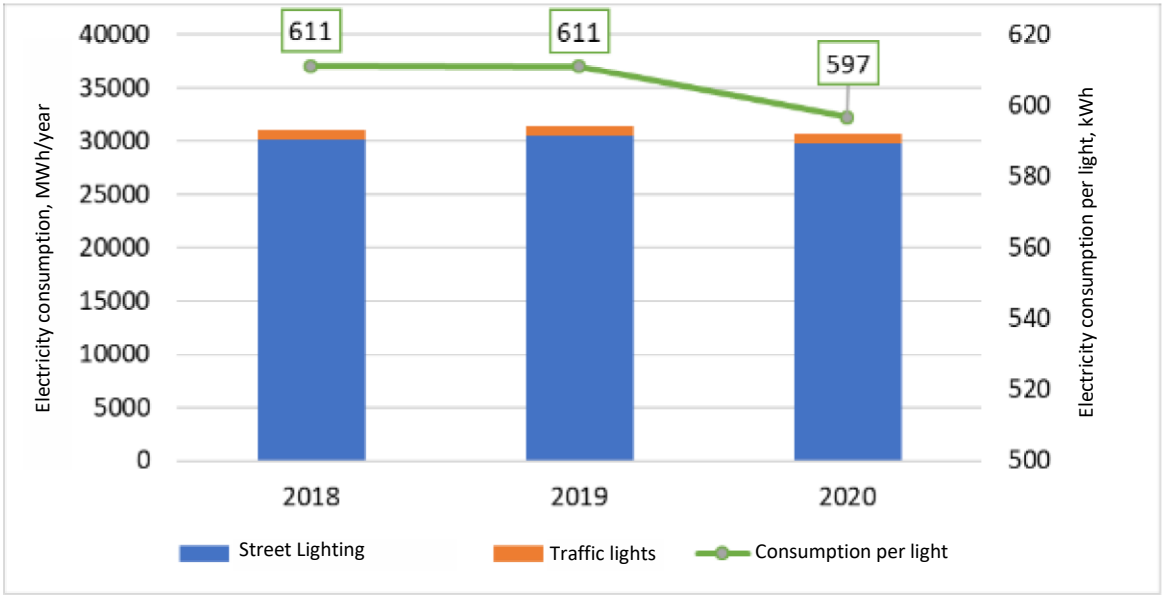


Figure 7.5. Electricity consumption for street lighting and traffic lights in 2018–2020

In total, there are still 48.51 km of unlit streets in Riga, for which one would have to install 1,600 lights.

A smart metering system is currently installed in approximately 4,000 of the 50,000 lights, which can be controlled remotely, and dimmed at night.

7.1.3 Municipal Transport

Table 7.3 summarises the key information about the municipal vehicle fleet in 2019–2020. The calculations were made based on the data obtained on the fuel and electricity consumption of the following companies and agencies of Riga City Council: SIA 'Rīgas satiksme', SIA 'Rīgas Nacionālais

zoologiskais dārzs', SIA 'Rīgas 1.slimnīca', SIA 'Rīgas Nacionālais zoologiskais dārzs', SIA 'Rīgas 1.slimnīca', SIA 'Rīgas 2. slimnīca', SIA 'Rīgas veselības centrs', SIA Rīgas Centrāltirgus, SIA 'Rīgas Dzemdību nams', SIA 'Rīgas nami', SIA 'Rīgas namu pārvaldnieks', SIA 'Rīgas pilsētbūvnieks', SIA 'Rīgas serviss', SIA 'Rīgas ūdens', PA 'Rīgas gaisma'.

Table 7.3. Key indicators related to municipal vehicles in Riga in 2019–2020

Indicator		Values	
		In 2019	In 2020
Number of vehicles by type	Cars	745, incl. 5 electric vehicles	697, incl. 10 electric vehicles
	Light cargo vehicles (up to 3.5 t)	285	277
	Heavy cargo vehicles (over 3.5 t)	161	162
	Motorcycles	59	59
	Others (trailers, ATVs, tractors, etc.)	311	249
Fuel consumption	Autogas	36.5 thousand litres	26.1 thousand litres
	Diesel fuel	1,498.3 thousand litres	1,203.7 thousand litres
	Petrol	222.7 thousand litres	159.0 thousand litres
	Electric power	79.1 MWh	62.0 MWh
Share of electricity in the end consumption of energy by the vehicle fleet, %		0.5%	0.5%
CO_2 emissions		4600 tCO_2	3618 tCO_2

Figure 7.6 shows the change in the number of municipal vehicles in the last five years according to the information provided by the institutions, and taking into account the availability of data at the time of preparation of the report. The owners of the largest fleets are SIA 'Rīgas satiksme' and RCC Finance Department. The data are incomplete before 2018 (the vehicle fleet of RCC Finance Department is not included).

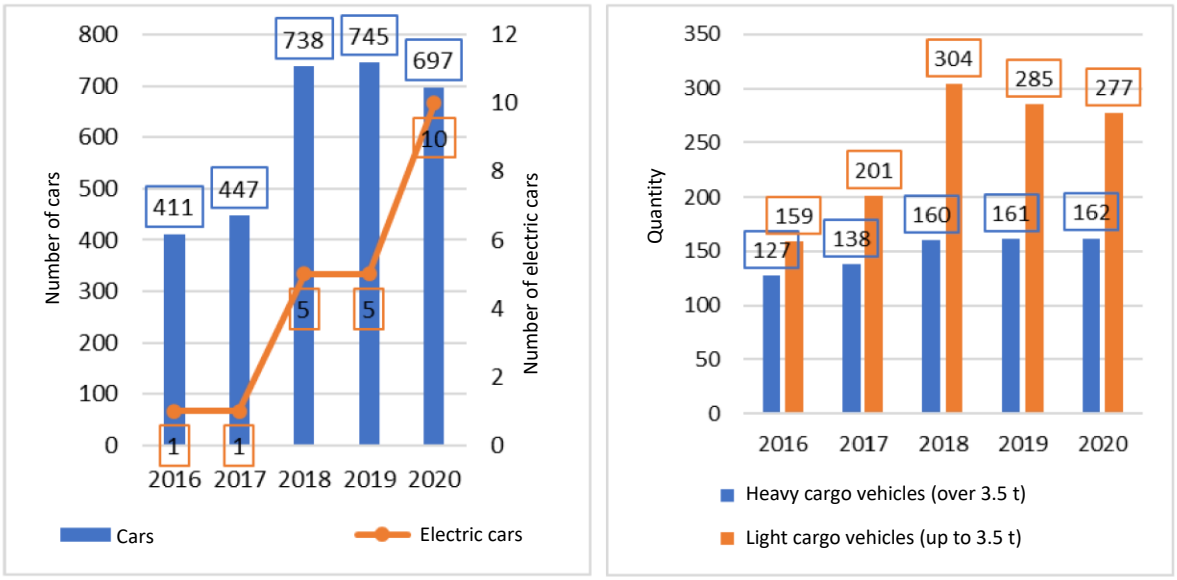


Figure 7.6. Municipal car fleet trends; initial estimation results

As shown in Figure 7.7, the fuel consumption of the municipal government's fleet is dominated by diesel fuel. In 2020, diesel fuel consumption accounted for 87.5% of the total energy consumption, followed by petrol, at 10.7%, autogas, 1.3%, and electricity, 0.5%.

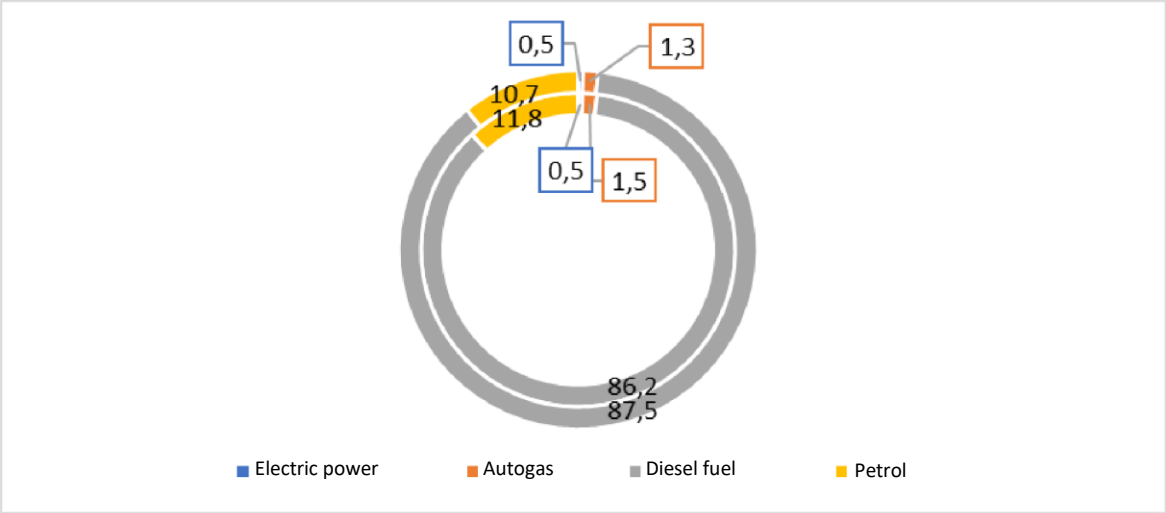


Figure 7.7. Consumption breakdown by energy resource (% of end energy consumption) in the municipal vehicle fleet in 2019 (inner circle) and 2020 (outer circle)

7.2 Challenges

Challenges can be observed in all municipal infrastructure sectors. The key challenges are summarised in Table 7.4.

Table 7.4. Key challenges in municipal infrastructure sectors

Challenges in municipal buildings
Large number of municipal buildings, with many stakeholders
Lack of reliable data on the heated floor areas of municipal buildings, their technical condition, and occupancy
Lack of transparent and reliable data on consumption and its indicators in municipal buildings
Absence of a certified energy management system and non-compliance with laws and regulations
Planning and implementation of transparent actions
High specific energy consumption in renovated buildings
High proportion of fossil fuels in municipal buildings
Air quality and ventilation in education institutions
Challenges in the street lighting sector
Extensive street lighting system
Lack of strategy
Energy management systems, incl. lack of energy monitoring
High specific electricity consumption per light
Obsolete poles
Providing lighting in unlit areas, especially on the outskirts of the city
Use of renewable electricity in street lighting
High electric power consumption for traffic lights
Challenges in the municipal transport sector
Lack of systematically collected data about the vehicle fleets of municipal institutions, data on fuel consumption, vehicle mileage; lack of a system for the regular updating and analysis of data
Availability of financing for a substantial increase in the number of vehicles using alternative fuels (especially emission-free) in the municipal fleet
Efficiency in the use of low-power vehicles (inefficient mileage)

7.3 Measures

In general, 17 measures have been identified for the municipal infrastructure sector, which will provide the following benefits in 2030:

- amount of energy saved: 32,513 MWh/year;
- increased amounts of renewable energy: 212,814 MWh/year;
- reduced amount of CO_2 emissions: 34,962 tCO_2/year;
- reduced energy costs: EUR 3.3 million per year;
- investments raised: EUR 111 million (of which 81% is planned for the construction of forced ventilation systems in education institutions).

All the planned measures are directly and indirectly related to the 3rd priority outlined in the Riga Development Programme (Good environment quality and sustainable urban ecosystem for mitigating climate change), including Task 3.6 'Reduce climate change'. The municipal infrastructure measures are closely related to measures planned in other subject groups of the ACTION PLAN, especially in the climate neutrality policy group. In order to implement several of the measures listed below, one must provide a regulatory framework that would stimulate the achievement of the climate neutrality goals by the municipal infrastructure sector.

According to the implementation and monitoring process (see more in Section 4.3.1), the responsibility for the implementation of the measures planned in this section lies with the municipal infrastructure subgroup. The task of the subgroup is to evaluate and delegate the implementation of the measures to the responsible institutions, and to conduct systematic monitoring and elimination of potential obstacles.

7.3.1 In Municipal Buildings

1. Creation, continuous improvement and certification of an Energy Management System (EMS).

The establishment of an energy management system in Riga Municipality is not only a requirement of laws and regulations, but also an essential need for optimising the work of the municipal government in order to systematically monitor and ensure the reduction of energy consumption in municipal buildings. As part of this measure, the municipal government must create, implement and certify an energy management system, which also includes the following measures:

- collection and monitoring of reliable source data, including the implementation of information and communication technology (ICT) solutions for energy consumption monitoring and control;
- coordination of the floor areas of municipal buildings between all data sources;
- creation of an open database (data repository);
- control and reduction of energy consumption in renovated buildings;
- incorporation of an energy efficiency guarantee into the construction and renovation of all municipal facilities;
- implementation of the 'energy efficiency first' principle at the level of all departments and companies: for example, in draft decisions, their impact on the climate and the environment should also be considered in the explanatory statements;
- drafting of energy certificates for municipal buildings in accordance with laws and regulations;
- integration of energy consumption targets into building management contracts;
- replacement of existing lighting in municipal buildings with energy-efficient solutions;

- running of annual energy saving competitions among municipal buildings, for example, starting with pre-school facilities and schools;
- expansion of the planning document Riga Municipal Property Management Strategy with energy efficiency guidelines for buildings;
- implementation of low-budget energy efficiency improvement measures, financing them using institutional savings.

The implementation of the energy management system would give an average annual saving of 3–8% of the total energy consumption in municipal buildings. The savings will make it possible to save an average of 15,939 MWh, or EUR 1.2 million per year. Approximate cost of the measure: EUR 150,000 per year.

2. Provision of 100% Renewable Heat Energy in Municipal Buildings

In order to achieve the goal of climate neutrality, the municipality must ensure the use of heat energy produced from renewable energy sources. Currently, most of the municipal buildings and sites are connected to the central heating system. The municipal government must arrange a gradual transition to heat energy from renewable energy sources, with proof of supply, in conjunction with the main heat energy supplier, AS 'Rīgas siltums', reaching 100% in 2030. The municipal government will additionally evaluate and implement other solutions, especially in buildings where fossil fuel heating equipment is installed (first by reducing the building's energy consumption to a minimum), and introduce CO_2 compensation mechanisms, for example, through capturing additional CO_2 emissions, planting trees, and implementing other measures.

3. Provision of 100% renewable electricity in municipal buildings

The use of electricity in municipal buildings is the second largest source of CO_2 emissions. The municipal government can reduce this by creating localised production of electricity, for example by installing solar panels on municipal buildings, and/or by introducing CO_2 compensation mechanisms, such as purchasing renewable electricity with zero CO_2 emissions. Given that the price of renewable electricity could be higher than electricity from the grid, the municipal government can also introduce this measure gradually, reaching 100% in 2030.

The implementation of the measure will ensure the achievement of the goal of climate neutrality set by the municipal government in 2030, when the electricity used in municipal buildings will come from renewable energy sources.

4. Drafting of the building renovation plan for 2030

The municipal government owns more than 4,000 buildings and sites. Some of them have been completely or partially renovated, but a large part have not. The energy monitoring system developed as part of the energy management system will enable the collection of data on municipal buildings and their energy consumption, which will further make it possible for the municipal government to develop a building renovation plan for 2030.

The implementation of the measure will not result in direct savings but will lay the basic conditions for achieving a systemic reduction in heat energy consumption through the planned measures, and improving indoor air quality in municipal buildings, especially in education institutions. The drafting of the initial version of the plan could cost EUR 45–50 thousand (exact cost depends on the level of detail of the plan).

5. Installation of forced ventilation systems in education institutions

Most of the already renovated education institutions do not have forced ventilation systems installed. Due to COVID-19, the need for forced ventilation systems and creating high-quality circulation of air in schools and pre-school facilities is a particularly urgent problem that needs to

be addressed immediately. In the future, when renovating municipal buildings, especially education institutions, the municipal government must plan for and include the construction and installation of forced ventilation systems in the engineering designs. One of the first tasks of the municipal government is to evaluate the forced ventilation systems (installed or absent) in the already renovated educational buildings and to include the results and planned activities in the Building Renovation Plan for 2030.

Given that no assessment has been made of the existing ventilation systems in municipal buildings (forced ventilation systems are installed in 36 out of 355 education institutions[107]) and their condition, it is currently not possible to determine the savings of the measure or the generated energy increase. The approximate cost of the measure is approx. EUR 90 million.

6. Renovation of municipal buildings and more extensive use of renewable energy sources in municipal buildings

Based on the Building Renovation Plan, the municipal government will ensure the renovation of municipally owned buildings, achieving appropriate indoor air quality, and the wider use of renewable energy sources. This measure will include the following activities:

- comprehensive renovation of all municipal buildings by 2030;
- renovation of buildings involving energy service providers (ESP);
- evaluation of the potential of solar panels depending on the consumption of the building and the roof area, as well as a database of potential projects;
- arrangement and restoration of green areas around the municipal buildings to be renovated;
- sustainable use of materials and resources;
- compliance with the principles of sustainable mobility (for example, regulations-compliant number of bicycle racks and electric charging points for vehicles, etc.);
- achieving indoor air quality that complies with laws and regulations (priority in education institutions);
- Implementation of renewable energy projects.

The measure will generate savings of at least 1,600 MWh and 232 tCO_2 in emissions. The estimated cost of the event could be at least EUR 48 million.

7. The construction of environmentally-friendly new buildings will be gradually implemented by 2030

In the future, the municipal government will construct buildings that not only comply with laws and regulations, but also with the Riga goal of climate neutrality, implementing the principles of circular economy and high energy efficiency requirements. These basic conditions will be integrated in the engineering designs of all new buildings, as well as an energy efficiency guarantee will be included in construction contracts. Before the construction of new buildings, the possibility of using the existing buildings for the need in question (through reconstruction, renovation, adaptation, change of function) will be assessed.

The construction of new buildings will lead to an increase in energy consumption, but the main goal of this measure is to ensure a minimum guaranteed energy increase, and promote sustainable, high-quality, energy-efficient construction.

[107]Source: RCC Property Department

8. Compliance With the Principles of Circular Economy

In the future, the municipal government will use the principles of the circular economy in the projects it implements, related to the renovation and construction of buildings, broader use of renewable energy sources, use of equipment, and other aspects. For example, in the construction of new buildings, the sustainability of the proposed materials, the possibility of recycling the materials, and other factors will be evaluated, thus taking into account the overall lifecycle of the building. In order to do this, the municipal government will first develop guidelines for observing circular economy principles in municipal procurement, which will then be regularly expanded and updated. Also, guidelines will be developed for the implementation of circular economy principles throughout the lifecycle of the building, from planning to demolition.
Taking into account the emission calculation methodology used in the plan, the measure will not result in a direct reduction of CO_2 emissions, but it will have a positive effect on the amount of CO_2 emissions generated over the cycle.

7.3.2 In the Street Lighting Sector

9. Creation and maintenance of an energy management system, including ICT implementation for energy monitoring

The creation of a certified energy management system for street lighting and traffic light operation is an important prerequisite for achieving a systematic reduction in energy consumption by this sector. There are two options for creating an energy management system: to create it together with the single energy management system of the municipal government, or as a separate system within the municipal agency 'Rīgas gaisma'. The measure must be implemented by as early as 2022, and the system must be continuously maintained afterwards. It is implemented by the municipal agency 'Rīgas gaisma' in cooperation with REA.

The implementation of the measure will generate an average annual saving of 3–8% of the total electricity consumption for street lighting, creating approximately 666 MWh and EUR 80,000 in savings. Approximate cost of the measure: EUR 15,000 per year.

- *Replace 45 mercury street lights*

The municipal street lighting system still uses 45 mercury lights, which must be replaced with energy-efficient LED lights. It is a measure with a short return period, to be implemented in 2022. The institution responsible for the implementation of the event is the municipal agency 'Rīgas gaisma'.

The implementation of the measure will result in 80% savings of the total electricity consumption of the section of the lighting system in question. This will make it possible to save approximately 27 MWh and EUR 3,200 per year. Approximate cost of the measure: EUR 4,500.

- *Change the remaining traffic light bulbs to LED lights*

Based on the information obtained, 15% of Riga's pedestrian traffic lights still have incandescent bulbs installed, which should be changed to energy-efficient LED lights. The measure has a short return period and should be implemented in 2022–2023. The institution responsible for this is the RCC Traffic Department, also involving the municipal agency 'Rīgas gaisma', which will directly replace the lights.

The implementation of the measure will generate at least 50% in savings, or 18 MWh and EUR 2,000 per year. According to the information provided by 'Rīgas gaisma', the approximate cost of the measure will be EUR 180.

- *Take over lights managed by other institutions.*

At the moment, the municipal agency 'Rīgas gaisma' manages all street lighting, but there are still a number of lights that are under the management of other municipal institutions because they are located on their grounds. The goal of the municipal government is to ensure that all outdoor lights are under the management of the municipal agency 'Rīgas gaisma', which further enables the maintenance of these lights and the reduction of energy consumption. The lights taken over can also be included in the street lighting modernisation project.

The sooner the lights are taken over, the sooner it will be possible to reduce their electricity consumption by implementing the measures mentioned above.

10. ***Preparation of an investment plan for street lighting, replacement of electric line infrastructure and poles, also assessing the possibility of concluding a long-term energy efficiency service contract***

89% of all street lighting uses sodium lights; the replacement of such with LED lights will result in significant energy savings. Although the municipal agency 'Rīgas gaisma' is gradually implementing various projects for replacing the lights, their replacement will take several years at the current pace. In a few European capitals, street lighting is being modernised by signing an energy efficiency service contract, which provides both financing and energy savings. In Riga, such a project would have much potential, but in order to be able to assess all options, one must draft an investment plan. The measure could be implemented in 2022. It is implemented by the municipal agency 'Rīgas gaisma' in cooperation with REA.

The implementation of the measure will not provide direct savings but will create basic conditions to achieve a significant reduction in electricity consumption through the project and measures planned. The drafting of the plan could cost EUR 70–100 thousand (exact cost depends on the level of detail of the plan).

11. ***Street lighting modernisation project, potential signing of an energy efficiency service contract***

Based on the drafted investment plan (see previous event), this measure will involve the preparation of all the necessary procurement documentation, including an energy efficiency service contract, and the announcement of the tender. This measure continues to be implemented by the municipal agency 'Rīgas gaisma', in conjunction with REA and other institutions of the Riga City Municipality.

The implementation of the measure will result in savings of at least 40–50% of the total electricity consumption in the relevant section of the lighting system. This will save 12,309 MWh and EUR 1.5 million. The approximate cost of the measure will be EUR 15 million.

- *Implementation of a remote smart control system.*

A small part of the street lighting has already been equipped with a smart control system, with which one can control the street lights, and provide dimming at night. The rest of the street lighting system should also be included in the smart control system by 2030. This measure can also be implemented together with the street lighting modernisation project.

If the street lighting modernisation project is not implemented, the installation of the smart control system must take place in those street lighting sections where the lighting has been replaced, and adjusting the lighting is possible. Adjusting the lighting will give an average of 1–3% in savings, or approximately 308 MWh and EUR 60 in savings. The cost could be approximately EUR 300-500 thousand.

12. Installation of energy-efficient street lighting in unlit areas

Although the installation of street lighting in the city's streets that are still unlit will increase the total electricity consumption, the municipal government must set a goal to install energy-efficient lights in these streets. The implementation of the measure will ensure that the specific electricity consumption per light will not increase, and the municipal government will continue to meet the conditions of the energy management system. This measure can also be implemented as part of the street lighting modernisation project.

The installation of street lights in the unlit areas will lead to an increase in electricity consumption, but the main goal of this measure is to make sure that the increase is minimal by installing efficient lights and an efficient lighting system.

13. Achieve the use of 100% renewable electricity for street lights, traffic lights and clocks in 2030

The use of electricity is a significant source of CO_2 emissions, which the municipal government can reduce by purchasing renewable electricity with zero CO_2 emissions. Given that the price of renewable electricity could be higher than electricity from the grid, the municipal government can also introduce this measure gradually, reaching 100% in 2030.

The implementation of the measure will ensure the achievement of the climate neutrality goal set by the municipal government in 2030, when the electricity used for street lighting and the operation of traffic lights and clocks (17,445 MWh after the implementation of the measures listed above) will be generated from renewable energy sources. As part of the event, it is assumed that the company will purchase green electricity, but the company can also review options and install the necessary renewable energy equipment for its own consumption of electricity.

7.3.3 Municipal Transport Sector

***14. Create and maintain a data/information records system for the municipal fleet*, incl. the number of vehicles, fuel/energy consumption, annual mileage; data analysis and feedback with fleet owners**

The creation of a fleet monitoring system is an important first step in making it possible for the municipal government to identify the current situation and follow its progress. Currently, there are significant deficiencies in data recording: no centralised records are kept for all vehicles; the analysis of existing information is complicated by different data storage solutions; gathering the information is manual work; no information on vehicle mileage is collected, which makes it impossible to compare transport energy consumption between institutions/vehicles using specific energy consumption indicators.

The creation of the energy consumption and mileage data/information records system of the municipal vehicle fleet is also a prerequisite for the inclusion of the municipal vehicle fleet in the municipal energy management system. The activities planned for the EMS include an assessment of the use of existing vehicles, the study of the travel habits of employees, recommendations and potential measures to reduce unnecessary trips, encourage walking and cycling, use of public transport, economical driving. As part of EMS communication, the municipal government will encourage its external suppliers and service providers to use low-emission and zero-emission transport and sustainable modes of transportation. The sooner the system for obtaining data is created, the sooner it will be possible to implement priority measures to reduce transport energy consumption. The expected energy consumption savings due to EMS are at about 140 MWh per year, for a 36 tCO_2 annual reduction in emissions, and a EUR 16,700 per year cost reduction. Planned cost of the measure: EUR 5,000 per year.

15. Increasing the efficiency of the use of vehicles

Preliminary research shows that vehicle utilisation in municipal institutions and companies is often low. The tasks to increase the efficiency of the use of vehicles include:

- carry out preliminary research on the use of company/institution vehicles (for example, if these are used on a monthly or daily basis) in order to determine the utilisation of the vehicles;
- conduct a survey of employees on their everyday mobility for work needs (during work), including the destinations (geographically, also stating the corresponding task, function), the distance travelled, and other particular needs (for example, the need to transport much luggage);
- based on the results of the preliminary research and employee survey on vehicle utilisation and mobility needs, decide on the optimisation of the number of vehicles, and the creation of mobility points. The purpose of a mobility point is to implement the use of vehicles shared among municipal institutions (including shared cars and other environmentally friendly vehicles, such as bicycles and electric bicycles), thus increasing the efficiency of the use of the municipal vehicle fleet. Creating a mobility point involves finding and setting up the most suitable location, creating a vehicle booking system and synchronising a digital key app. The concept of shared mobility can be expanded by making it possible for other interested parties to use the vehicles during off-hours and on holidays;
- availability of safe driving courses for municipal employees, during which employees learn how to drive more safely and more economically.

As a result of the measure, the expected energy savings are 820 MWh/year, the expected CO_2 emission savings are 220 tCO_2/year and the cost savings due to reduced fuel consumption are 100.4 thousand EUR/year.

16. Promotion of the use of public transport for work among employees of the Riga City Municipality

In order to increase the use of public transport among municipal employees, one must create a binding requirement to use public transport for work trips within the city. Alternatively, a time limit (for example, 40–60 min.) can be set, below which journeys can be made by public transport as a priority. This means that work trips that take less 40 min. (or another amount of time) are made by public transport. The employees must be provided with monthly public transport tickets. The implementation of this measure would not only have a positive effect on the reduction of transport CO_2 emissions, but would also serve as an example of using public transport instead of private cars for the rest of the public.

As a result of the measure, the expected energy savings are 690 MWh/year, the expected CO_2 emission savings are 180 tCO_2/year and the cost savings are 83.6 thousand EUR/year.

17. Transition to low-emission/zero-emission vehicles in companies, municipal institutions

The city's goal is a 100% transition to environmentally-friendly zero-emission vehicles in the municipal fleet by 2030. The measures to be implemented include the development of criteria for the purchase of environmentally friendly vehicles and services, vehicle procurement (or service procurement) following the established criteria, and assessment of the purchase of work bicycles and/or other environmentally friendly vehicles for municipal authorities. The transition of the municipal vehicle fleet to zero-emission vehicles will result in expected savings of CO_2 emissions at 3,200 tCO_2/year and an increase in the share of renewables at 12,000 MWh/year.

In addition, activities that would promote the use of environmentally friendly transport solutions (public transport, bicycles, car sharing) among municipal employees are supported not only for work trips, but also for commuting to and from work.

The increase in emission-free vehicles must go hand in hand with the development of the charging infrastructure. The municipal government will install electric vehicle charging infrastructure at municipal institutions in proportion to the increase in the number of electric vehicles, and promote the use of renewables.

A detailed description of the four priority measures that will generate the greatest savings and/or investments in achieving the goals is shown in Annex 4.1. These measures are:

1. provision of 100% renewable heat energy in municipal buildings;
2. provision of 100% renewable electricity in municipal buildings;
3. street lighting modernisation project, potentially concluding an energy efficiency service contract;
4. transition to low-emission/no-emission vehicles in companies, municipal institutions, etc.

8 Energy Production

8.1 Description of the Current Situation

Information about energy production in Riga was obtained for the central heating system, decentralised heat supply, electric power supply, and natural gas supply. The total amount of energy produced in 2020 was 7,417 GWh, where heat energy production accounted for 75%, and electricity production, 25% (see Figure 8.1). The total input of energy generated from fuel was 8,665 GWh in 2020, with 25% renewables (biomass, biogas, solar energy) and 75% fossil fuels (see Figure 8.2).

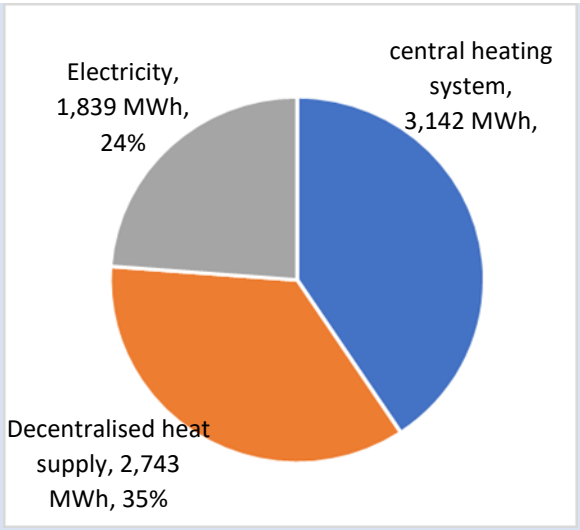


Figure 8.1. Breakdown of the total amount of energy produced in 2020

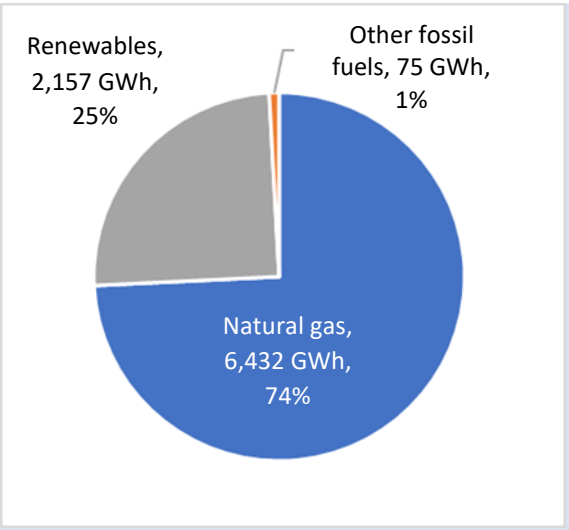


Figure 8.2. Breakdown of fuel for energy production in 2020

8.1.1 Central Heating System

The central heating system of Riga covers ~56%[108] of the total heat energy demand in Riga, whereby 70% of the consumers are in housing, and 30% are other users. The total amount of heat energy supplied to consumers in 2020 was 2,756 GWh.

The central heating system in Riga is managed by AS 'Rīgas siltums', which in 2020 produced 32% of the total heat energy demand in the company's 39 automated boiler houses and 5 heating plants (see Table 8.1), while the rest of the heat energy was purchased from other companies.

Table 8.1. Summary of AS 'Rīgas siltums' energy sources (2020)

Indicator	Value
Number of energy sources	44
Installed heating and electrical capacity	947.34 MW_{th} (including 71.0 $MW_{wood\ chips}$) 56.48 MW_{el}
Fuels used[2]	67% natural gas, 33% wood chips, 0.025% diesel fuel
Total amount of heat energy produced	1,130 GWh/year
Amount of heat energy delivered to consumers[109]	1,006 GWh/year
Average efficiency factor of energy sources	99%[110]
Heat energy purchased	2,136 GWh/year
Heat energy transferred to consumers	2,756 GWh/year

[108] Based on the calculations made by SIA EKODOMA.
[109] https://www.rs.lv/sites/default/files/page_file/ilgtspejas_parskats_2020.pdf
[110] Based on the information provided by AS 'Rīgas siltums'.

Length of heating lines, incl. unrenovated	825 km (including 697.52 km of AS 'Rīgas siltums', and ~127.5 km of others); ~244 km (35%) not renovated (owned by AS 'Rīgas siltums')
Heat energy losses in heating lines	11.77%
Area of operation of heating supply	307.30 km^2, of which 307.17 km^2 in Riga and 0.13 km^2 in Dreiliņi, Stopiņi Municipality
Number of connected sites[111]	7,532
Heated area[112]	19,336.9 thousand m^2
Heat energy fee[113]	69.36 EUR/MWh (without VAT) Since 11 March 2022: EUR 74.08 per MWh
The amount of CO_2 emissions from AS 'Rīgas siltums' energy sources	139.6 thousand tCO_2
Total Riga central heating system CO_2 emissions	398.4 thousand tCO_2
Heat supply CO_2 emission factor for Riga	0.145 tCO_2/MWh

AS 'Rīgas siltums' concluded two ambitious projects in 2021, as a result of which the share of biomass in the energy balance of AS 'Rīgas siltums' was to increase to 50% in 2021. In 2020, 68% or 2,136 GWh of the total amount of heat energy transferred to consumers in Riga was purchased from seven other energy production sources[114] (see Table 8.2). Approximately 45% of the total amount of heat energy delivered to consumers in 2020 was the amount of heat energy purchased from AS 'Latvenergo' TEC-1 and TEC-2 cogeneration plants.

Table 8.2. Characteristics of other energy sources for 2020

Indicator	Boiler rooms	Cogeneration plants
Number of energy sources	2 (SIA 'Rīgas BioEnerģija', SIA 'Eco Energy Riga')	5 (TEC-1, TEC-2, SIA 'Juglas Jauda', SIA 'Rīgas Enerģija', SIA 'Energia Verde')
Capacity installed	54.2 MW	1,709.47 MW_{th} (including 92.5 $MW_{wood\ chips}$) 1,013.38 MW_{el}
Fuels used	wood chips (diesel fuel[1])	Natural gas/wood chips/peat (diesel fuel[1])
Amount of heat energy purchased, GWh/year	331 GWh	1,805 GWh
Fossil/biomass ratio	69% (fossil) and 31% (biomass)	
CO_2 emissions amount	258.8 thousand tCO_2	

AS 'Rīgas siltums' gradually attracts new customers every year, and has expanded its licensing area to the neighbouring Ropaži Municipality. Therefore, heat energy produced in Riga is also supplied to consumers outside the administrative territory of Riga. By 2020, 65% of the heating lines owned by AS 'Rīgas siltums' have been renovated, achieving a significant reduction in heat energy losses. In recent years, two pilot projects for the 4th generation heat supply system have also been implemented.

A breakdown of the amount of heat energy depending on the type and source of the energy in the central heating system of Riga is shown in Figure 8.3.

[111] AS 'Rīgas siltums' Breakdown of purchased heat energy amounts and the amount of heat energy transferred to consumers in 2020.
[112] Data obtained from SIA 'EKODOMA' research project 'AS "Rīgas siltums" ESP inclusion'
[113] https://www.rs.lv/lv/saturs/rigas-siltums-siltumenergijas-tarifs
[114] AS 'Rīgas siltums' annual report for 2020: https://www.rs.lv/lv/content/gada-parskati

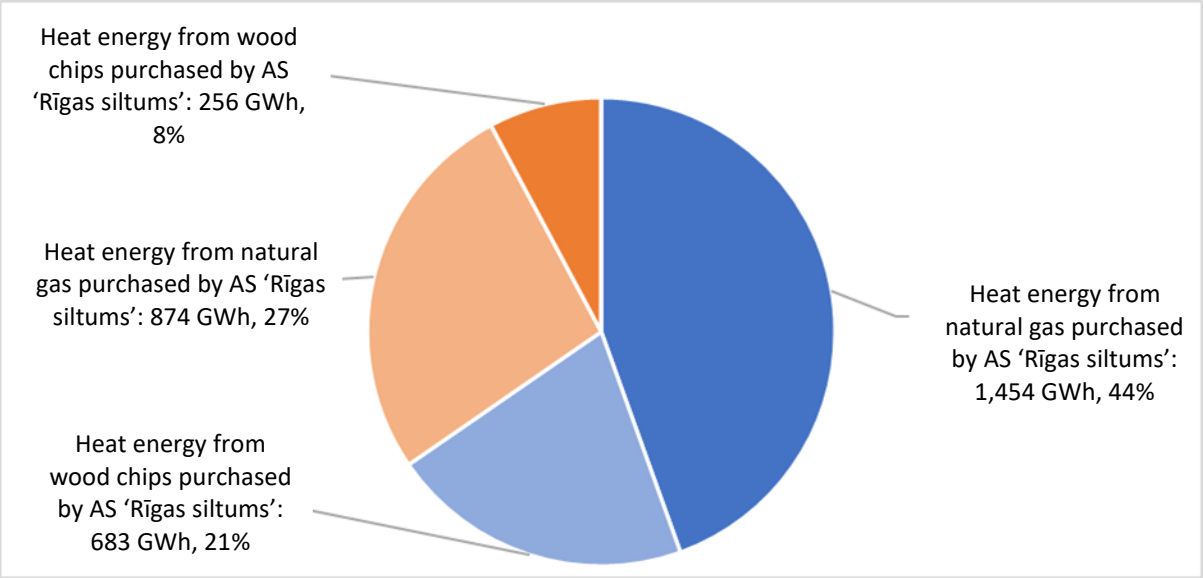


Figure 8.3. Breakdown of the amount of heat energy depending on the type and source of the energy in the central heating system of Riga

8.1.2 Decentralised Heat Supply

Decentralised heat energy production includes to those heat energy producers and consumers who are not connected to the single central heating system of Riga, but have individual or local fuel-fired equipment for generating heat energy. Currently, no data are kept on decentralised heat supply in various sectors, so they are obtained through estimates and using publicly available databases. In Riga, two main groups of such consumers can be distinguished, with input data available from various information sources: the manufacturing and service sector and the housing sector (see Table 8.3). Both the manufacturing and service sector and the housing sector use two main types of fuel: natural gas and biomass (most commonly firewood).[19]

Table 8.3. Key data describing decentralised heating supply

Indicator	Manufacturing and service sector	Housing sector
Heat energy consumption	2,046 GWh/year	484 GWh/year
Types of fuel used	Natural gas (49.5%), biomass (45.1%), fuel oil (3.3%), biogas (1.7%), diesel (0.2%), LPG (0.1%), coal (0.02%)	Natural gas, LPG, petroleum products, coal, firewood, briquettes, pellets, lumber waste
Proportion of fossil/renewable	53% (fossil), 47% (biomass)	61% (fossil), 39% (biomass)[115]
CO_2 emissions amount	195.6 thousand tCO_2	59.6 thousand tCO_2

8.1.3 Electricity Production

The main indicators for electricity production in Riga in 2020 are shown in Table 8.4. The largest producers of electricity in Riga are the AS 'Latvenergo' thermal power plants, TEC-1 and TEC-2, which in 2020 produced 92% (1685 GWh) of the total amount of electricity produced in Riga.

[115] Source: https://lvafa.vraa. gov.lv/faili/materiali/petijumi/2014/VARAM_202_2013/3_etapa_atskaite_F_ELLE.pdf

Table 8.4. Key indicators related to electricity production in Riga in 2020

Indicator	Values
Total electrical capacity installed	1,071.541 MW
Amount of electricity produced	1,839.5 GWh
Major electricity producers	92% AS 'Latvenergo' TEC-1 and TEC-2
Share of non-renewable and renewable energy sources	96% non-renewable, 4% renewable

The large proportion of the thermal power plants results in a high amount of fossil fuel in the balance of electricity produced in Riga. 96% of the amount of electricity produced in 2020 was from natural gas, and the remaining amount was from renewables. Although new solar panels are installed every year, in 2020 they produced only 0.05% (0.928 GWh) of the total amount of electricity generated in Riga (see Figures 8.4 and 8.5). Compared to 2011, the total amount of electricity produced has decreased by 19%, but the share of renewables has increased 9 times. The total amount of electricity produced covers 91.2% of the total electricity demand in Riga in 2020.

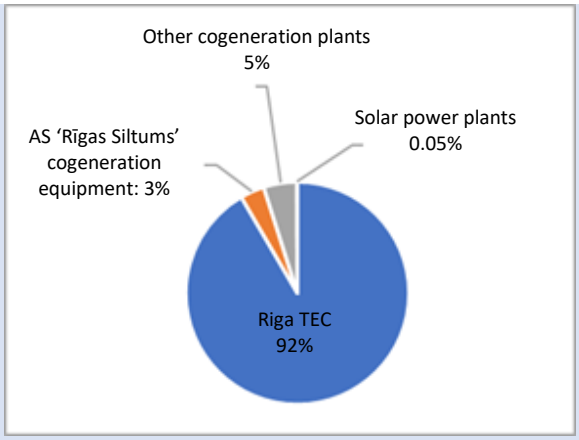


Figure 8.4. Amount of electricity produced by cogeneration and solar plants in Riga in 2020, broken down by equipment ownership

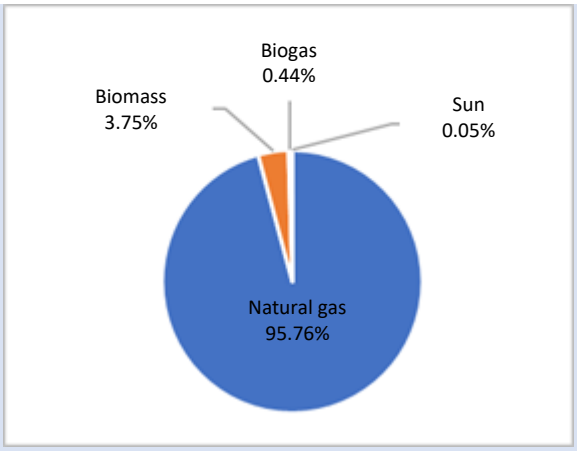


Figure 8.5. Amount of electricity produced by cogeneration and solar plants in Riga in 2020, broken down by resource type

In addition to the AS 'Latvenergo' TEC thermal power plants, other smaller-capacity cogeneration plants also operate in Riga, which typically also transfer the heat energy they produce to the central heating system of Riga. Therefore, the amount of electricity generated depends on the amount of heat energy produced, which in turn depends on the demand for heat energy. The total amount of electricity produced in Riga in 2020 was 1,839.5 GWh, which is probably even higher, as there are no publicly available data on all cogeneration stations in Riga. As for the lower-capacity cogeneration plants, a gradual increase in the electricity generated was observed prior to 2016, with a sharp decrease observed since 2018. This can be explained by the expiration of the government support for mandatory components of procurement (MCP). In Riga, electricity is also produced using solar power facilities. Their installed capacity has increased almost 4 times since 2017.

In recent years, AS 'Augstsprieguma tīkls' has doubled the length of its 330 kV high-voltage lines in Riga, and increased the length of its 110 kV high-voltage lines by 65 km. Over the past 8 years, power transmission losses have decreased by 0.6% and currently amount to 3.99%.

Four power distribution companies operate in Riga: AS 'Sadales tīkls', AS Latvijas Dzelzceļš, SIA RTO Elektrotīkli, SIA TLA Elektro.[116] The largest of these is AS 'Sadales tīkls', which distributes electricity to consumers through more than 352 thousand power metering points.

[116] Source: https://www.sprk.gov.lv/en/node/129

8.1.4 Natural Gas Consumption

In total, 29 natural gas traders were registered in Latvia in 2021, of which 18 began operations.[117,118] Although the market is open, the majority of consumers continue to be supplied by AS 'Latvijas gāze'. In 2020, 73% of all natural gas consumed in Latvia was sold by AS 'Latvijas gāze'[119] (see Table 8.5).

Table 8.5. Key indicators related to natural gas supply in Riga in 2020

Indicator	Values
Average gas availability in Riga neighbourhoods	80%
Total natural gas consumption	362,429 thousand m^3
Changes in natural gas consumption since 2018	-28%
Breakdown of consumers	9% households, 91% others
Amount of CO_2 emissions from natural gas consumption	699 $ktCO_2$[120]

AS GASO is the only distribution system operator in Latvia. According to the RCC Urban Development Department's study on the quality and availability of services characterising the urban development of Riga in 2020, the average availability of gas in Riga's neighbourhoods is 80%. Gas availability is 100% for six out of 58 neighbourhoods (Avoti, Centrs, Dārzciems, Grīziņkalns, Ķengarags, and Maskavas Forštate), and 0% for three neighbourhoods (Kundziņsala, Salas, and Voleri).[121,122]

The breakdown of natural gas consumption by year and user groups is shown in Table 8.6. Based on the information provided by AS GASO, the total consumption of natural gas in 2020 was 3462 GWh, which is 22% less than the average consumption of natural gas in 2018–2019.

Table 8.6. Breakdown of natural gas consumption by different end consumers[123]

End consumers	Natural gas consumption, GWh/year		
	2018	2019	2020
Housing sector	493	461	295
Manufacturing and service sector	4,303	3,671	1,014
Public sector			213
Riga central heating system			1,940
TOTAL	**4,796**	**4,131**	**3,462**

Of the total natural gas consumption in 2020, 56% was consumed by the central heating system of Riga, 29% by the production and service sector, 9% by the housing sector, and 6% by other consumers, such as government and municipal buildings, and other public buildings that provide their heating supply individually.

[117] Source: https://app.powerbi.com/view?r=eyJrIjoiYmIyYjVmYjQtZGNhOS00YzgwLThiMmEtN2IwMWU2OTUwZGRkIiwidCI6ImU0MGNhOTA5LTg3YmEtNGQ2NS05MTllLTU1YjVlMGRlODUwNSIsImMiOjh9

[118] There is no information available about natural gas traders for Riga users.

[119] Calculated taking into account the AS 'Conexus Baltic grid' total natural gas consumption in Latvia (11.6 TWh, https://www.conexus.lv/uploads/filedir/Aktualitates/Parskati/Dabasg__parv_sist_operatora-zinojums_par_2020_JUN_ready2.pdf) and AS 'Latvijas gāze' the amount of natural gas sold in Latvia (8.5 TWh, https://cns.omxgroup.com/cds/DisclosureAttachmentServlet?messageAttachmentId=853614)

[120] Using 0.202 tCO_2/MWh as the emission factor, and the lowest heat for combustion being 9.55 MWh/thousand m^3. It should be noted that this amount includes both the central and decentralised heating supply, and companies participating in the EU ETS.

[121] Source: https://sus.lv/pilsetvides-attistibu-raksturojoso-pakalpojumu-kvalitate-un-pieejamiba-rigas-58-apkaimes-2020gada

[122] Source: https://sus.lv/petijumi/petijums-par-pilsetvides-attistibu-raksturojoso-pakalpojumu-kvalitati-un-pieejamibu-0

[123] The information is based on data provided by AS GASO, and data and calculations on central and decentralised heating systems.

8.2 Challenges

Table 8.7 shows the main challenges for the energy production sector to achieve the objectives of the ACTION PLAN.

Table 8.7. Key challenges of the energy production sector

Challenges in the energy production sector
Significant impact on achieving climate neutrality (second largest source of CO_2 emissions).
There is no clear and single strategy for achieving climate neutrality in energy production in Riga.
Impact of national sources of energy (operation of AS 'Latvenergo' TEC-1 and TEC-2 thermal power plants).
Lack of support for the production of electricity from renewable energy sources (including the expiry of mandatory procurement permits for cogeneration plants, and its impact on the share of renewable energy sources).
There is a lack of common understanding about the wider use of biomass in energy production and its impact on air quality in Riga.
Challenges in the central heating system
High proportion of fossil fuels, with 69% in the production and supply of heat energy in the central heating system of Riga.
Competitiveness of renewable energy projects with natural gas solutions for heat energy production.
Higher burden of administrative and environmental requirements compared to decentralised energy production solutions.
Gradual transition to the 4th generation heat supply system in places with already existing heat lines and heat supply system.
Technical condition and development of small natural gas boiler houses of AS 'Rīgas siltums' (with a total installed capacity of 29.5 MW): transition to renewables and the possibility of their connection to the central heating system of Riga.
Use of surplus energy: provision of technological parameters for its delivery to the Riga central heating system.
Availability, quality, and use of input data for decision-making and further monitoring.
Challenges in decentralised heating supply
Availability, reliability, and use of information and raw data in the decision-making for the decentralised heat supply in Riga.
High share of decentralised heat supply in Riga, 44%.
High (63%) share of fossil fuels in the manufacturing and service sector, and in the housing sector (61%).
The efficiency and compliance of the installed decentralised fuel-fired equipment with energy-efficiency and other law (e.g., compliance with fire safety requirements).
Efficient use of wood energy resources (especially for firewood).
Air pollution from decentralised fuel-fired facilities, especially in the centre of Riga.
Challenges in electricity supply
High proportion of fossil fuels (96%) in local electricity production.
Currently, REA does not have a data system for tracking implemented renewable energy projects, and no data on installed capacities or produced electricity are collected or analysed.
Building energy communities, promoting the installation of renewable energy equipment for local and individual electricity production.
Electrification of transport and the heating supply system. Transition from using gas to electricity for cooking in buildings.
Installation of new solar plants in various newly developed areas.

Encouraging companies to switch to local electricity production for their own consumption.[124]
Challenges in natural gas supply
Availability of natural gas consumption data for all consumer groups in order to plan targeted actions. Currently, 91% of the total natural gas consumption is taken up by the 'Other' category.
Reduction of natural gas consumption in all sectors.
Large losses on the level of end consumers of natural gas.[125] Non-compliance of gas supply system elements in residential and commercial buildings with regulatory requirements.[126]
The sustainable development strategy of Riga states that several construction development areas with gas supply are planned for the future. This vision of the future defined in the sustainable development strategy of Riga does not match the vision of climate neutrality. In order to promote the achievement of climate neutrality, other technological solutions should be sought for providing heating, for example, creating connections to the centralised heating supply system (if possible), reducing the necessary heat energy consumption to a minimum, etc.

8.3 Measures

A total of 9 measures have been identified in the energy production sector that will generate the following benefits in 2030:

- increased amounts of renewable energy: 1,080,233 MWh/year;
- reduced amount of CO_2 emissions: 181,122 tCO_2/year;
- investment volume: EUR 975 million.

Most of the measures and performance indicators included correspond to the actions determined for the year in Riga Development Programme 2022–2027. Measures related to the central heating system of Riga were determined in accordance with the non-financial goals of AS 'Rīgas siltums' for 2024. The planned energy production measures are closely linked with the measures and results planned in other subject groups of the ACTION PLAN, such as measures for multi-apartment buildings, environmental communication, municipal infrastructure, as well as climate neutrality policy groups.

The energy production subgroup will be mainly responsible for the implementation of the measures (see Section 4.3.1).

8.3.1 Total Energy Production

1. ***Develop a long-term planning document for the energy sector of Riga to achieve climate neutrality goals.***

In order for Riga to achieve the goal of climate neutrality (net 'zero' CO_2 emissions) by no later than 2050, one must abandon the use of natural gas and other fossil fuels in the production of energy (heat energy and electricity). Achieving this goal requires a targeted, strict, and smart long-term energy policy. Issues related to the national-level energy supply must also be resolved in Riga, which makes the achievement of the goals of climate neutrality in Riga even more complicated and time-consuming, so work on tackling these issues must be started as soon as possible.

The long-term planning document of the energy sector of Riga includes centralised and decentralised heating supply, and electricity production. Individual measures in each of these sectors will have effects on each other and effects on the system as a whole, so they must be viewed as a whole.

[124] According to the proposed amendments to the Electricity Market Law drafted by the Ministry of Economics, the NETO system will also be available to legal entities, and the installed capacity limits will be increased. Such amendments will allow companies to transfer the amount of electricity produced from renewables, but not consumed, to the grid and later recover it, paying only for the transmission and distribution service.

[125] The losses in the elements of the gas supply system owned by users account for 86% of all losses on the way from the border of Latvia to the combustion of the fuel. https://www.gaso.lv/uploads/filedir/Par_uznemumu/2020_gaso_vides_politika.pdf

[126] Source: https://likumi.lv/ta/id/275009-noteikumi-par-latvijas-buvnormativu-lbn-241-15-dabasgazes-ieksejo-gazesvadu-sistema

It is essential within the framework of the planning document to set ten-year goals (2030, 2040, 2050 goals) for the sector as a whole and for each individual, in order to then determine clear measures to achieve these goals. The following issues should initially be addressed in drafting the planning document:

- availability of raw data and improvements in data quality (central heating system, decentralised heating, electricity supply, and natural gas use);
- future role of AS 'Latvenergo' TEC-1 and TEC-2 in providing the national energy supply and in achieving the climate neutrality goals of Riga;
- use of modelling tools for predicting future trends and developing various scenarios for achieving the ten-year goals in the energy sector of Riga, to reach climate neutrality by no later than 2050;
- discontinuing investments in new fossil fuel capacity.

A more detailed description of the drafting of the long-term planning document for the energy sector of Riga is provided in Annex 4.2.

8.3.2 Central Heating System

2. Increasing the efficiency of heat energy production in energy sources.

AS 'Rīgas siltums' manages 44 energy sources. So far, improvements have been made with a particular focus to increase the energy efficiency of large thermal power plants, but further efforts must be taken to promote more efficient heat energy production. At the same time, stricter requirements for the efficiency of energy sources of other operators from which heat energy is purchased should be considered and assessed.

3. Gradual transition to the 4th generation heating supply system.

Currently, the central heating system of Riga mostly uses a 3rd generation heating line, where the temperature of the heating medium (water) is below 100 °C. In 4th generation heating lines, the heat medium has lower water temperatures (flow temperature 60–40 °C, return temperature 30–25 °C), which leads to a reduction of heat energy losses in the lines, with the possibility to introduce a heat energy surplus from other renewables sources, such as solar collectors and heat pumps. Such a concept is intended for the climatic conditions of Northern European countries, where heat energy is provided for both heating and hot water production.[127]

In general, one must promote the use of 4th generation heating line solutions in the central heating system of Riga. The implementation of the measure by 2030 should be considered mandatory for new connections to the central heating system of Riga, and the installation of such a system should be considered if rebuilding heat lines or changing the heating supply system for the consumer. The implementation of the measure will create a direct impact on the achievement of the central heating system goal: a relative reduction of losses in heating lines. The measure is also included in the non-financial goals of AS 'Rīgas siltums' for 2024, developed by the RCC Climate Neutrality Group.

4. Foster the digitisation of the heat supply system.

the central heating system of Riga includes 44 energy sources managed by AS 'Rīgas siltums'; the total length of the heat lines is 825 km with more than 7,000 connections. Currently, in most cases, the heat energy is supplied to the consumers according to the temperature schedule prepared by AS 'Rīgas siltums'. It predicts what the temperature of the heat medium should be, depending on the outdoor

[127] Source: https://www.gulbene.lv/images/att/proj/2020/low/Zemas_temperat%C5%ABras_CSS_ievie%C5%A1anas_strat%C4%93%C4%A3ija_Gulbenes_novad%C4%81.pdf

air temperature, in order to deliver the required amount of heat energy to consumers. As part of the digitisation of the heat supply system, it is planned to use real-time data from energy sources and consumers, and the actual outdoor air temperatures registered by local meteorological stations, according to which the central heating system operation can be adjusted.[128] The overall energy efficiency of the central heating system can be increased in this way. It should be noted that this measure is also related to compliance with regulatory requirements for the creation of an individual heat energy consumption metering system at the level of the consumer.

The implementation of the measure by 2030 should first take place in cases where the reconstruction of existing energy sources and heating lines is carried out. Then in the case of building new energy sources, heating lines, and the connection of new consumers. The implementation of the measure will create a direct impact on the achievement of the central heating system goal: a relative reduction of losses in heating lines. The event is included in the non-financial goals of AS 'Rīgas siltums' for 2024.

5. Promoting more renewables in the central heating system.

The following actions are planned as part of this measure:

- Promote the use of solar system solutions and heat pumps in low-capacity boiler houses of the central heating system. According to the forecasts of the International Energy Agency, the use of solar collectors for hot water supply and heat pumps for heating will play a significant role in replacing fossil fuels in the future.[129] AS 'Rīgas siltums' manages 36 lower-capacity natural gas boiler houses (total capacity: 29.5 MW; within a range of 42 kW to 13.00 MW). Individual buildings, small groups of buildings, and certain residential neighbourhoods are connected to these boiler houses (Mangaļi, Valdlauči, 'Juglas papīrfabrika', Jaunciems). As part of the event, it will be necessary to first assess the options for replacing the boiler houses with renewable solutions or with connections to the central heating system of Riga. The energy consumer should be assessed and, if possible, the energy consumption should be reduced to a necessary minimum. In terms of implementation, it would first be necessary to start implementing renewables projects in natural gas boiler houses that need reconstruction, or the implementation of measures that offer the shortest payback time. Then, all other natural gas stations should be gradually switched to renewables or connected to the central heating system of Riga. In addition, it must be ensured that new boiler houses of any capacity installed only use renewables.
- Foster the utilisation of surplus heat. Currently, 3 renewable energy plants and 6 industrial companies, which theoretically meet the conditions for using surplus heat, have been identified in Riga.[130] Notably, however, the use of surplus heat in the central heating system is determined by the temperature levels and heat media used. Therefore, the first step is to assess the use of surplus heat from the nine sources identified above.

In general, the implementation of these measures will increase the proportion of renewables by 38,883 MWh/year, and achieve a reduction of 7,854 tCO_2 in emissions. A more detailed description of the promotion of renewables growth in the central heating system is given in Annex 3.2.

6. Implementation of innovative pilot projects.

In order to achieve the goals of climate neutrality by no later than 2050, one must assess and implement pilot renewables projects in cooperation with universities and scientific institutions in order to look for various solutions to improve the efficiency of the existing central heating system, to

[128] Source: https://www.dtu.dk/english/news/2020/10/eng-digitalisering-i-fjernvarmen-bidrager-til-2030-maal??id=5c3a7c1a-867b-4ea0-b185-4be5dd65e371

[129] Source: https://www.iea.org/news/pathway-to-critical-and-formidable-goal-of-net-zero-emissions-by-2050-is-narrow-but-brings-huge-benefits

[130] Source: https://videszinatne.rtu.lv/wp-content/uploads/2021/02/DHCS_lv_1_nodevums_g_c.pdf

adapt technological renewables solutions to local conditions, which includes promoting the use of emission-free energy sources, such as heat recovery from wastewater. This measure also includes looking for solutions that involve the production of cold energy in the context of adaptation to climate change. The implementation of the measure will not have a direct and immediate effect on the increase in the proportion of renewables or the reduction of heat energy consumption, but the measure has a long-term effect on the achievement of climate neutrality goals in Riga.

7. Ensuring the connection of new clients to the central heating system of Riga.

Based on calculations, in 2020, the central heating system in Riga accounted for only 56% of the total heat energy demand. From the point of view of air quality and efficiency, the central heating system is a more sustainable solution compared to decentralised heat supply systems. Therefore, one of the goals is to increase the share of the central heating system in Riga. In order to achieve this, one must address several important issues:

- prepare standard solutions and support mechanisms for connecting decentralised sites to the central heating system, which should be able to compete with the individual natural gas heating system in terms of cost;
- create financial support or other instruments to encourage users of fuel-burning equipment to connect to the central heating system of Riga, by making changes to RCC Binding Regulation No. 97 'On territorial zoning of air pollution' in what pertains to the choice of fuel-burning equipment, and setting requirements for reducing CO_2 emissions;
- implement information measures to boost awareness (for more, see Section 12.3, Environmental Communication subsection);
- develop a support programme that makes it easier for residents to connect to the central heating system through support options.

As a result of the implementation of the measure, it is expected that the share of the central heating system will increase as much as 60% compared to 2020. The measure is also included in the non-financial goals of AS 'Rīgas siltums' for 2024. A more detailed description of attracting new clients to the central heating system is provided in Annex 3.

8.3.3 Decentralised Heating Supply

8. Promote the use of renewables in decentralised heat supply or connecting to the central heating supply system of Riga.

The aim of this measure is to foster an increase in the share of renewables in the decentralised heating supply. At the same time, this measure and its planned actions must be implemented in accordance with the measures of the Riga Air Quality Improvement Action Programme 2021–2025 intended to improve air quality in order to reduce air pollution created by using renewables, especially biomass. Overall, this includes the following key actions:

- Gradually, with a transition period, no later than 2025, new permits will no longer be issued for the installation of fossil fuel-burning equipment with a capacity of less than 0.2 MW. This measure applies to both the replacement of existing equipment and the installation of new equipment. Such equipment is principally used in the housing and public sector. The consumption of natural gas will be significantly reduced as part of this measure, as the use of other fossil fuels in fuel combustion plants with a capacity of less than 0.2 MW is very small. At the moment, there are no specific data available on the number of such devices and their installed capacity in Riga, and as to the breakdown of the fuel used in them, so it is not possible to determine what the increase in renewables and the reduction of CO_2 emissions would be if this measure is implemented.

- The installation of fuel-burning equipment with a capacity greater than 0.2 MW takes place according to the following priority approach: possibility of connecting to the Riga central heating system; use of renewables technologies; use of natural gas only with carbon capture and storage (the use of other fossil fuels in decentralised heating supply is not planned), starting from 2030[131]. This measure covers the replacement of existing equipment and the installation of new equipment, and mainly covers the manufacturing and service sector, of which the majority (63%) currently uses fossil fuels.
- In order to encourage the use of renewables, consider the possibility of applying the 'polluter pays' or other principles in the municipality.

The ACTION PLAN encourages the transition of the decentralised heat supply to renewables, by developing emission-free heat sources as a priority, and building connections to the central heating system of Riga.

The implementation of the measure will result in a reduction in natural gas consumption and an increase in the share of renewables by 511,850 MWh/year in decentralised heat supply, compared to the 2020 levels, as a result of which a reduction of 115,525 tCO_2 will be achieved in 2030.

8.3.4 Electric Power Supply

9. Promote the use of renewables in the production of electricity for the needs of Riga.

This measure includes the following actions:

  - Construction of wind and other renewable energy power plants. In accordance with the General Regulations for Land Planning, Use, and Construction, wind power plants with a capacity of more than 20 kW are also allowed to be built in forest areas. According to the data of the State Land Service, forest land in Riga is 5,445 ha, i.e., 18% of the total area of the city. One of the options is to assess whether and where it would be possible to build wind power plants in the Riga forest areas, thereby increasing the share of renewables in the city's energy balance. The first step would be to assess whether any of the forest areas in Riga meet the criteria for setting up a wind power plant;
  - Encourage the creation of local resident and municipal energy communities by providing information and technical support;
  - assess the possibility of installing solar panels and other renewable energy solutions for local residents (energy communities, companies, etc.), using the infrastructure available to the municipal government. Develop solutions for installing solar panels (e.g., let out roof areas with guaranteed purchase of energy produced according to the energy exchange market price).

- Creation of a calculator for estimating the costs of installing solar panels and wind generators. By adapting existing tools, one must develop a tool for assessing the installation of solar panels and wind generators for Riga. Such a tool would help interested parties to assess the potential and benefits of these facilities, thereby increasing the share of renewables in electricity production.
- Encouraging the transition of companies to local electricity production for own consumption. A large number of companies in Riga consume much electricity, which can be covered at least partially with renewable energy production facilities, such as solar panels, in the long term. There are companies in Riga that already invest in renewables,

[131]Source: https://iea.blob.core.windows.net/assets/deebef5d-0c34-4539-9d0c-10b13d840027/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf

even without government support. With the rapid development of solar panel technologies, their use in electricity production is becoming more and more profitable. One of the main tasks of the municipal government is to inform Riga companies about the possibilities of installing renewables-based power generation equipment, in cooperation with partners, such as ALTUM.

The implementation of this measure will increase the share of renewables in the electricity production sector by 529,500 MWh/year, and a reduction of 57,716 tCO_2 will be achieved in 2030.

A detailed description of the three priority measures with a significant contribution to the achievement of the goals is shown in Annex 4.2. These measures are:

1. Develop a long-term planning document for the energy sector of Riga to achieve climate neutrality goals.
2. Promote the use of renewables in the central heating system of Riga.
3. Ensuring the connection of new clients to the central heating system of Riga.

9 Apartment Buildings

9.1 Description of the Current Situation

Residential buildings with three or more apartments are considered multi-apartment buildings, including low-rise and high-rise residential buildings[132]. There are a total of 11.7 thousand of such buildings in Riga, which is 29.7% of the total number of apartment buildings in Latvia.[133] According to the data provided by REA, the total useful floor area for multi-apartment buildings in Riga is 18,615 thousand m^2, with an average useful floor area of 1,585 m^2 per building. Their number and useful floor area, broken down the year of commissioning of the buildings, is shown in Figure 9.1. The largest proportion (59%) are buildings that were commissioned in the period up to 1945. However, the buildings put into operation between 1946 and 1993, i.e., built during the Soviet period, have the largest useful floor area (56% of the total) and have a larger number of apartment owners.

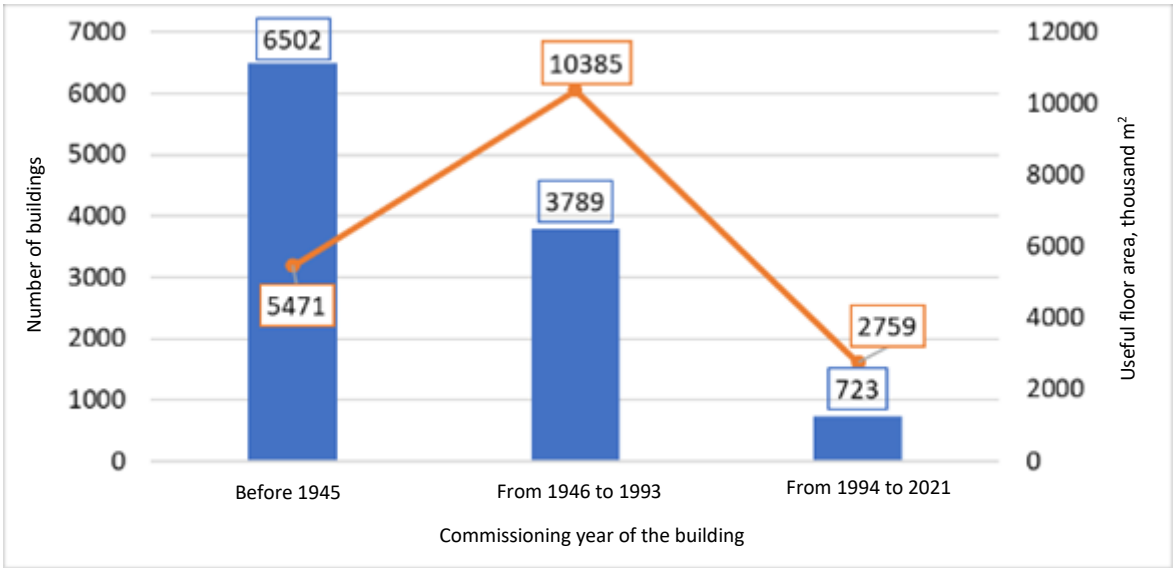


Figure 9.1. Number of multi-apartment buildings, and useful floor area, broken down by the year the building was commissioned

Studies show that the energy efficiency requirements of multi-apartment buildings built during the USSR period and prior to 2015 do not meet the requirements of the currently effective Cabinet Regulation No. 280 'Regulations on Latvian building code LBN 002-19 "Heating equipment of building perimeter structures"'. Changes in the regulatory requirements for multi-apartment buildings pertaining to the specific heating energy consumption according to the year of construction of the building are shown in Table 9.1. Exceptions in terms of energy efficiency requirements are set for buildings that have the status of cultural heritage sites. Information about the total number of apartment buildings in Riga that have this status is not available.

Table 9.1. Changes in regulatory requirements for the energy efficiency of multi-apartment buildings[134]

	Specific heat energy consumption for heating, kWh/m^2 per year							
	1980	1992	2003	2015	2016	2017–2018	2019–2020	>2021
New buildings	150–200	100–130	70–90	60–85	≤70	≤60	≤50	≤40
Renovation and reconstruction	-	-	-	≤90				≤80

[132] Source: http://arhitekts.riga.lv/index.php?option=com_content&view=article&id=583:kvartalu-izvele&catid=131&Itemid=28
[133] Source: https://ec.europa.eu/energy/sites/default/files/documents/lv_2020_ltrs.pdf
[134] Source: https://ec.europa.eu/energy/sites/default/files/documents/lv_2020_ltrs.pdf

Riga has a large proportion of buildings that need to be renovated (about 6,000 apartment buildings). At the same time, the activity of renovation of existing buildings is low.[135] By 2019, a total of only 159 had been renovated in Riga[136], or 1.4% of the total number of apartment buildings in Riga. Out of the total number of apartment buildings (105) which received co-financing for improving their energy efficiency as part of the ALTUM programme, 46 buildings were managed by homeowner associations (44%), 43 by municipal limited companies (41%) and 16 by other limited companies (15%). Two apartment buildings were renovated with the participation of ESP companies.[137]

In order to promote the renovation of multi-apartment buildings, the municipal government has so far been granting real estate tax incentives. In May 2020, the programme 'Riga Municipal Co-financing of the Renovation of Residential Houses in 2021–2022' was approved, providing 50% as co-financing for measures to improve the energy efficiency of homes[138,139].

Building managers play an important role in the renovation of multi-apartment buildings. There is a lot of competition in the housing management market in Riga, and new companies are still entering it.[140] One of the largest management companies is SIA 'Rīgas namu pārvaldnieks', which manages 4284 houses.[141] In total, more than 170 housing management companies and more than 500 homeowner associations are registered in Riga.[142] Based on the results of a survey of Riga citizens, there is still a high (44%) level of dissatisfaction with the quality of housing in Riga. In addition, housing maintenance costs are also increasing.[143] One of the solutions is to establish homeowner associations, and let the residents take on the management of the buildings themselves. However, there are still a significant number of buildings that have not been taken over by homeowner associations[144] (2,500–3,500 buildings).

Currently, there are no data available on the overall energy efficiency level of multi-apartment buildings in Riga. In relation to the information provided by REA, the average specific heat energy consumption in multi-apartment buildings connected to the central heating system of Riga in 2017–2020 was 147 kWh/m^2 per year[145] (without climate correction). The changes in the total consumption of heat energy by the housing stock connected to the central heating system of Riga are shown in Figure 9.2.

[135] Source: https://ec.europa.eu/energy/sites/default/files/documents/lv_2020_ltrs.pdf
[136]Source: Riga Development Programme 2022–2027, 'Description of the current situation', version 1
[137]Source: http://www.renesco.lv/projects/renovating
[138]Source: Riga Development Programme 2022–2027, 'Description of the current situation', version 1
[139]Source: https://atjauno.riga.lv/dzivojamas-majas/
[140] Source: https://www.db.lv/zinas/uznemums-riga-ir-loti-liela-konkurence-namu-apsaimniekosanas-tirgu-498371
[141]Source: Riga Development Programme 2022–2027, 'Description of the current situation', version 1
[142] Source: https://www.lursoft.lv/meklet?q=namu+apsaimnieko%C5%A1ana
[143] Source: https://atjauno.riga.lv/dzivojamas-majas/
[144]Source: Riga Development Programme 2022–2027, 'Description of the current situation', version 1
[145] The calculations are based on the information about the floor areas of the buildings available to the State Land Service, and the information about the consumption of heat energy at 4,707 sites provided by AS 'Rīgas siltums'.

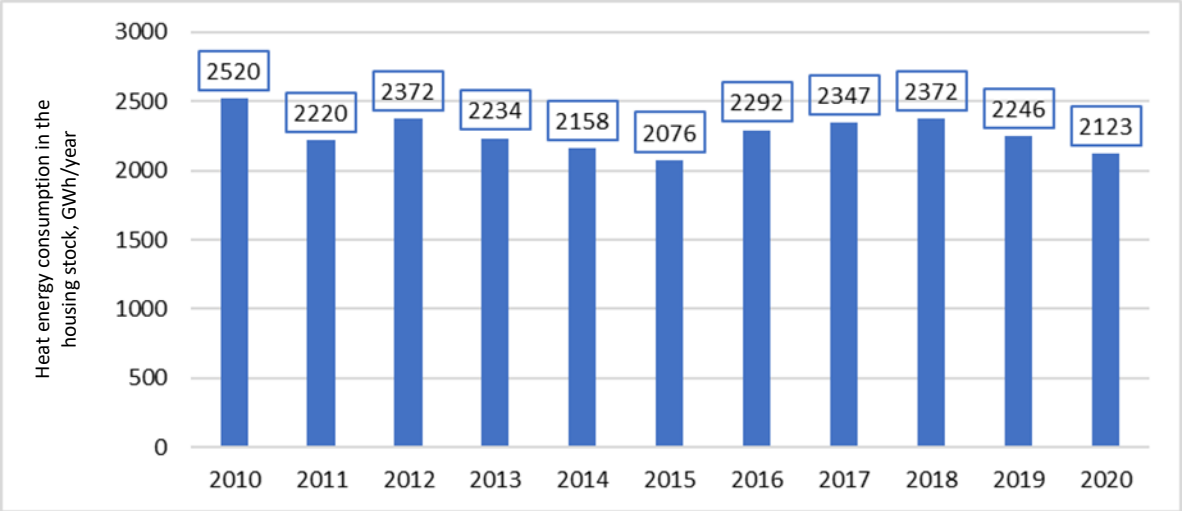


Figure 9.2. Changes in heat energy consumption in the housing stock

Heat energy consumption has not changed significantly over the last 10 years. The average decrease during this period is only 2%. The total heat energy consumption was 2,123 GWh in 2020, which generated 307.8 thousand tCO_2 in emissions.

9.2 Challenges

Table 9.3 summarises the main current challenges pertaining to the renovation of multi-apartment buildings, in order to achieve the goals of the ACTION PLAN.

Table 9.3. Key obstacles/challenges identified related to the energy efficiency of multi-apartment buildings in Riga

Challenges in the multi-apartment building sector
Availability and reliability of input data for the assessment of the energy efficiency level of multi-apartment buildings.
The largest heat energy consumer and source of CO_2 emissions is the central heating system of Riga.
Residential buildings are both physically and technologically outdated, and measures for their revitalisation are not carried out on a sufficient scale.
Low proportion of renovated multi-apartment buildings (1.4% or 159 buildings). Low interest of local residents in the renovation of apartment buildings.
No strategy for the renovation of multi-apartment buildings has been developed, no institution that would be responsible for systematically addressing these issues at the municipal level has been determined.
Bad reputation of the municipal building management company in the organising of building renovation projects.
Renovation of multi-apartment buildings with a small number of flats, which are in a technically poor condition or dangerous for operation. E.g., two-storey wooden buildings in the Maskavas Forštate, Vecmīlgrāvis, Sarkandaugava, Vecrīga neighbourhoods, and the Central District.
Restoration of multi-apartment buildings that have the status of cultural heritage sites.
The role of apartment building homeowner associations is essential in the renovation of the buildings. Low activity among local residents, which limits the creation of associations. The total number of associations is unknown and identifying them is difficult.
Creation of an individual heat energy metering system by 2027.
The co-financing available for the implementation of energy efficiency measures in housing is not used actively enough.
Owners of the multi-apartment buildings fail to agree on joint decision-making.

Low familiarity of local residents with measures to save heat energy and the correct use of renovated buildings, including their equipment. Organising of information events.
Long (>30 years) repayment period for multi-apartment building renovation projects, if the project profitability is only based on heat energy savings and does not take into account the additional benefits of renovating the buildings.
Insufficient capacity of the construction industry to renovate a large number of apartment buildings in a short time.
Support programmes for housing renovation are fragmented and short-lived. In order to receive financial support, project participants are faced with complicated and time-consuming documentation and bureaucratic processes.
Building owner savings are insufficient, and debt liabilities often make it difficult to obtain financing for renovation. Improvements in the energy efficiency of houses have not been implemented to an adequate extent, despite the availability of various EU financial resources.
Quick, sustainable renovation of the buildings based on circular economy principles is needed.

9.3 Measures

A total of 6 measures have been identified in the multi-apartment building sector that will generate the following benefits in 2030:

- amount of energy saved: 410,784 MWh/year;
- amount of CO_2 emissions reduced by: 59,563 tCO_2/year;
- expected investment amount: 1009 million EUR/year.

The measures included in the ACTION PLAN are directly and indirectly related to Task 5.3 of the Riga Development Programme 'Foster the comprehensive renovation of the housing stock, and promote the improvement of living spaces'. It should be noted that the implementation of these measures will have an impact on the heat energy and electricity generation sector, which is described in Chapter 8 of this document. The responsibility for the implementation of the measures is assigned to the multi-apartment buildings subgroup (see Section 4.3.1).

9.3.1 Improving the Availability of Information and Data About the Energy Efficiency of Multi-Apartment Buildings

The measure pertains both to activities in the multi-apartment building sector and to environmental communication. The measure includes the creation of an energy monitoring and benchmarking system for multi-apartment buildings, with the aim of informing local residents about current energy consumption, and encouraging the introduction of energy efficiency measures, based on the comparison of data between similar types of buildings. One of the first tasks is to develop a methodology for the collection and analysis of heat energy consumption data for multi-apartment buildings connected to the central heating system and those with individual heat supply. The second step is to create and maintain a publicly available database on the actual heat energy consumption of multi-apartment buildings (including specific heat energy consumption and/or energy fees paid in renovated and non-renovated multi-apartment buildings, etc.). The creation and maintenance of the database would enable the identification of problematic buildings that do not meet regulatory requirements, and based on these data, energy certification could be carried out in buildings with the highest specific heat energy consumption.

The implementation of this measure will not have a direct and immediate effect on the reduction of heat energy consumption, but this measure has a long-term effect on the achievement of climate neutrality goals in Riga.

9.3.2 Developing and Updating a Renovation Programme for Riga Multi-Apartment Buildings

Currently, the renovation of multi-apartment buildings in Riga and elsewhere in Latvia does not take place consistently, but largely depends on the availability of co-financing for the renovation of buildings and the initiative of project participants in obtaining financing. Since one of the goals of the ACTION PLAN is to achieve the renovation of 2,000 apartment buildings by 2030, one must develop a Riga apartment building renovation programme as soon as possible (by mid-2022). The following issues must be addressed as part of it:

- assessment of the current situation, setting goals and performance indicators, and monitoring of the progress;
- Development of rules for the establishment and implementation of the Energy Efficiency Centre as part of the Housing Competence Centre;
- clear allocation of duties and responsibilities among all involved parties (municipal departments, agencies, companies);
- development of support instruments for reducing energy poverty;
- defining of conditions for managing and implementing the programme;
- defining of the activities to be supported, and establishing of stricter requirements for the renovation of buildings;
- creation of mechanisms for obtaining funding.

A more detailed description for the development of the programme is offered in Annex 4.3. The implementation of this measure will not have a direct and immediate effect on the reduction of heat energy consumption, but this measure has a long-term effect on the achievement of climate neutrality goals in Riga.

9.3.3 Creation and Operation of the Energy Efficiency Centre

The goal of the Energy Efficiency Centre is to provide support to the residents of Riga in matters of building renovation, starting with the development of an energy audit and ending with support for the start of construction work. In the creation of this centre, it would be necessary to involve specialists and representatives of various industries: engineers, energy auditors, building managers, associations, AS 'Rīgas siltums', ESPs/project managers, as well as municipal ESPs and institutions that allocate funding. The Energy Efficiency Centre could potentially be in charge of:

- developing and implementing the Riga housing programme;
- collecting and updating quality information about the housing stock in the municipality;
- collecting knowledge and examples of good practice pertaining to energy efficiency in housing;
- attracting existing financial sources and participating in the introduction of new financial instruments;
- implementing energy efficiency improvement and climate change mitigation measures;
- implementing monitoring activities, e.g., maintaining a heat energy database for multi-apartment buildings;
- ensuring the development of architectural solutions for standardised renovation projects;
- developing and promoting the implementation of standardised insulation projects for building;
- advising, informing, and educating citizens;
- strengthening the competences of developers of renovation projects for existing buildings;
- ensuring the representation of housing sector interests at the national and EU level;

- providing financial support to local residents in what pertains to the renovation of buildings, creating long-term loans beneficial to local residents (revolving fund, and other sources).

A more detailed description for the development of the programme is offered in Annex 4.3. The implementation of this measure will contribute to the completion of multi-apartment building renovation projects and the achievement of the goals by 2030.

9.3.4 Involvement of Local Residents in the Renovation of Apartment Buildings

The Riga City Municipality cannot carry out the renovation of multi-apartment buildings for the residents, but it can provide them with the necessary support and motivation in order to promote the involvement of the residents in the arrangement and renovation of their homes. This measure includes the following main actions:

- Targeted, well-designed, and comprehensive municipal campaign in cooperation with the Ministry of Economics information campaign 'Dzīvo siltāk', Riga building managers, FOCAs, and associations. During the campaign, it would be necessary to involve the media, hold information events, provide local residents with tours of renovated buildings serving as examples of good practice, continuing to inform and involve local residents in co-financing the renovation of buildings within the Riga housing renovation programme, and holding training sessions for house managers, house supervisors, and other interested parties on the topics of the building renovation process, its benefits, and ways to receive aid.
- Providing support for the preparation of documentation (for RCC, ALTUM, ELENA, and other programmes) and participation in general meetings with local residents. This measure is already being implemented. It would be important to analyse the activities carried out so far and, based on the conclusions, make the necessary improvements.
- Creation of a support mechanism for the establishment of multi-apartment homeowner associations taking over the buildings and making decisions.
- Creation of a training programme for energy efficiency project managers. The purpose of the training is to provide future energy efficiency project managers with the necessary knowledge, tools, and communication skills to help implement multi-apartment building renovation projects in Riga faster and more efficiently.
- Evaluate the possibility of establishing a municipal ESP company.

Additional communication measures for local resident involvement in the renovation of multi-apartment buildings are described in Section 12.3 'Environmental communication'. Approximately EUR 979 million will be needed to restore 2,000 apartment buildings. It will generate 410,784 MWh in savings and a reduction of almost 60 thousand tCO_2 in emissions per year.

9.3.5 Establishment of the Riga Energy Efficiency Fund

Riga has one of the lowest rates of renovated residential buildings in the EU. At least 6,000 multi-apartment buildings need to be renovated urgently; the renovation would require EUR 2–3 billion. Therefore, Riga City Council has decided to establish the Riga Energy Efficiency Fund (REF) for the renovation of multi-apartment buildings. One of the main prerequisites before its establishment is to assess and agree what the purpose of the REF will be and how it will be financed. As part of the creation of the REF, one must address the following issues:

- adopt legislative initiatives and create a legal framework;
- define technical documentation objectives, compliance criteria, and quality requirements;
- establish a governance structure;
- define the financing mechanisms, including innovative financing schemes for building renovations based on energy efficiency/RES investments and low-cost energy efficiency measures;
- develop a results-based business model for the Riga Energy Efficiency Fund;
- prepare a portfolio of renovation projects and an investment plan;
- educate local residents and homeowners on energy efficiency and renewable energy topics, as well as on using the circular economy concept, thus accelerating the circulation of knowledge and information among local residents and stakeholders, encouraging them to actively participate in the renovation of buildings.

Similarly, to the implementation of the measures mentioned above in this section, the measure will not result in an immediate and direct reduction of heat energy consumption by the multi-apartment building sector, but it will contribute to the implementation of multi-apartment building renovation projects and the achievement of 2030 goals. The cost of creating and maintaining the fund could be EUR 29 million (3% of the building renovation project investments).

9.3.6 Researching New Standardised Solutions for Building Renovation, Reducing Building Renovation Costs

Taking into account the need to restore multi-apartment buildings in Riga and the gradual increase in construction costs, which cannot be fully covered by savings from the implementation of energy efficiency measures, one must find new solutions to reduce costs for building renovation projects. As part of this event, and in cooperation with universities and scientific institutions in Latvia and Europe, one must:

- develop pilot projects using new and innovative solutions in the heating and power supply of buildings;
- arrange the development of standardised building renovation projects;
- implement pilot projects for the standardised renovation of a block, of several buildings;
- determine the principles and prepare guidelines for the creation of energy communities.

The implementation of this measure will not have a direct and immediate effect on the reduction of heat energy consumption, but this measure has a long-term effect on the achievement of climate neutrality goals in Riga.

A detailed description of the three priority measures with a significant contribution to the achievement of the goals is shown in Annex 4.3. These measures are:

1. Developing and updating a renovation programme for Riga multi-apartment buildings.
2. Creation and operation of the Energy Efficiency Centre.
3. Establishment of the Riga Energy Efficiency Fund.

10 Transport

10.1 Current Situation

Road transport is the main source of transport-generated CO_2 emissions in Riga. Table 10.1 shows data on the number of registered vehicles in Riga, broken down by type. Overall, the number of registered passenger cars has increased by 7%, lorries by 4%, motorcycles and tricycles by 37%, quads by 12%, and mopeds by 16% in the last five years. The number of registered buses has fallen by 8%. In 2020,

a total of 271.8 thousand vehicles were registered in Riga. The proportion of vehicles in technical order is in the range of 92–94% for cars and lorries and in the range of 85–86% for motorcycles, tricycles, and quads.

Table 10.1. Number of registered vehicles in Riga[146]

Type of vehicle	Year				
	2016	2017	2018	2019	2020
Cars	207,472	213,865	217,063	220,218	222,015
Lorries	32,154	32,712	33,155	33,713	33,432
Buses	1,630	1,700	1,667	1,650	1,501
Motorcycles and tricycles	6,858	7,385	7,777	8,646	9,383
Quad bikes	275	306	295	306	307
Mopeds	4,451	4,571	4,722	4,969	5,181
Total	**252,840**	**260,539**	**264,679**	**269,502**	**271,819**

Until recently, there was a lack of regularly collected long-term data on the intensity of bicycle traffic in Riga. Surveys of cyclists were carried out in the period from 2008 to 2020 by the Latvian Cyclist Association and the 'Pilsēta cilvēkiem' association using volunteer work. The results show that the number of cyclists tends to increase, including during winter. For example, in September 2018, around 570 cyclists were counted on the Vanšu Bridge in the morning between 8:00 and 9:00 (for comparison, in 2008, it was about 100, and in 2014, approximately 440). At that same time of day in February 2020, more than 160 cyclists were counted on the Vanšu Bridge (for comparison, in 2014 it was about 50, in 2015, some 70, and in 2018, about 110).

In 2020, the first permanent counter for pedestrians and cyclists was installed at the mobility point in the VEF neighbourhood, at the intersection of Brīvības and Gustava Zemgala. The results for the second half of 2020 showed that on average almost 50 thousand cyclists and 60 thousand pedestrians went through the area every month. The data also show that bicycles are used more on weekdays, which points to the bicycle as an everyday mode of transportation.

10.1.1 Energy Consumption

In general, the road vehicle fleet consists almost entirely of vehicles powered by fossil fuels. Although the number of electric vehicles is on the rise, they still make up an insignificant share of the total vehicle fleet. As of 11 August 2021, 1,964 electric vehicles were registered in Riga, including 1,350 passenger cars, 35 lorries, 18 buses, 22 quads, 20 motorcycles, and 519 mopeds using an electric drive (see Figure 10.1). Electric vehicles (including plug-in hybrids) make up 0.5% of the vehicles registered in Riga.

[146]Source: CSDD

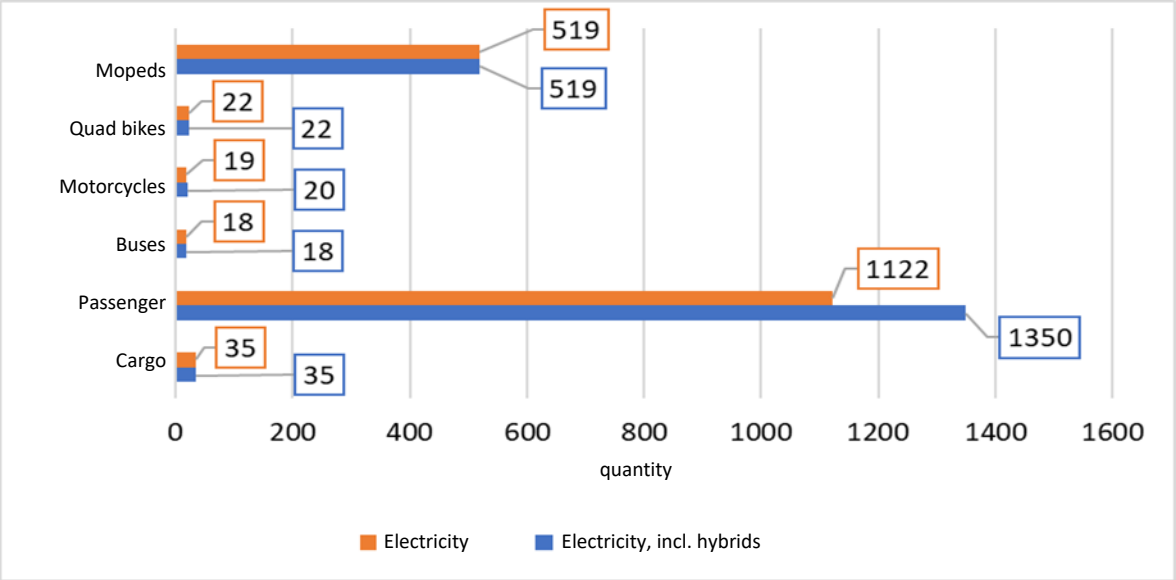


Figure 10.1. Electric vehicles registered in Riga as of 11 August 2021[135]

Information about electric vehicle charging locations was gathered from several sources. Information about electric vehicle charging stations in Riga collected by CSDD is shown in Table 10.2. The largest publicly available networks of charging stations are CSDD (e-mobi fast charging station network) with 11 charging stations in Riga, and Elektrum with 8 charging stations. At the same time, CSDD reports that this information may be incomplete, because public information about private charging stations is not always available, and ordinary (wall socket) charging stations are not kept track of. A database on electric vehicle charging options is also maintained by the 'Bezizmešu mobilitātes atbalsta biedrība' (Emissions-free Mobility Support Association)[147].

Table 10.2. Public and private (with limited access) electric vehicle charging stations in Riga[148]

No.	Controller	Address	Number of units	Type
1	CSDD/SM	Kārļa Ulmaņa gatve 122, Riga	1	Public
2	CSDD/SM	Jūrmalas gatve 46B, Riga	1	Public
3	CSDD/SM	Mārupes iela 10A, Riga	1	Public
4	CSDD/SM	Jelgavas iela 1, Riga	1	Public
5	CSDD/SM	Bauskas iela 86, Riga	1	Public
6	CSDD/SM	Dzirnavu iela 105, Riga	1	Public
7	CSDD/SM	Skanstes iela 7, Riga	1	Public
8	CSDD/SM	Dzelzavas iela 5, Riga	1	Public
9	CSDD/SM	Brīvības gatve 255, Riga	1	Public
10	CSDD/SM	Akadēmiķa Mstislava Keldiša iela 18, Riga	1	Public
11	CSDD/SM	Sergeja Eizenšteina iela 16, Riga	1	Public
12	Elektrum	Pulkveža Brieža iela 12, Riga	6	Public
13	Elektrum	Vienības Gatve 194A, Riga	2	Public
14	Elektrum	Ulbrokas iela 46k-2, Riga	1	Public
15	Elektrum	Vesetas iela 27, Riga	3	Public
16	Elektrum	Duntes iela 19A, Riga	2	Public
17	Elektrum	Uzvaras bulvāris 7, Riga	2	Public
18	Elektrum	Dēļu 7, Riga	1	Public

[147] Available at: http://www.e-transports.org/index.php/features-mainmenu-47/team/236-uzlades-punkti-2
[148] Source: CSDD

No.	Controller	Address	Number of units	Type
19	Elektrum	Lielirbes iela 29, Riga	5	Public
20	Fiqsy	Maskavas iela 257, Riga	4	Public
21	Fiqsy	Āzenes iela 5, Riga	4	Public
22	TC Akropole	Salaspils iela 4b, Riga	3	Public
23	IKEA	Biķeru iela 2, Riga	4	Public
24	TC Ozols	Rencēnu iela 1, Riga	1	Public
25	TC Spice	Lielirbes iela 29, Riga	1	Public
26	Mobilly	Brīvības iela 403, Riga	1	Public
27	Mobilly	Dzelzavas 120G, Riga	1	Public
28	Mobilly	Ulbrokas iela 13, Riga	1	Public
29	Mežaparka biroji	Ķelnes iela 1, Riga	2	Private
30	AS Swedbank	Balasta dambis 15, Riga	1	Private
31	AS 'Latvijas valsts meži'	Vaiņodes iela 1, Riga	1	Private
32	Moller Auto Krasta	Krasta iela 54, Riga	2	Private
33	Moller Auto Lidosta	Kārļa Ulmaņa gatve 86, Riga	3	Private
34	Moller Auto Mežciems	Sergeja Eizenšteina iela 16, Riga	2	Private
35	SIA 'Baltijas sporta auto'	Mīlgrāvja iela 16, Riga	1	Private
36	SIA 'Baltijas sporta auto'	Skanstes iela 21, Riga	2	Private
37	SIA 'Baltijas sporta auto'	Krasta iela 54, Riga	2	Private
		Total units:	**69**	
		sites in total	**37**	

The availability of other alternative fuelling options in Riga is small. It is possible to buy Neste MY 100% renewable diesel fuel at two fuel stations, and compressed natural gas (CNG) at one AS 'Virši-A' fuel station. SIA 'Rīgas satiksme' offers hydrogen for cars, buses, and lorries at the fuel station at Vienības gatve 6.

Information received from the largest fuel station operators about the amount of fuel sold at the fuel stations in Riga is shown in Figure 10.2. Of the total amount of fuel sold in Riga (~3000 GWh/year), around 71% is diesel fuel, 26% is petrol, 3% is autogas. Natural gas consumption is negligible.

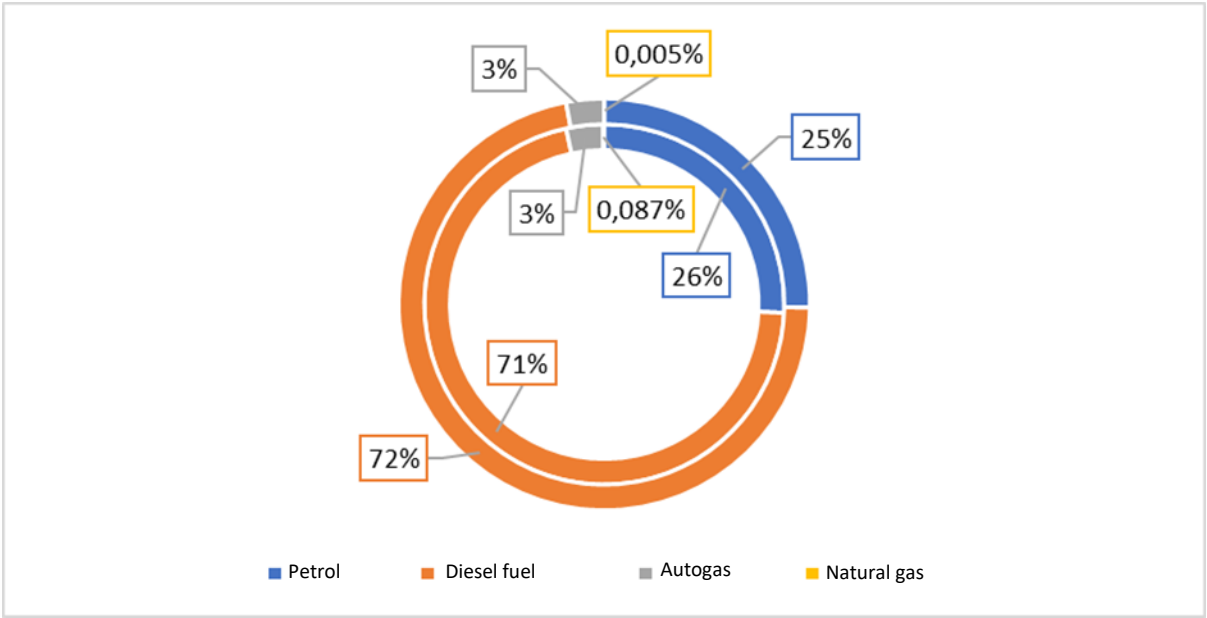


Figure 10.2. Fuel sold at fuel stations in Riga, broken down by type (by energy), in 2019 (inner circle) and 2020 (outer circle)

10.1.2 Traffic Intensity

In recent years, there has been a significant trend of an increase in traffic intensity on the roads for accessing Riga. According to the data of VSIA 'Latvijas Valsts ceļi' (see Figure 10.3), the traffic intensity on the main national roads leading to Riga rose by 11% in the period from 2016 to 2020, with a 12% increase in general (including regional and local roads) (see Table 10.3).

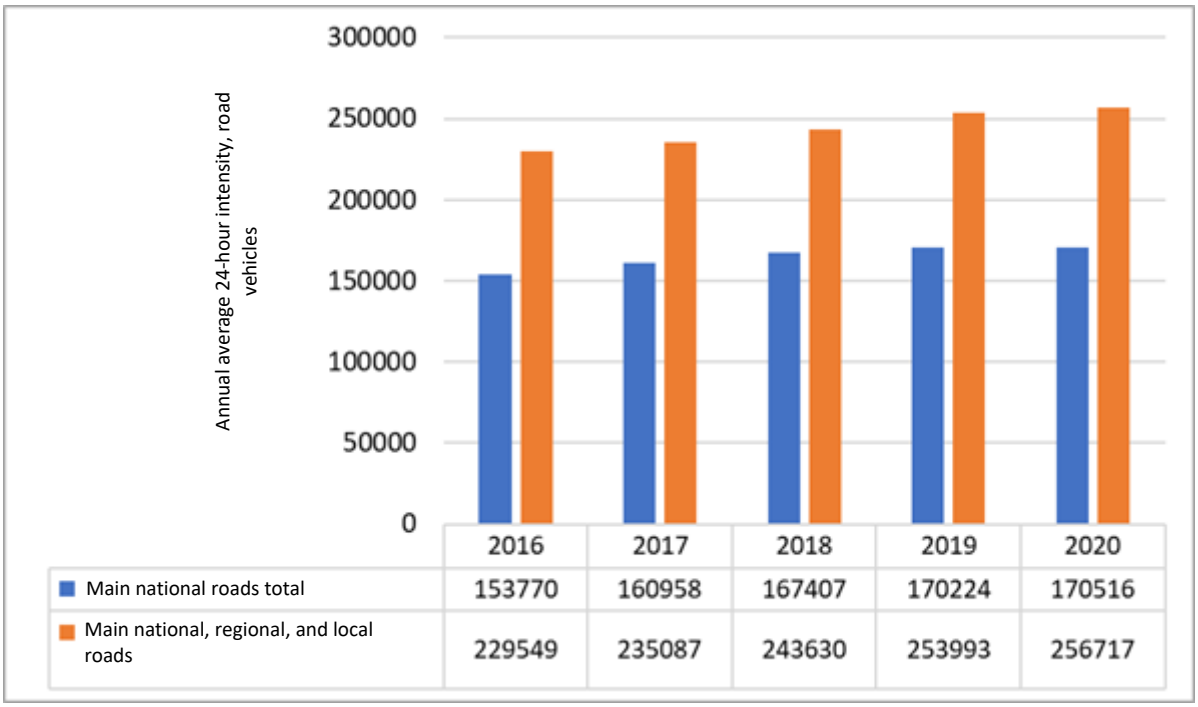


Figure 10.3. Change in the number of cars entering/leaving Riga, broken down by year

The biggest traffic flows enter Riga from the A2 (from Salacgrīva, Sigulda, Valmiera) and A10 roads (from Jūrmala, Tukums, Liepāja, Ventspils). On average, 10% of the registered road traffic is lorries. The exception is the V35 road, on which the average share of lorries over the last five years is 27%.

Table 10.3. Annual average 24-hour traffic intensity on roads leading to Riga

Road No.	Annual average 24-hour intensity				
	2016	2017	2018	2019	2020
A2	37,689	40,218	40,660	40,994	41,401
A6	23,108	24,227	25,618	25,273	24,153
A7	25,278	27,775	26,968	28,307	27,340
A8	24,369	23,500	25,983	27,110	24,269
A10	43,326	45,238	48,178	48,540	53,353
P1	8,691	6,682	6,669	7,347	7,817
P2	10,868	9,639	9,156	10,865	11,082
P4	20,865	21,807	20,503	20,530	22,798
P132	8,467	9,833	9,231	11,339	12,973
V1	11,067	11,649	14,088	15,360	12,118
V20	9,838	8,921	10,622	10,886	11,939
V35	5,983	5,598	5,954	7,443	7,474

10.1.3 Modes of Transport

The main modes of transportation in Riga are public transport and private cars (see Figure 10.4). According to a household survey conducted in 2019[149], public transport use accounted for 46.8%, private car use, 42.4%, and physically active modes of transportation (walking and cycling), 10.8%. This data describes the transport habits of people in Riga before COVID-19. A SKDS survey[150] of the travel habits of Riga residents in 2021, compared to 2019, shows that the share of private car and bicycle use in Riga increased in 2021, while public transport decreased (see Figure 10.5).

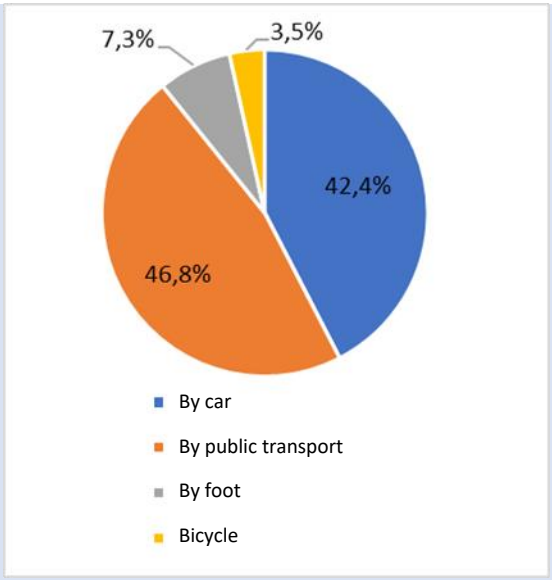


Figure 10.4. Modes of transport in Riga in 2019[139]

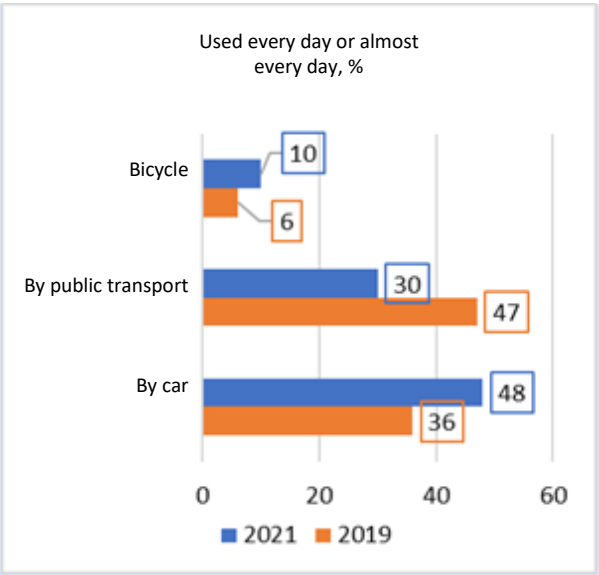


Figure 10.5. Changes in the travel habits of Riga residents due to COVID-19[140]

Cars

The largest source of CO_2 emissions in the transport sector is passenger cars. According to CSDD data (see Figure 10.6), in 2021, 57.3% of passenger cars registered in Riga were diesel-powered passenger cars, 36.6% were petrol-powered passenger cars, 5.5% were autogas-powered passenger cars, 0.5% were electric, and 0.1% were powered by natural gas. Broken down by age, cars up to 2 years old make up 10%, 3–5-year-old cars, 12.2%, 6–10-year-old cars, 17.9%, while the majority (59.9%) of the vehicles are older than 11 years.

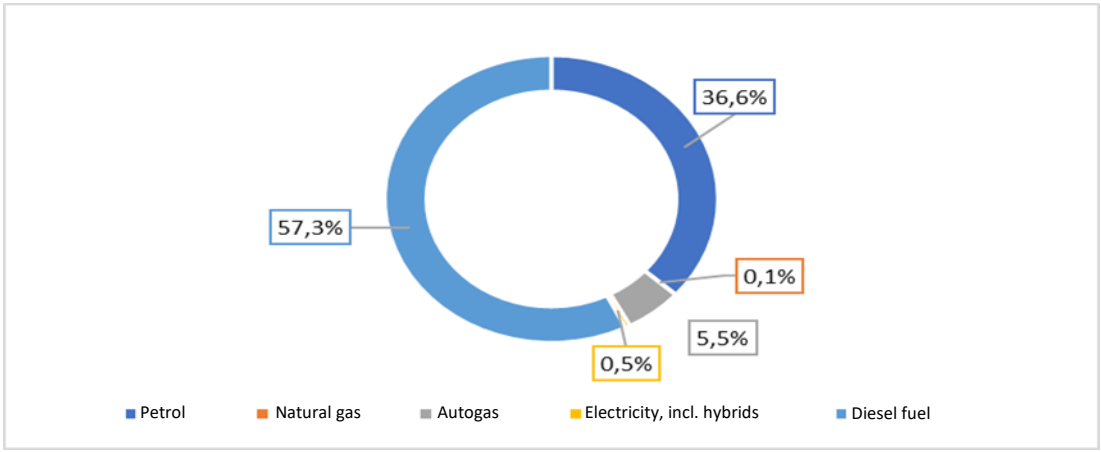


Figure 10.6. Passenger cars registered in Riga in 2021, by fuel type (% of total)

[149] Survey of travel habits in Riga. As part of the SUMBA project, ~5,000 respondents (2019)
[150] Riga resident satisfaction with the activities of the municipal government and processes taking place in the city. May–July 2021

Car use in Riga sees an increasing trend (see Figure 10.7). Despite the annual decrease in the population of Riga by 3.5% percent between 2016 and 2020, the number of registered cars per 1,000 residents has increased from about 320 vehicles in 2016 to 360 vehicles in 2020. In terms of the number of registered passenger cars per 1,000 inhabitants, Riga is below the European average. In 2019, around 570 passenger cars per 1,000 inhabitants were registered in the member states of the European Union. Taking into account the current trend of car use and the fact that the number of registered cars per 1,000 inhabitants in Riga (and in Latvia as a whole) is almost 40% lower than on average in Europe, it can be assumed that the number of cars will increase in the future as well. At the same time, many European cities are implementing measures to limit the use of private cars, especially those that use fossil fuels. For example, Paris, Amsterdam, Oslo and Berlin have already set targets to phase out diesel and petrol cars in the city.

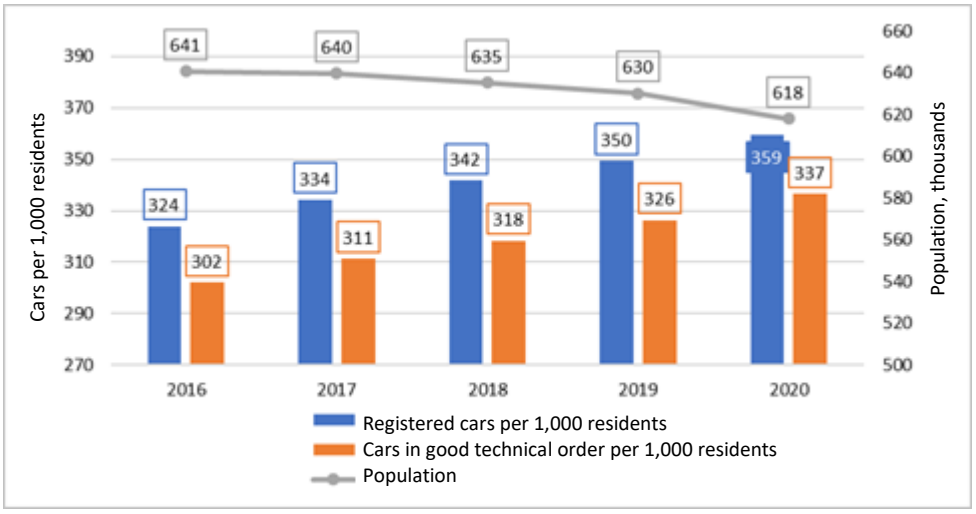


Figure 10.7. Level of car ownership in Riga [151]

In terms of ownership, 64% of registered cars are owned by private individuals.

Lorries

The share of cargo vehicles registered in Riga is about 12.5% of the total number of registered vehicles. Broken down by age, cargo vehicles up to 2 years old make up 15.2%, 3–5-year-old cargo vehicles, 18%, 6–10-year-old vehicles, 24.8%, and 42% of the vehicles are older than 11 years.

Broken down by the fuel consumed, 95.4% are diesel vehicles, 3% are petrol, 1.1% are autogas, 0.1% are electric, and 0.4% are powered by natural gas. In terms of ownership, only 2.2% of registered cars are owned by individuals.

Public Transport Access

Public transport in Riga consists of bus, trolleybus, tram, and minibus routes. In 2020, the Riga municipal company SIA 'Rīgas satiksme' managed:

- 54 bus routes;
- 18 trolleybus routes;
- 8 tram routes.

Since 1 December 2018, SIA 'Rīgas mikroautobusu satiksme' has been providing passenger transportation. In 2020, SIA 'Rīgas mikroautobusu satiksme' served minibus 18 routes.

Figure 10.8 shows the number of passengers carried by RP SIA 'Rīgas satiksme' over the last five years.

[151] Source: CSDD, CSB

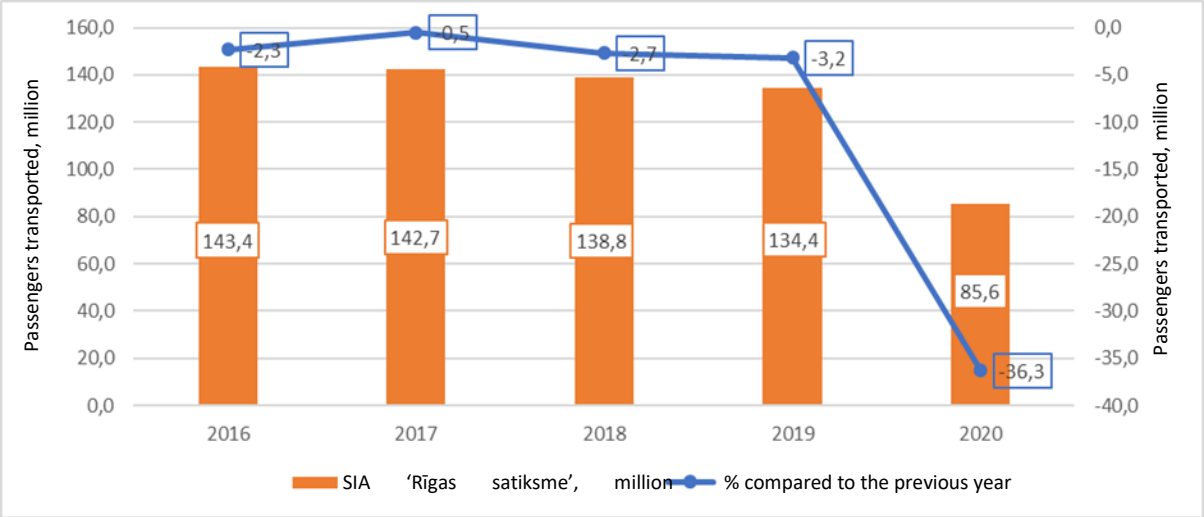


Figure 10.8. Change in the number of passengers transported[152]

In general, over the last five years, the number of passengers transported in public transport had a tendency to decrease. In the period from 2016 to 2019, before COVID-19, the number of passengers transported decreased by 6.3%, from 143.4 million passengers in 2016 to 134.4 million passengers in 2019. In 2020, due to COVID-19, there was a significant 36.3% year-on-year decrease in the number of passengers transported.

Passengers transported by public transport types in 2019 (inner circle) and 2020 (outer circle) are shown in Figure 10.9.

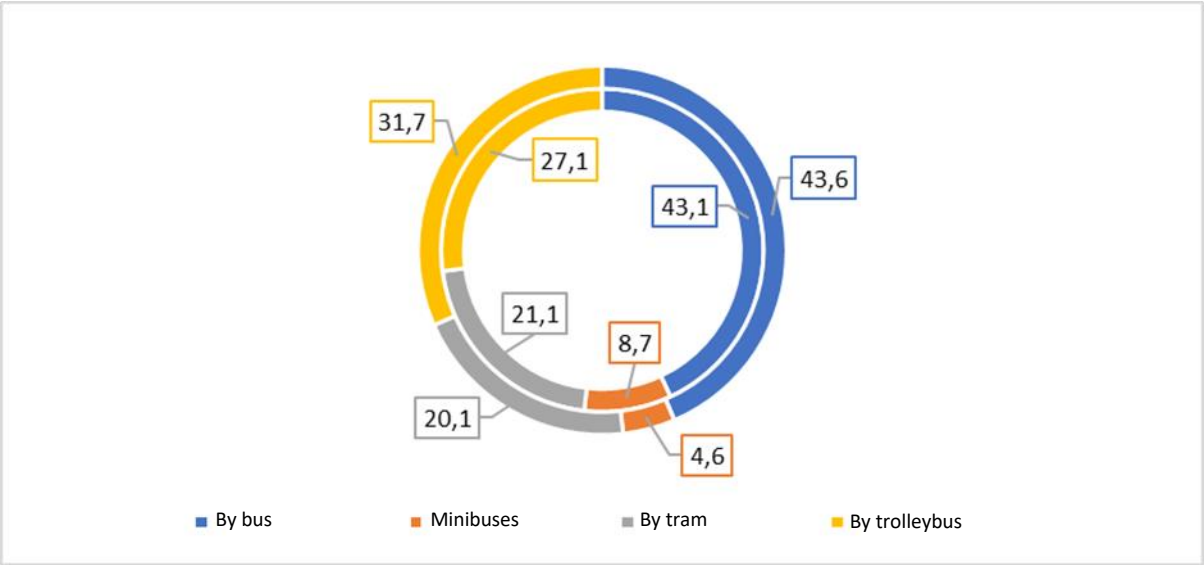


Figure 10.9. Share of passengers transported (% of the total number of passengers transported) by public transport types in 2019 (inner circle) and 2020 (outer circle)[142]

Figure 10.9 shows that in 2019, the biggest share of passengers was transported by buses (43.1%), followed by trolleybuses (27.1%), trams (21.1%) and minibuses (8.7%). In 2020, there was a significant decrease in the number of passengers transported by minibus (-68% compared to 2019). This can be explained by the suspension of operations of SIA 'Rīgas mikroautobusu satiksme' due to COVID-19, starting in April 2020, and the cancellation of public transport discounts. The smallest decrease in the number of passengers transported during the effects of COVID-19 in 2020 was in passenger transport by trolleybus; the proportion of passengers transported by trolleybuses increased accordingly.

[152]Source: RP SIA 'Rīgas satiksme'

The total mileage of public transport vehicles over the last five years is shown in Figure 10.10. In 2016–2019, the mileage of buses was 23.7–24.1 million km/year, or an average of 56 thousand km/year per bus. The total mileage of trams was 7.3–7.9 million km/year, or an average of 45 thousand km/year per wagon. The total mileage of trolleybuses was 9.9–10.4 million km/year, or an average of 37 thousand km/year per trolleybus. The total mileage of RP SIA 'Rīgas satiksme' vehicles is about 38–39 million km/year. In 2020, there was a 7.4% year-on-year decrease in mileage.

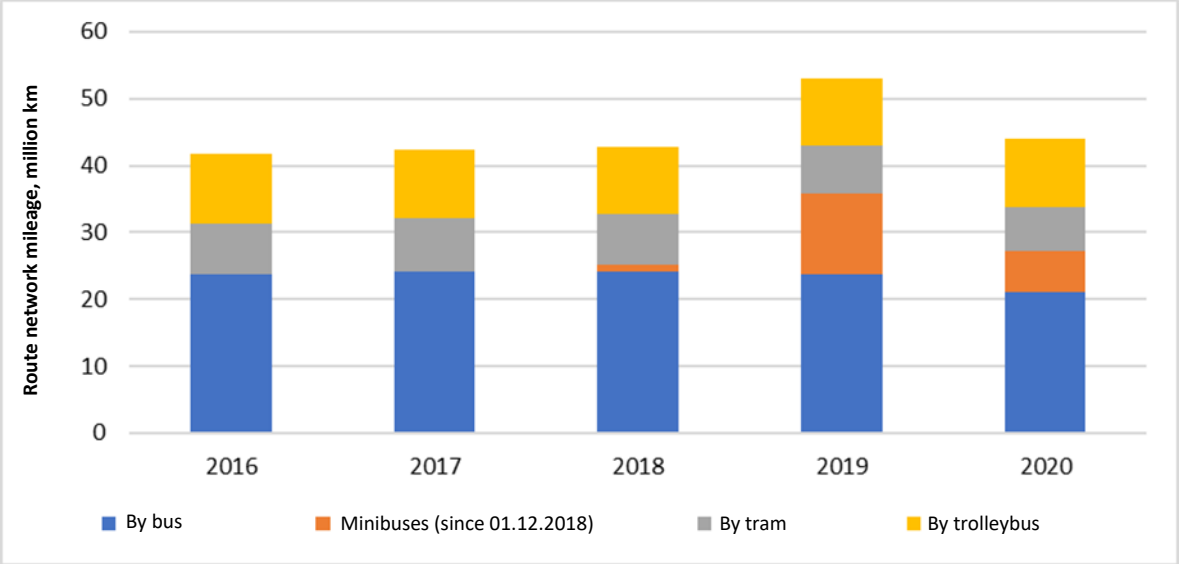


Figure 10.10. Vehicle mileage change trends[142]

Specific indicators of fuel consumption were calculated using the data on the number of passengers transported and fuel consumption provided by RP SIA 'Rīgas satiksme'. The results are shown in Table 10.4.

Table 10.4. The calculated specific energy consumption of the vehicles of RP SIA 'Rīgas satiksme' (calculated on the basis of the data on fuel consumption and the amount of passengers transported, as provided by RP SIA 'Rīgas satiksme')[153]

Type of transport	2019	2020
Buses, Wh/pkm	304	438
Minibuses, Wh/pkm	214	336
Electric vehicles, Wh/pkm	102	146

Annual CO_2 emissions were calculated based on the data on the consumption of diesel fuel and electricity for the operation of buses and minibuses provided by RP SIA 'Rīgas satiksme' (see Figure 10.11). The most accurate data coverage is for 2019. In 2019, the total emissions in bus traffic were 30.5 thousand tonnes of CO_2, of which the majority (87%) was from passenger transportation in buses. The decrease in emissions in 2020 can be explained by the decrease in the amount of transportation (vehicle mileage) due to COVID-19. In 2018, however, lower total emissions can be explained by the fact that SIA 'Rīgas mikroautobusu satiksme' began its operations at the end of the year.

[153] The calculation is under the assumption that one passenger travels an average of 6.5 km (source: Mobility of Latvian population survey results for 2017).

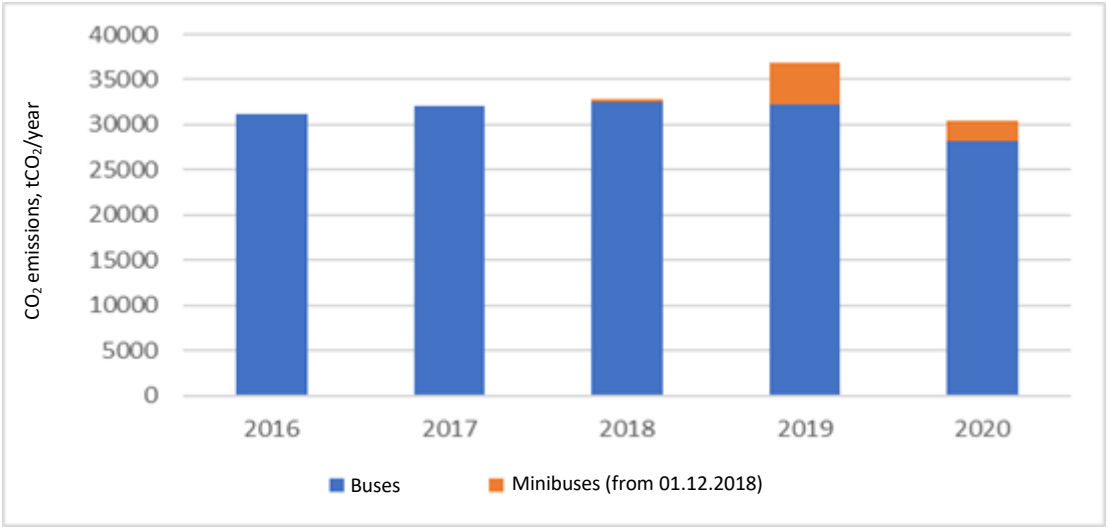


Figure 10.11. Estimated CO_2 emissions in public transport

As part of the *H2Nodes* international project, RP SIA 'Rīgas satiksme' has purchased and is using 10 hydrogen-powered trolleybuses. One hydrogen fuel station (in operation since early 2020) is used for the needs of the trolleybus fleet. Hydrogen production takes place in the steam reforming process using natural gas. The average fuel consumption of hydrogen trolleybuses was approximately 11 kg of hydrogen per 100 km in the first half of 2021. Hydrogen consumption is significantly affected by weather conditions, i.e., the need to heat or cool vehicles in order to provide an appropriate climate for the passengers.

Railways

Riga Central Railway Station and the railway transport system are an essential part of the transport system of Riga, and its role will only increase in the future. The ACTION PLAN supports the general progress towards rail transport being a priority backbone of the transport system, as defined in the policy planning documents, and provides for measures to strengthen the interaction between public transport and railways in Riga, and to promote the use of railways.

In the period from 2016 to 2019, the number of passengers transported by railway rose by 8.8%, from 17.2 million passengers in 2016 to 18.6 million passengers in 2019. The 2020 data show a reduction in the number of passengers, caused by COVID-19.

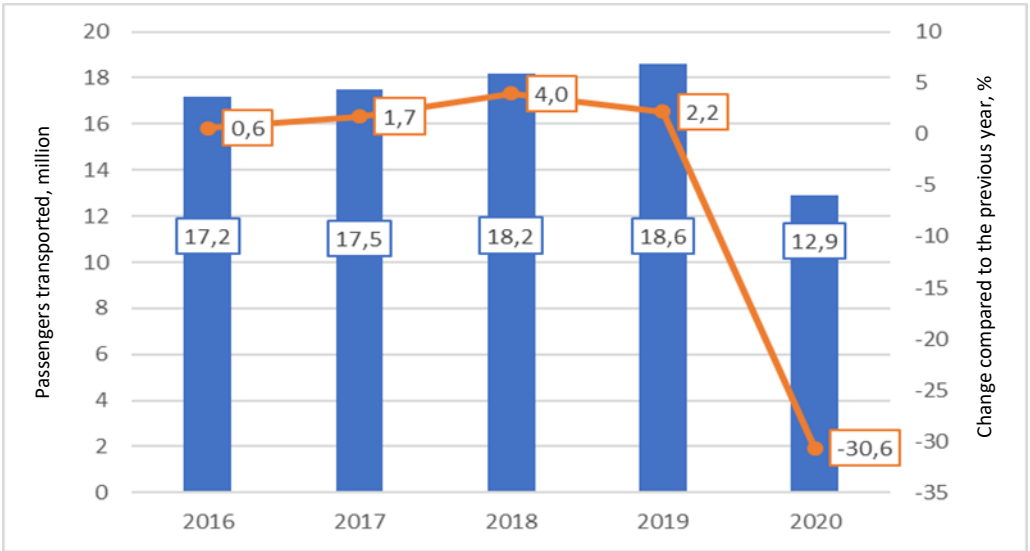


Figure 10.12. Passenger transport by railways[154]

[154] Data source: Latvian official statistics

AS 'Pasažieru vilciens' is in charge of domestic railway passenger transport. According to the information provided by the company, 90% of passengers are transported by electric trains, and 10%, by diesel trains. The number of departures and arrivals at Riga Central Station averages 120 per day.

Water Transport

An evaluation was carried out in 2021[155], preparing a vision of management scenarios and aspects of regulatory arrangements in order to develop low-emission water transport in Riga. Further research is planned for routes, mobility points, and the potential to promote climate-friendly mobility. According to CSDD data, ~7400 watercraft are registered in Riga (see Table 10.5).

Table 10.5. Watercraft registered in Riga as of 11.08.2021

Rowing boats	Motorboats	Jet skis	Cutters	Specialised watercrafts	Total
1,909	4,481	562	467	4	**7,423**

The port of Riga handles an average of about 3,500 vessels a year, most of them (~87%) being cargo ships. About 80 cruise ships visit the port during the cruise season.

The number of passengers served had a rising trend before the start of the COVID-19 pandemic (see Figure 10.13). Between 2016 and 2019, the number of passengers served by ferries and cruise ships increased from 581.6 thousand to 568.7 thousand, with on average 90% of them being ferry passengers. In 2020, passenger turnover fell 67.9% year-on-year.

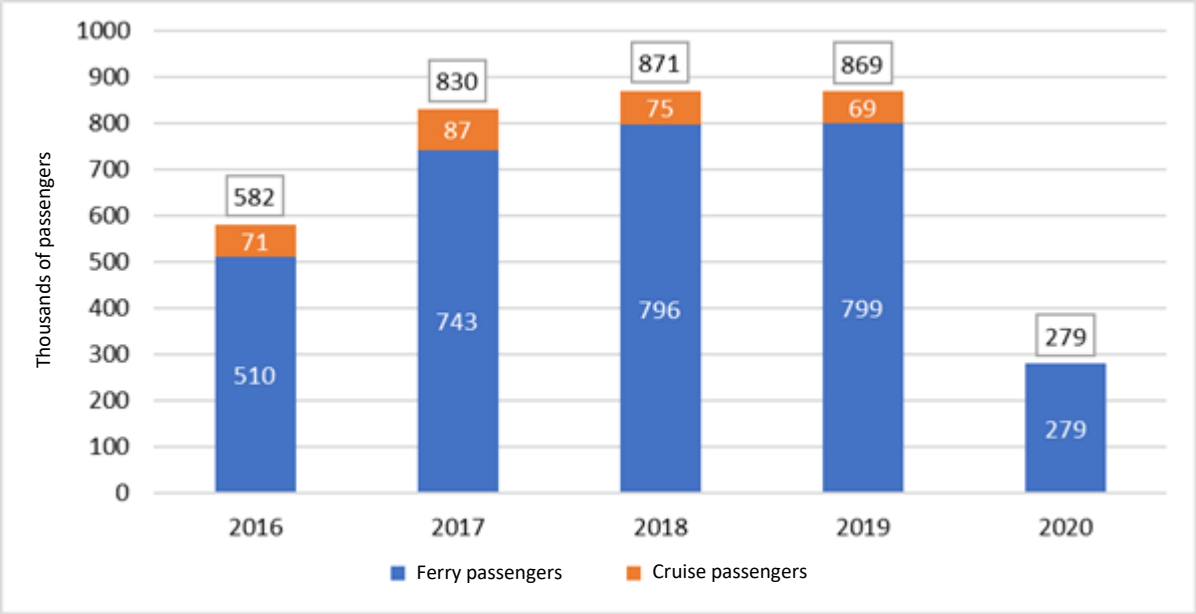


Figure 10.13. Number of passengers served in the Freeport of Riga[143]

In contrast, between 2016 and 2019, the annual freight turnover decreased (see Figure 10.14). In 2019, cargo turnover fell by 11.6% compared to 2016. In 2020, the drop in freight turnover was 27.7%, as compared to 2019.

[155] Vision and proposals for an optimal management model in the development of low-emission water transport in the administrative territory of Riga (2021)

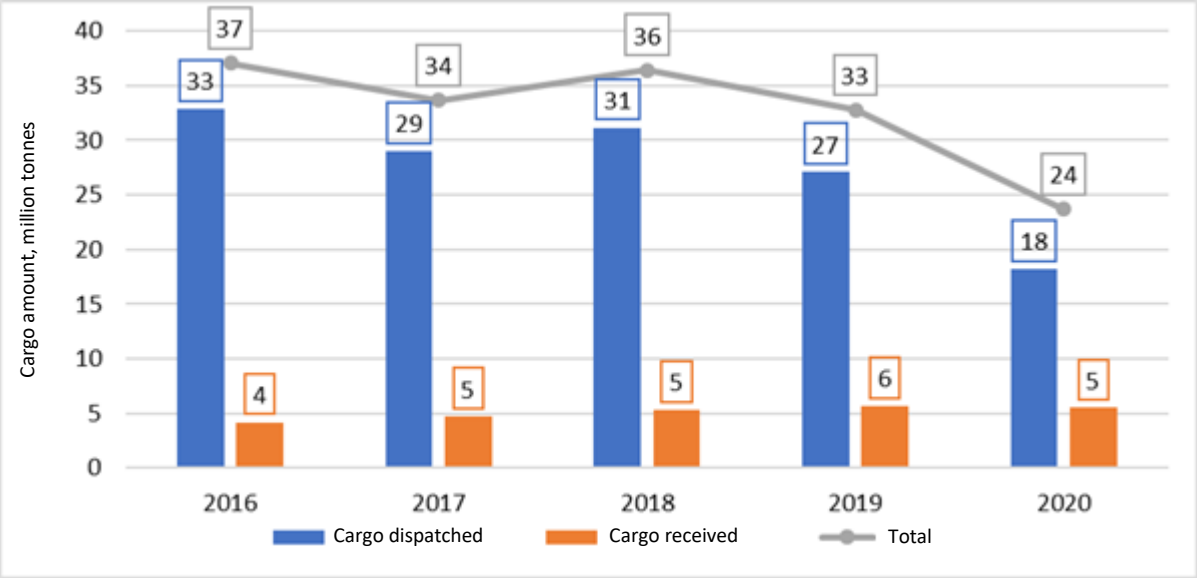


Figure 10.14. Cargo turnover in the Freeport of Riga[143]

Development Programme of the Freeport of Riga 2019–2028 sets strategic goals, envisaging an increase in the number of processed cruise ships to at least 150 ships per year and an increase in the total cargo turnover to 45 million tonnes per year.

10.2 Challenges

Table 10.6 summarises the most significant challenges related to the reduction of CO_2 emissions in the transport sector in Riga.

Table 10.6. Sustainable mobility challenges identified in Riga

Challenges
Reducing the need for travel (among Riga residents and residents of Riga suburban municipalities going to Riga)
Increasing the number of trips made by foot, bicycle, and public transport; reducing the number of trips made by car
Improving bicycle infrastructure
Increasing the average number of passengers in cars
Changing the lifestyle habits among the public
Faster development of safe and comfortable bicycle and pedestrian infrastructure
Increasing the share of renewable energy in the public transport fleet in accordance with the requirements of the Transport Energy Law (draft, 16.12.2020)
Railway transport insufficiently used for passenger transportation within the city
Development of alternative fuel infrastructure, incl. electric charging stations in Riga neighbourhoods
Reducing the average age of the road vehicle fleet
Decreasing number of public transport users and rising number of private car users due to COVID-19
Creation of a system for the regular collection of data/information for monitoring population mobility parameters (mobility surveys, vehicle counts)

10.3 Measures

A total of 15 measures have been identified in the transport sector that will generate the following overall benefits in 2030:

- amount of energy saved: 731,300 MWh/year;
- increased amounts of renewable energy: 54,000 MWh/year;
- amount of CO_2 emissions reduced by: 214,300 tCO_2/year;
- investments necessary: EUR 630 million.

Some of the measures and performance indicators identified in the ACTION PLAN have been put forward in accordance with the actions specified in Riga Development Programme 2022–2027. Measures related to the modernisation of the bus fleet of RP SIA 'Rīgas satiksme' are included in accordance with the company's vehicle upgrade plan up to 2027. The unit in charge of the implementation of the ACTION PLAN measures is the transport subgroup (see Section 4.3.1). It should be noted that according to the management structure proposed by the ACTION PLAN, the transport subgroup is in charge of the topics related to private and public transport. The measures to be implemented in the municipal vehicle fleet are described in the context of the municipal infrastructure (see Section 7.1.3). In addition to the measures described for the transport sector, the implementation of measures in the other topics discussed in the ACTION PLAN — environmental communication, municipal infrastructure, adaptation, and urban planning and climate neutrality policy — will also have a positive impact on the implementation of measures and the achievement of goals in the transport sector.

10.3.1 Initiatives to Reduce the Need to Travel

According to the results of population surveys, the common popular daily travel destinations in Riga are work and education. Expert discussions took place during the development of the ACTION PLAN, revealing two key problem areas: (1) availability of basic services (pre-school facilities, schools, healthcare facilities, etc.) near where local residents live, and (2) increasing pendulum migration from the Riga suburbs to Riga. Two main areas were defined in reducing the need for people to travel between Riga and its suburbs:

1. Inclusive urban planning where city residents and guests do not depend on private cars.

This area involves the prioritisation of sustainable ways to travel, the development and use of sustainable mobility assurance criteria, the practical implementation of the concept of mobility points, the introduction of smart traffic management technologies, and other measures. The priority measures are aimed at the revitalisation of the existing built-up areas of the city and the construction of detached houses on the periphery, followed by the planning and development of new built-up areas.

2. Measures to promote distance working and e-services for increasing the availability of services.

It is necessary to conduct research on the mobility habits of municipal employees, the demand for reducing the number of trips, and the possibility of doing so. Based on the results of the research, work sharing spaces will be equipped in municipal buildings, making it possible for employees to manage their trips more efficiently, and to avoid wasting time travelling between meetings. In addition, the possibility of creating shared distance working spaces for municipal employees living in Riga multi-apartment building neighbourhoods and suburban municipalities (in cooperation with these municipalities) will be evaluated. In cooperation with the private sector, the municipal government will offer to rent the premises it owns for the creation of work sharing spaces for the needs of local residents of Riga.

In the field of e-services, the municipal government will continue to work in the Riga City Municipality portal www.eriga.lv.

Assuming that the use of motorised transport could be reduced by 10% (not including public transport), the energy consumption of the transport sector could be reduced by 191 thousand MWh/year, for a 46.7 thousand tCO_2 drop in emissions per year.

10.3.2 Initiatives to Transition From Private Cars to Less Polluting Modes of Transportation

The transition from private cars to alternative modes of transportation is a cornerstone of sustainable mobility. Physically active methods of travel — walking and cycling — is the most efficient and environmentally-friendly way to increase the sustainability of mobility. Although public transport does produce CO_2 emissions, the specific energy consumption and CO_2 emissions per passenger-kilometre are much lower than for private cars, so the development of public transport and improving its availability is also a priority.

3. Increasing passenger-kilometres travelled on foot and by bicycle.

Surveys show that 58% of the population had a positive view of the possibility of travelling by bicycle in Riga, and 54% of the population have a positive opinion of the pedestrian infrastructure for their daily needs. The goal of the city is to improve these indicators and create an accessible, comfortable, and safe infrastructure for pedestrians and cyclists, which would be interesting for people of all ages, genders, and social statuses, including residents and guests of the city. The measures planned in the ACTION PLAN are aimed at implementing the priority of pedestrians and cyclists (pedestrian-cyclist-car hierarchy) defined in the Riga Sustainable Development Strategy 2030:

- Informing and educating traffic participants about climate change, air pollution, and public health issues, traffic changes planned in the near and distant future, mobility alternatives for private cars.
- Continuous development of bicycle infrastructure in accordance with the updated concept of the development of bicycle traffic in Riga until 2030 (expected), communication and cooperation with the parties involved (Latvian Association of Cyclists, 'Pilsēta cilvēkiem' association, neighbourhood associations, etc.) in order to monitor problem issues and promote the development of bicycle infrastructure according to demand (top priority).
- Free-access bicycle pilot project over 2–3 years, providing a fleet of 1,000 bicycles that are available for free (with or without a time limit) or for a small fee to city residents and guests for use for a certain period of time, by pre-registering it on an online platform.
- Campaigns encouraging employers to provide their employees with bicycles instead of cars, annual awards for cyclist-friendly companies (for example, organise campaigns as part of EnergoneatkaRĪGA 2030 (see Section 12.2)).
- Attractive information campaigns about safe cycling for schoolchildren.
- Creating a pleasant and safe environment for pedestrians.

Assuming that the proportion of cycling can be increased to 12% of the passenger-kilometres travelled in the city, the energy consumption of the transport sector could be reduced by 106 thousand MWh/year, for a 28 thousand tCO_2 drop in emissions per year.

4. Increasing the number of passenger-kilometres travelled by public transport

The measures in this section of the ACTION PLAN are closely related to the actions planned in the Development Programme 2027 for improving public transport services. The fields for developing public transport are:

- Improving the accessibility of public transport. The local residents of Riga already have a highly positive opinion of the availability of public transport (85%). The availability of a public transport stop at a distance of 300 metres from a residential building is ensured in 83% of Riga. In the context of the ACTION PLAN, measures are aimed at ensuring the availability (convenience) of public transport for car users, in order to promote the change of mode of transport from private car to public transport. This includes measures for the creation of the necessary infrastructure, such as the integration and connection of the Riga and suburban public transport systems with the railway infrastructure, construction of parking facilities and their connection to public transport, improving the network of public transport routes, creating mobility points, so that it is convenient for car users to combine public transport with other modes of transportation, and informing car users about the opportunities available in the city, the benefits of using public transport, and campaign-like events, such as 'Day without a Car', as well as opportunities to try public transport services for free for a certain time.
- Improving the quality of public transport services. The opinion of local residents about the quality of public transport services in Riga is positive (81%). The planned improvements will be aimed at providing traffic data/information, improving the available range of tickets and introducing a single ticket, improving the average driving speed by creating lanes for public transport.
- Modernisation of the fleet, incl. transition to emission-free vehicles.
- Promotion of the use of railway transport. According to the national planning documents, railways are the backbone of the Latvian transport system. Successful integration of *Rail Baltica* and regular domestic passenger transport into the city's transport system is important for Riga. In addition to the already planned infrastructure improvement projects, the role of the city is also that of providing information, in order to raise the awareness of citizens about the necessity and possibility for changing their habits for travelling in the city, including the use of railways.
- Modelling of future scenarios for potential changes in the number of public transport users and provision of existing infrastructure, development of an ACTION PLAN.
- Revision and optimisation of the public transport route network according to the demand and urban development trends to reduce redundant routes, public transport mileage, and the road vehicle fleet.

Increasing the share of public transport in the passenger-kilometres travelled by up to 20% (prioritising electric zero-emission transport) reduces energy consumption by some 198 thousand MWh/year, and 53 thousand tCO_2 in emissions every year.

5. Restrictions on private transport

In the field of private transport, Latvian legislation currently sets requirements regarding the mandatory addition of biofuel to fossil fuel, which is implemented by fuel suppliers and applies to vehicle users. Also, a differentiated vehicle operating tax has been imposed depending on the age of the vehicle and the amount of CO_2 emissions per kilometre, thus encouraging the use of newer and more efficient vehicles.

In the future, a tightening in regulatory requirements for private transport is expected, taking into account increasingly strict requirements at the level of the European Union. The EU aims to abandon the use of internal combustion engines in road transport by setting stricter emission standards for cars and lorries, thus moving towards zero emissions. In 2021, the European Commission came up with proposals to help achieve the set goal of climate neutrality by 2050.[156] The EC proposals include more

[156] EU Fit for 55 package (2021) https://www.consilium.europa.eu/en/policies/eu-plan-for-a-green-transition/

ambitious targets for reducing greenhouse gas emissions in the transport sector and for renewable energy. New restrictions on the use of traditional fuels and requirements for faster implementation of the use of alternative fuels are expected to result in progress towards the European Green Deal's goal of reducing transport sector emissions by 90% in 2050 compared to 1990 levels.

Measures planned to limit private cars in Riga:

- Implementation of a low-emission zone. In accordance with the National Air Pollution Reduction Action Plan 2020–2030, and the Riga Air Quality Improvement Action Programme for 2021–2025, it is planned to gradually introduce a low emission zone in Riga. Preliminary studies and development of an action programme took place in 2021. The planned activities will be gradually introduced in 2023–2027. The low-emission zone will improve air quality and contribute to the creation of a pleasant and clean urban environment by limiting polluting vehicle traffic. An increase in the share of emission-free vehicles, reduction of transit through the city, and transition from private cars to alternative modes of transportation will contribute to the reduction of CO_2 emissions.
- Regular reviews of the car park policy (fees and location) with the aim of reducing the attractiveness of the city centre for car users; creation of new car parks integrated with public transport stops on the city's periphery.

6. Other measures to reduce passenger-kilometres travelled by car.

- Development of mobility points, providing wide and convenient access to shared transport and micromobility options. The creation of mobility points will provide various user-friendly micromobility options at the same time (including electric bicycles and scooters), reducing the need to use private transport.
- Support for vehicle sharing companies, for example by providing dedicated parking spaces and mobility points. A discount policy may be used if users are offered zero-emission vehicles.
- Development of the innovative concept 'mobility as a service' in Riga, combining the available modes of transportation, promoting cooperation with the vehicle-sharing service sector, ensuring the availability of data and information for transport users, mobility service providers, and municipal authorities responsible for transport planning.

Assuming that the use of motorised transport could be reduced by 5% (not including public transport), the energy consumption of the transport sector could be reduced by 135 thousand MWh/year, for a 33 thousand tCO_2 drop in emissions per year.

10.3.3 Initiatives to Increase the Share of Renewables in Transport

7. Promoting the use of renewables technologies.

Measures to be implemented include:

- Preservation of the existing measures (free parking spaces for electric vehicles, ability to use public transport lanes) provided that public transport traffic is not obstructed by the increase in the number of electric vehicles. When a significant number of electric vehicles is reached, this measure should be evaluated accordingly during a revision of the ACTION PLAN.
- Electric vehicle charging infrastructure development at municipal institutions, in public spaces, and at multi-apartment buildings, actively encouraging the private sector to participate in the construction of the infrastructure.
- Electric vehicle charging infrastructure development integrated with the production of renewable energy and innovative solutions for using energy storage potential.

- Support for the purchase of electric vehicles (for example, an electric bicycle if replacing a car).
- Research of the potential of alternative fuels in transport in Riga.

By increasing the share of electric vehicles to 5% of the car and truck fleet, the energy savings are expected to be 69 thousand. MWh/year, eliminating 23 thousand tCO_2 in emissions every year.

8. ***Assessment of the gradual transition of vehicles for municipal functions (waste management, etc.) to clean technologies, with possible support by the municipal government, thereby promoting the requirements set forth in the National Energy and Climate Plan 2030 and the Transport Energy Law (draft of 16 December 2021).***

9. ***Assessment of the impact of delivery transport (e.g., Bolt, Wolt, DPD, Latvijas Pasts) on CO_2 emissions in Riga, possible solutions for reducing CO_2 emissions, cooperation between the municipal government and businesses.***

10. ***Transition to low-emission and zero-emission technologies in the fleet of RP SIA 'Rīgas satiksme', including the creation of the necessary infrastructure.***

In 2021, RP SIA 'Rīgas satiksme' began the procurement procedure for the purchase of 35 electric buses. As part of the Recovery and Resilience Facility and the Cohesion Fund, it is planned to buy zero-emission buses and low-floor trams, to install electric bus charging infrastructure, thus meeting the requirements set out in the Transport Energy Law (draft of 16 December 2021) for the share of renewable energy and/or renewable electricity in the amount of energy to be used in public transport in 2030. The company plans to purchase a total of 74 electric buses by 2027.

The expected reduction in energy consumption when switching to electric buses is 32 thousand MWh/year, and a 30 thousand tCO_2 reduction in emissions every year.

11. ***Assessment of possible future development trends in the number of electric vehicles in Riga, and their impact on the energy supply system.***

Current forecasts by the Ministry of Transport and AS 'Latvenergo' show that the number of electric vehicles in Latvia could significantly increase by 2030, reaching 18 thousand in a conservative scenario, while 60 thousand is also realistic. Given that the majority of electric vehicles are concentrated in Riga, an assessment of the expected increase in the number of electric vehicles is necessary, making it possible to predict possible changes in power consumption and planning necessary infrastructure improvements. This includes predicting the required number of charging stations and their location, as well as power consumption management measures.

12. ***Development of low-emission water transport in Riga.***

In 2021, research took place on the development of low-emission water transport in Riga. The results of the research will provide a more detailed vision of the potential of water transport in reducing CO_2 emissions in the transport sector.

10.3.4 Horizontal Measures

13. ***Inclusion of data necessary for the calculation of transport sector CO_2*** emissions in population mobility surveys. ***Creation of a system for regular data collection and information analysis.***

Data and information play a significant role in the updating of the assumptions of CO_2 calculations and the annual monitoring of CO_2 emissions; these should be regularly collected in the form of mobility surveys of citizens and companies: their choice of mode of transport, mileage (km/day, km/year),

number of people in the vehicle, number of vehicles by fuel type and age, average vehicle fuel consumption.

The information obtained and analysed from mobility operators includes information on the number, type, use of vehicles, availability of charging infrastructure, etc. In order to provide access to this type of urban mobility information, one must set up a data sharing requirement for mobility operators using the open data protocol GBFS (General Bikeshare Feed Specification).

14. Regular inventory of vehicles (cars, buses, lorries, bicycles) and long-term monitoring in order to assess the current situation and the impact of implemented measures.

Riga does not regularly monitor the movement of vehicles. The last detailed information was obtained in the SUMBA project[157] in which a manual vehicle count and a population survey of travel habits were carried out. For the regular counting of vehicles, it would be necessary to create intelligent systems that would be able to automatically count the number of vehicles, broken down by their type. In determining the number of locations where this counting takes place, one can use the minimum number of locations specified in the SUMBA project, potentially expanding it.

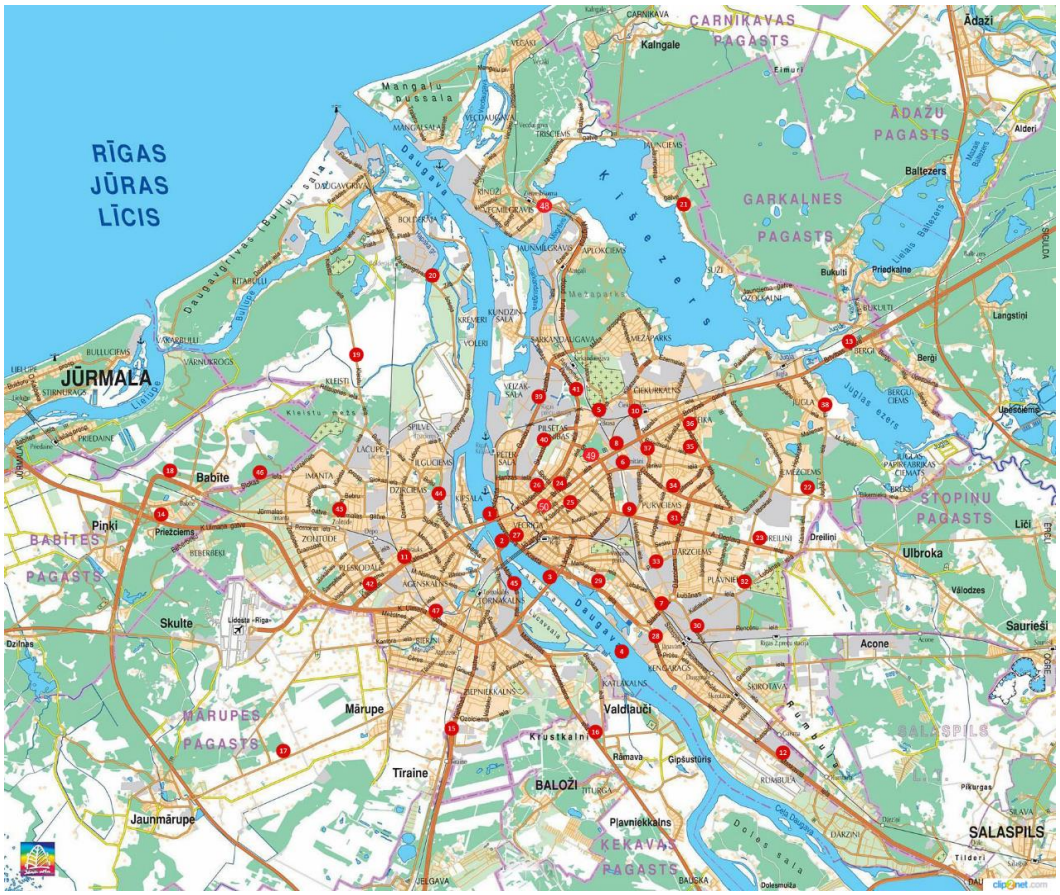


Figure 10.15. SUMBA project counting locations

15. Develop the use of modelling tools for predicting future trends in the transport sector, for creating and analysing scenarios.

Although the implementation of these measures does not have a direct impact on the reduction of energy consumption in transport, they are necessary for the evaluation and monitoring of the current situation, creation and analysis of future scenarios, and for effective and justified governance and policy-making.

[157] https://sumba.eu/sites/default/files/2021-04/SUMBA_CMP_Latvian_FINAL.pdf

A detailed description of the three priority areas with a significant contribution to the achievement of the goals is shown in Annex 4.4. These measures are:

1. Initiatives to reduce the need for the population to travel.
2. Initiatives to achieve a transition from private cars to less polluting modes of transportation (walking, cycling, public transport).
3. Initiatives to increase the share of renewables in the vehicle fleet.

11 Adaptation to Climate Change

11.1 Assessment of Climate Change Risks and Vulnerability

Three scenarios of changes in the concentration of greenhouse gases, RCP2.6, RCP4.5, RCP8.5 (Representative Concentration Pathways), were included in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC):

- RCP 2.6 is a scenario that occurs if strict measures to reduce GHG emissions are introduced, whereby GHG emissions decrease starting from 2020.
- RCP 4.5 is a scenario that occurs if moderate GHG emission reduction measures are introduced, and the amount of GHG emissions starts to decrease in 2040.
- RCP 8.5 is a scenario where effective GHG mitigation measures are not implemented and GHG emissions continue to increase.

In order to understand how the climate will change in the future, one must also predict what the future environmental policy and behaviour of the public will be in the field of climate change. GHG emission scenarios are modelled taking into account different levels of action: for example, countries can take an active approach and significantly reduce GHG emissions, or can continue to cause significant pollution by reducing emissions at a slower pace.

Changes in the climate parameters of Latvia are predicted according to two scenarios: RCP 4.5 and RCP 8.5. The risks analysed in this document are also based on these two scenarios. The RCP 4.5 scenario is characterised by moderate climate change, while the RCP 8.5 scenario is characterised by significant climate change. Information about Latvian climate change predictions is available at: https://www4.meteo.lv/klimatariks/. In the case of Riga, data from the Riga weather station were used.

In the following document, climate change scenarios are projections of climate parameter values in Latvia estimated by LEGMC for up to 2100, based on the conditions predicted in the Representative Concentration Pathway scenarios (RCP 4.5 and RCP 8.5) of the IPCC 5th assessment report.

In order to assess the potential impact of the risks to and the vulnerability of the municipality, data were collected from other available studies, analyses, plans, and documents.

11.1.1 Analysis of Historical Data and Climate Predictions

Long-term observation data from the weather monitoring station at the University of Latvia show that the average air temperature in Riga rose by 1.1°C between 1795 and 2006. The average air temperature increased in all seasons, but most significantly in winter, by 1.7°C, and least in summer, by 0.3°C. The number of days with freezing weather decreased, but the number of extremely hot days increased. Although the average summer air temperature increase in 1795–2006 was 0.3 degrees, the last two decades show a more rapid rise in average temperature. Also, the number of extremely

hot days when the maximum air temperature reaches or exceeds 30°C has been rising in the last 30 years[158] (see Figure 11.1).

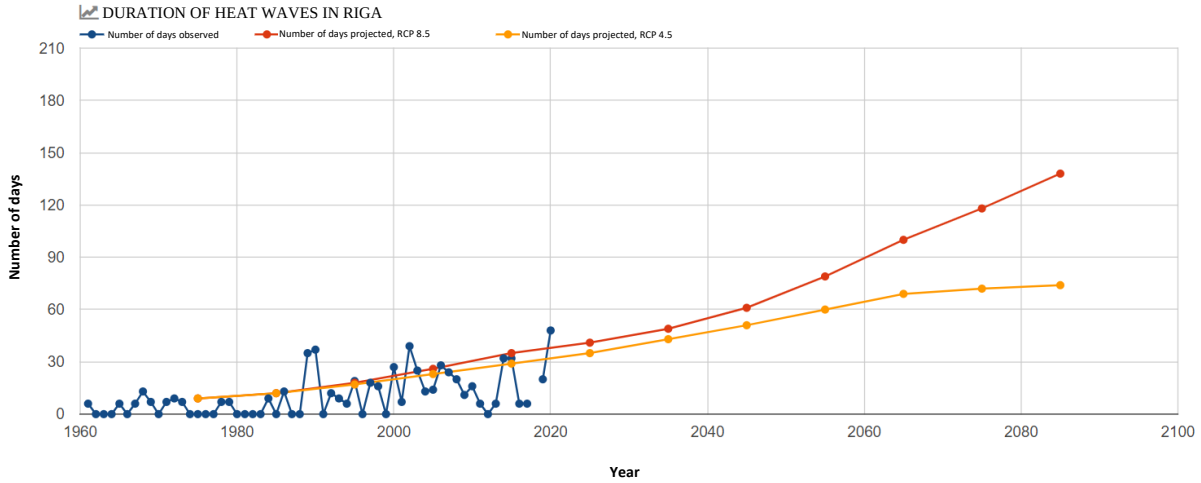


Figure 11.1. Duration of heat waves, projected number of days in Riga

According to climate change scenarios, a significant increase in average air temperature is predicted for the future, similarly to the rest of Latvia (see Figure 11.2). As a result of the current climate change, it is predicted that the minimum and maximum ambient temperatures will also increase, with a significant decrease in the number of days of sub-zero weather in Riga, and an increase in the duration of heat waves.

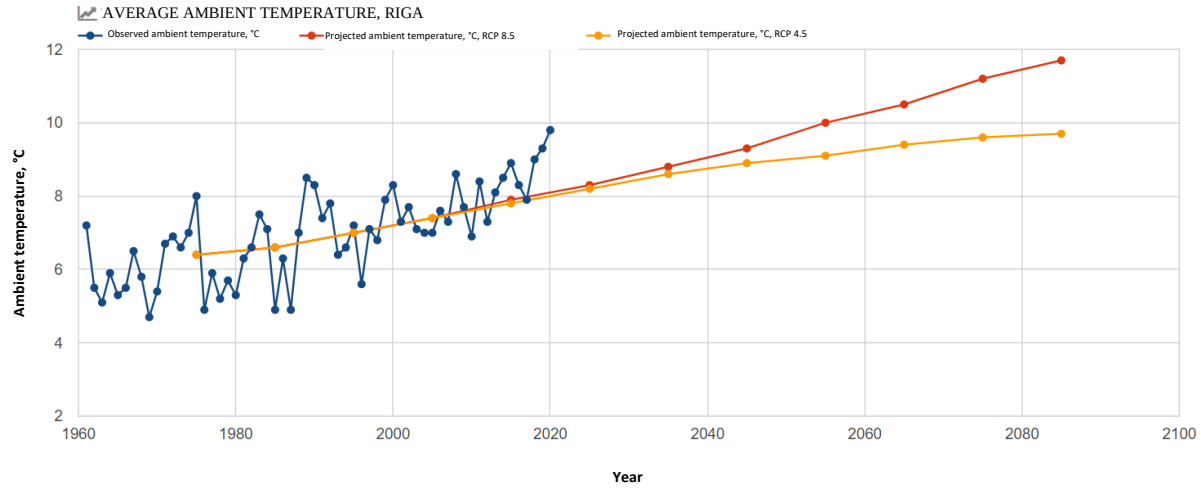


Figure 11.2. Average ambient temperature, Riga weather station

In certain multi-apartment building neighbourhoods of Riga with high density and low amounts of vegetation, increased heating of street surfaces and building facades is expected on hot summer days, creating a heat island effect (when, under similar climatic conditions, the air temperature in a densely built-up part of a city rises more than in the periphery of the city with less density and more green areas).

In the study 'Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia', an assessment of the percentage of built-up areas at the measurement points, the type of land surface cover, and the area of tree crowns revealed a correlation between these environmental features and air temperature. Air temperature was more often higher in areas with a higher proportion of asphalt

[158] Source: Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia. Summary. Riga, 2016 http://arhitekts.riga.lv/images/stories/petijumi-diskusijas/rigas-klimats/2_Telpiska_dala/Telpiska_un_sociala_dala%E2%80%93KOPSAVILKUMS.pdf

surfaces and buildings in the surroundings than in the places where greened surfaces and tree crowns dominated. Correlations of data on air temperature and environmental conditions also revealed a significant effect on air temperature at a specific time of day. In places where there is a large proportion of asphalt surfaces and buildings, increased air temperature is more often recorded in evening measurements (at 22:00), which indicates heat accumulation during the day and slow emission of heat after sunset. Also, there is a significant negative correlation between air temperature and tree crowns in relatively richer areas, and it is also significant in the evenings. Thus, in places where there are more trees, the air temperature drops faster in the evenings, which can be explained by less accumulation of heat energy in surfaces during the day and a decrease in temperature due to evaporation.[159]

A slight increase in the average amount of precipitation is also predicted for Riga (see Figure 11.3), which may pose a threat to municipal infrastructure if the capacity of the rainwater collection system is exceeded. Studies carried out in the 1960's and 1970's demonstrated that due to development, air convection (air circulation caused by faster warming of surfaces) is more active over cities in summer, and more convection leads to an increase in the frequency of precipitation. In Latvia, too, an analysis of local precipitation data demonstrated that the amount of precipitation in the centre of Riga was higher than on the outskirts. Air pollution also contributes to precipitation (for example, solid dust particles serve as condensation nuclei for precipitation).[160]

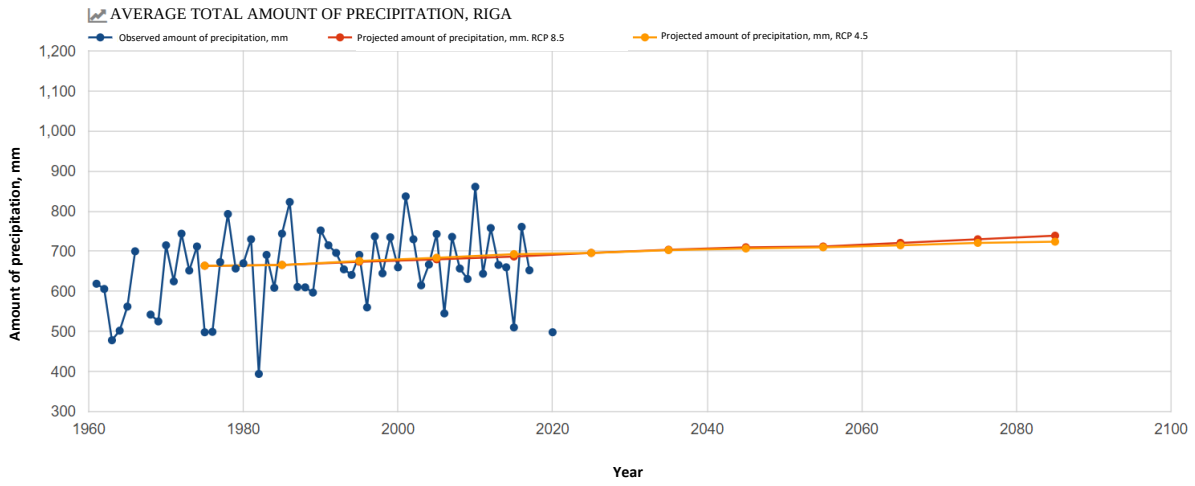


Figure 11.3. Average total amount of precipitation in Riga

Wind-related climate predictions show that the number and intensity of wind and storms will not increase significantly, remaining at the current level. Notably, the stability of the weather will decrease in general. Precipitation will have a less even pattern over the year, increasing both the risk of flooding and excessive rainfall and the risk of prolonged droughts. It is the risk of long-term drought that increases the risk of floods, because dry, parched soil absorbs large amounts of water more slowly, as a result of which the ability to absorb sudden precipitation decreases. In the long run, such conditions may also create the need to collect drained rainwater and use it for irrigation to reduce groundwater consumption.

A summary of the climate threat risk assessment is shown in Table 11.1. In the assessment of the existing risk level, the probability of the risk is assessed as low if the information sources mentioned in Table 1 do not indicate that in the last 10 years, the risk would affect the residents of Riga

[159] Source: Toms Bricis, 2016 'Microclimate measurements' Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia http://arhitekts.riga.lv/images/stories/petijumi-diskusijas/rigas-klimats/2_Telpiska_dala/ Microclimatic measurements_T.Bricis.pdf

[160] Source: Toms Bricis, 2016 'Climate Change in the World and in Riga' Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia http://arhitekts.riga.lv/images/stories/petijumi-diskusijas/rigas-klimats/2_Telpiska_dala/Klimata-parmainas_T.Bricis.pdf

significantly more often than average. The rating 'moderate' is given if these sources of information indicate that the frequency of the risk has increased in recent years, while the rating 'high' should be indicated in the future for risks that occur significantly more often than on average (the average for the historical time period for which the data is analysed). The impact caused by the risk is currently assessed as low for the majority of risks in Riga, because the available information shows that the consequences caused by the occurrence of the risks are mostly local and do not cause significant losses. The rating 'moderate' marks those risks that have already caused damage to the environment and the people, while 'high' should mark those future risks, the occurrence of which will cause significant damage to the environment, people or municipality. It is important to recognise that for all the risks (except the risk of storms, based on the forecast of the number of stormy days of LEGMC for Riga), an increase in their impact and frequency is expected. This means that increased attention should be paid to the implementation of preventive actions to reduce the impact of all these risks in Riga.

Table 11.1. Climate threat risks in Riga

Type of climate threat	Existing level of risk		Future threat		
	Probability of the risk	Impact of the risk	Expected changes in intensity	Expected changes in regularity	Period
Extreme heat	Moderate	Moderate	Increase	Increase	Short term (20–30 years)
Flooding and sea level rise	Moderate	Moderate	Increase	Increase	Medium term
Floods caused by heavy rainfall	Moderate	Low	Increase	Increase	Medium term
Storm surges	Moderate	Moderate	Increase	Increase	Long term (around 2100)
Drought and water shortage	Low	Low	Increase	Increase	Medium term
Storms	Moderate	Low	No changes	No changes	Long term
Forest fires	Moderate	Moderate	Increase	Increase	Medium term
Biological threats	Moderate	Low	Increase	Increase	Long term
Water-borne diseases	Moderate	Low	Increase	Increase	Long term

Options for existing risk	Options for future risk	Period
Low	Increase	Short term (20–30 years)
Moderate	Reduction	Medium term (after 2050)
High	No changes	Long term (around 2100)
Unknown	Unknown	

11.1.2 Environmental and Socio-Economic Factors That may Contribute to the Vulnerability of the City to Climate Change

The city of Riga is the capital of the Republic of Latvia; it is located on the southern coast of the Gulf of Riga in the Baltic Sea. Riga is also the economic centre of Latvia, where a large number of manufacturers and various service providers are concentrated. This means that Riga has much traffic, over an extensive road and railway network that connects the city to other Latvian cities.

The population of Riga is 614,618 (CSP, 2021), or ~33% of the entire population of Latvia; however, the population of Riga has a tendency to decrease. It should be noted that people who do not live in Riga, but work and regularly use the city's infrastructure, are also exposed to the effects of climate change. Approximately 61% of the city population is of working age, respectively 39% of

the population (children, seniors, etc.) are more exposed to climate manifestations such as intense heat, and the municipal government should pay extra attention to the protection of these social groups.

Riga has the features of a metropolitan area, with the municipalities adjacent to the city developing and building relatively actively, while their inhabitants are economically closely tied to Riga. The high density of population and infrastructure increases the climate-change vulnerability of Riga, as any climate-induced extreme phenomena will affect a greater number of people and result in more extensive damage to buildings and infrastructure. The situation is also worsened by the lack of infrastructure in many multi-apartment building neighbourhoods in Riga, such as Dārziņi, Mangaļsala, Jaunciems, Trīsciems, Rumbula, Bukulti, Suži, Beberbeķi, Kleisti, and Buļļi, where an insufficient number of hydrants and surface fire water intakes was found.

According to the 2020 annual report of the State Forestry Service, Riga City Municipality had 5,494.33 ha[161] of forest land (18% of the total area of the city), while according to the data of the State Land Service[162] agricultural land (LIZ) occupied 354 ha (1% of the total area of the city), streets and roads occupied 2,733 ha (9%), water sites occupied 4,930 ha (16%), residential areas, 6,700 ha, and industrial areas, 5,250 ha[163] (22% and 17%).

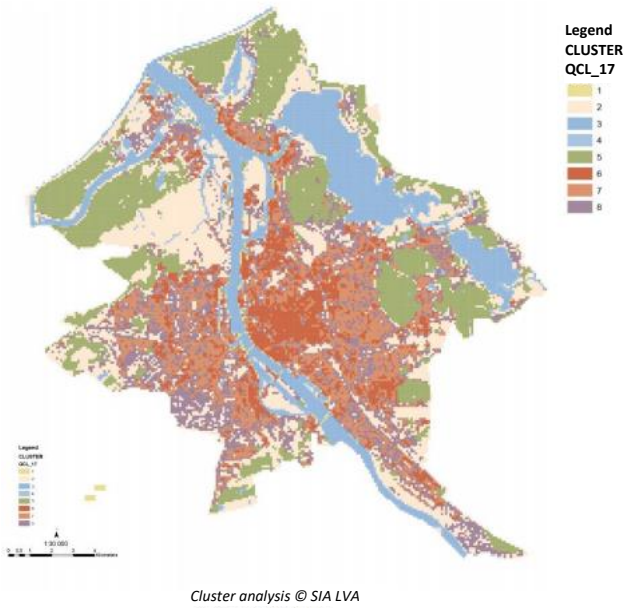
Although approximately one-third of the area of Riga is occupied by green or water areas, most of them take up large sections on the periphery of the city, but in the densely built-up areas in the city centre, there is not enough vegetation to reduce the heat island effect and overheating of buildings and streets in summer. Cluster analysis was conducted in the study 'Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia' concluding that the highest urban heat island intensity in Riga could be observed in densely-built city districts.[164] The regions most intensively exposed to the heat island effect can be seen in Figure 11.4.

[161] Source: State Forestry Service Statistics https://www.vmd. gov.lv/valsts-meza-dienests/statikas-lapas/publications-un-statistika/meza-statistikas-cd?nid=1809#jump

[162] Source: State Land Service Statistics https://www.vzd.gov.lv/lv/zemes-sadalijums-zemes-lietosanas-veidos

[163] Source: Economic profile of Riga https://www.riga.lv/lv/media/3955/download

[164] Source: Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia, Riga 2016 http://arhitekts.riga.lv/images/stories/petijumi-diskusijas/rigas-klimats/2_Telpiska_dala/Telpiska_un_sociala_dala%E2%80 %93SUMMARY.pdf



		surface temperature	Urban heat island intensity
buildings	6	40.4	11.2
buildings and urban greenery	7	36.6	7.4
urban greenery and buildings	8	34.4	5.2
urban greenery	2	32.0	2.8
water and buildings	1	31.7	2.5
forest	5	30.3	1.1
water and urban greenery	4	29.2	0.0
water	3	25.0	-4.2

Cluster analysis © SIA LVA

Figure 11.4. Results of the cluster analysis in the study 'Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia'[165]

Riga is crossed by the Daugava, Latvia's largest river; its length within the city is 31 km. Several tributaries flow into the Daugava in the city, the largest of which are Hapaka Ditch, Mārupīte, and Olekte. The border of Riga in the west runs along the Lielupe, the right tributary of which — the Buļļupe — lies entirely within the city and connects the Lielupe with the Daugava. Also, in Riga there are several large lakes: Ķīšezers, Jugla, and others.

The hydrological conditions of rivers and lakes, the features of precipitation, and water level fluctuations in the Gulf of Riga create a significant flood risk for the city, so a Flood Risk Management Plan was developed for Riga. The public consultation process for the Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027 is currently underway. Riga is included in this plan as a national flood risk area. The water level of the lower reaches of the Daugava, and Lakes Ķīšezers and Jugla is significantly dependent on sea level fluctuations, and on level rises and falls caused by wind. Flood levels are observed in mid-winter and late autumn during storms, when northwest winds cause surges in the Gulf of Riga.[166]

Since the construction of hydroelectric power plants, there is no significant flood risk for Riga during the ice retreat and flooding period. At present, the most significant risk of flooding in Riga is caused by storm surges, when, as a result of a strong westerly wind, water is forced into the Gulf of Riga, and further into the Daugava when the wind changes direction and blows from the northwest. Due to water level fluctuations caused by storms, the sea coast of Riga is also affected by the risk of coastal erosion. The threat of flooding in Riga is also created by intense and prolonged rainfall, which can cause the water level to rise in the Daugava, the Lielupe, and Lake Ķīšezers, flooding the lowest areas, basements of houses, and negatively affecting the operation of the sewage pumping station, with the discharge of the wastewater to the biological wastewater treatment station 'Daugavgrīva'[167]. It is important that a large part of Riga has a joint wastewater system (rainwater is fed into the household sewer system), which creates additional risks in situations of heavy rainfall and flooding, in that

[165] Source: Climate impact, adaptation to climate change, and socio-economic assessment of adaptation opportunities in multi-apartment blocks in Riga and Latvia, Riga 2016 http://arhitekts.riga.lv/images/stories/petijumi-diskusijas/rigas-klimats/2_Telpiska_dala/Telpiska_un_sociala_dala_zaksavtams_lemumu_pienemejiem.pdf

[166] Draft Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027 (viewed on 7 July 2021).

[167] Flood risk management plan for Riga https://www.rdpad.lv/wp-content/uploads/Rigapretpludiem/dokumenti/06riskmanagment.pdf

wastewater treatment facilities will be overloaded. Also, insufficient capacity of the rainwater system contributes to the flooding of trafficways, causing disruptions in the transport system.

In general, the most typical rainwater management practice for Riga is to drain rainwater through a pre-built sewer system (separate system or joint system) to a water body, before treating it at a wastewater treatment plant.[168] Such a conventional approach has a number of downsides: a negative impact on the quality of the urban environment, microclimate, biological diversity, and urban ecosystems, and the inevitability of floods and pollution of open bodies of water during extreme rainfall, when the existing infrastructure cannot accommodate all the rainwater.

The most important available numerical indicators that describe the vulnerability of Riga due to climate change are shown in Table 11.2. In the future, opportunities for gathering and analysing more extensive data should be evaluated in order to more fully understand the city's weaknesses in the context of climate.

Table 11.2. Key indicators describing the urban environment in the context of climate change

Indicator	Values	Comment
Population	614,618	39% are vulnerable population groups (people older or younger than working age). The population is decreasing.
Street density	9%	Land occupied by streets and roads, of the total area of the city.
Proportion of green and water areas	34%	Water sites 16%, forest areas 18% of the total area of the city.
Number of forest fires	65	65 forest fires were registered in 2019, affecting an area of 16.3 hectares (of which 16 hectares was forest land)
The climate-normal average summer air temperature (June–August) is 16.2 °C	18.4 °C in 2010 18.1 °C in 2018 18.8 °C in 2021	The climate normal is the average indicator for the period 1981–2010. The bigger the deviation of the average temperature from the climate normal, the more hot periods there are in the summer.
The risk of flooding in Riga with the probability of: 10%, 1%, 0.5% Population affected	Spring floods 6,042 (10% probability) 13,236 (1% probability) 15,685 (0.5% probability) Storm surges 10,383 (10% probability) 20,459 (1% probability) 23,692 (0.5% probability)	Flood risk index for local residents 0.41 (see the draft of the Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027, Table 6.1.2.4)
Number of wastewater treatment plants, water intakes, and landfills flooded with high (10%), medium (1%), and low (0.5%) probability of storm surges	7 (10%) 21 (1%) 28[169] (0.5%)	Flood risk index for the environment 1.00 (see draft Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027)
Flooded cultural heritage areas, hectares flooded with a 0.5% probability of sea storm surges	185.74 ha	See draft Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027)
Potential changes in flood risk due to climate change in the national flood risk area: Riga	Storm surges, rain floods will increase	See Table 6.1.4.1 in the draft Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027)

[168] 'Integrated stormwater management (iWater)' project of the Interreg Central Baltic programme for region cross-border cooperation in 2014–2020: www.integratedstormwater.eu

[169] Draft Daugava River Basin Area Management Plan and Flood Risk Management Plan 2022–2027

A summary of the municipality's vulnerabilities and the main indicators is shown in Table 11.3. The current level of vulnerability is generally assessed as low, given that significant losses (both financial and non-financial) have either not occurred so far, or no information is available to confirm them. However, it is important to take into account the fact that if no preventive actions are taken in the next 10–100 years, the vulnerability of certain sectors may increase rapidly. For example, if the building stock is not renovated, the occurrence of more and more frequent heat waves will significantly contribute to the deterioration of public health, level of productivity, and quality of the buildings in the long run, or if the construction of fire infrastructure is not carried out, the fire risk will increase in several multi-apartment building neighbourhoods, for example, in Dārziņi and Mangaļsala. Therefore, all types of threats included in the table are considered significant in the long term, and one must take preventive actions so that the level of vulnerability in these sectors does not increase.

Table 11.3. Expected impact of climate change on various sectors in the municipality

Type of climate threat	Vulnerable sectors	Current level of vulnerability	Indicators
Extreme heat	Transport infrastructure	Low	Road damage due to heat
Extreme heat	Energy	Low	Increase in energy demand for indoor cooling
Extreme heat	Public health and productivity	Low	Decrease in productivity due to heat Heat-induced increase in mortality/diseases Frequency of chronic disease flare-ups Frequency of heatstroke Increased demand on the sanitation system
Flooding and sea level rise	Transport infrastructure	Low	Road infrastructure damaged by floods
Flooding and sea level rise	Buildings	Low	Flood-damaged buildings, building foundations and structures
Flooding and sea-level rise (flooding caused by heavy rainfall)	Centralised sewer system	Low	Wastewater overload at the Daugavgrīva biological wastewater treatment station. Frequency of emergency discharge (when untreated wastewater enters the environment)
Drought and water shortage	Water supply	Low	Increase in water consumption
Drought and water shortage	Environment and biodiversity	Low	Damage to green areas (burn/withering) as a result of drought Increase in water consumption for the maintenance of the city's green areas
Storms	Buildings	Low	Damage to buildings as a result of storms
Storms	Energy supply	Low	Quantity and duration of power outages due to storms
Storms	Green infrastructure	Low	Damage to green areas (e.g., broken trees) as a result of storms
Forest fires	Civil protection and rescue services	Low	Number of people injured and killed in forest fires Number of people left homeless as a result of forest fires.
Forest fires	Forestry	Low	Area of burnt-down forests
Biological threats	Public health	Low	Incidence of waterborne diseases among the public

11.2 Challenges

Various challenges related to adaptation to climate change can be observed in the urban environment of Riga, and the main ones are shown in Table 11.4.

Table 11.4. Key climate change adaptation challenges in Riga

Challenges
Flooding of streets and low-lying areas as a result of heavy rainfall.
Overheating of streets, deterioration of street surface due to heat.
Overheating of road surface (asphalt damage, deformation of rails).
Overheating of building interiors increasing the demand for cooling.
Overheating of building interiors decreasing the productivity of workers.
Reduction in green areas (construction, paving with asphalt and paving stone), unsustainable maintenance of green areas.
Long-term, drought-induced increase in water consumption for the maintenance of green areas.
Deterioration in water quality in surface water reservoirs and streams (pollution, algal blooms, etc.), which increases the spread of intestinal infectious diseases.
Increased risk of fire due to drought.
There is a lack of data on the impact of extreme heat on the public, and no public health data collection system has been developed that would make estimating the profitability of adaptation measures possible.
In the sewer system of some districts/neighbourhoods of Riga, the rainwater drainage system is not completely separated from the centralised (household) sewer system. When there is an overload of the household sewer system, untreated household wastewater can be discharged into the environment in order to protect the operation of the Daugavgrīva biological wastewater treatment station.
The management of the wastewater system is fragmented: the overall sewer system is under the control of 'Rīgas ūdens', the separate rainwater system within the building lines of streets is under the control of the RCC Traffic Department and partially under the control of 'Rīgas ūdens', the rainwater system inside blocks and courtyards is owned by the holders or owners of the land, including the executive management of Riga, while ditches and partially or completely developed smaller rivers are under the control of the RCC Housing and Environment Department. No inventory of drainage systems has been carried out. Fragmented allocation of functions hinders the implementation of sustainable rainwater management, while fragmented responsibility leads to misunderstandings and conflicts among stakeholders. Currently, there is no RCC institution in Riga that is responsible for the implementation of water and green solutions (which would, among other things, deal with the separation of rainwater from the centralised sewerage system).
The human, financial, and technical resources allocated for rainwater management, for the maintenance and development of infrastructure in Riga Municipality are not sufficient (RCC departments are allocated less than 5% of the funding needed to ensure sustainable rainwater management every year).
The Riga City Municipality has not developed a sustainable rainwater management strategy or plan, nor has a rainwater management model been created (neither an institutional model nor a business model for the sustainable growth of the rainwater system).

11.3 Measures

In total, the Riga City Municipality has identified 10 measures in the field of adaptation to climate change. The aim of implementing the adaptation measures is to reduce the risks caused by climate change and increase the city's resilience. The measures are generally aimed at creating a sustainable urban environment in order to also improve the quality of life and safety of the city residents.

All measures included in this section are directly or indirectly related to Priority 2 'Urban environment promoting quality of life' and Priority 3 'Good environmental quality and sustainable urban ecosystem

for mitigating climate change' outlined in the Riga Development Programme, and more specifically to Tasks 2.1, 2.2, 2.3, 3.1, 3.2, 3.3. As part of accomplishing Task 3.4 'Provide citizens with high-quality and accessible utility services', one must also take climate aspects into account. The adaptation measures are also closely linked to the measures planned in the other subject groups of the ACTION PLAN, such as the municipal infrastructure and mobility measures, so that they are implemented sustainably and in accordance with climate predictions.

According to the implementation and monitoring process (see more in Section 4.3.1), the responsibility for the implementation of the measures planned in this section lies with the climate change adaptation subgroup. The task of the subgroup is to evaluate and delegate the implementation of the measures to the responsible institutions, and to conduct systematic monitoring and elimination of potential obstacles.

11.3.1 Measures Aimed at Mitigating Flood Risk

1. ***Update the Flood Risk Management Plan for Riga and update all related planning documents using the latest sea tide and coastal erosion forecasts.***

The expected costs are up to EUR 50,000.

2. ***Implement flood mitigation and environmental protection measures that are already included in the Daugava river basin area management and flood risk management plan.***

The Riga development programme includes a currently ongoing project with investments in the amount of EUR 4.52 million. The cost of other anti-flood projects depends on the scope and the nature of the project in question.

3. ***Continue the separation of the rainwater drainage system from the general sewer system, and encourage the coordinated reconstruction and sustainable development of the rainwater system, which includes supporting the integration of decentralised rainwater solutions in the central rainwater drainage system.***

The following activities are recommended as part of the measure:

- Integration of various green infrastructure and sustainable rainwater management solutions for the urban environment (buildings, structures, and biological methods for the management, accumulation, natural purification, and soil infiltration of rainwater), which relieve or replace centralised rainwater drainage systems. Solutions may involve infiltration cassettes and wells, permeable street paving, lining, filter strips, sedimentation or runoff ponds, biofilters, or rain gardens.
- Reconstruction of existing enclosed rainwater drainage systems, construction of a new rainwater drainage system where necessary to separate rainwater from the household sewer system, and creation of storage pools to distribute rainwater flows in a balanced manner.
- Construction of ditches, ravines, and other types of water reservoirs for heavy rainfall events, which can also be functionally used during the rest of the year.
- Conduct dynamic hydrologic modelling of the system to accurately determine the likelihood of flooding not only as a result of storm surges or general water level rise, but also as a result of localised heavy rainfall. Based on the modelling results, develop an integrated sustainable rainwater management model.
- It is necessary to increase the pollution treatment capacity of the planned biological wastewater treatment station 'Daugavgrīva' by increasing the water intake capacity, which will make it possible to treat more municipal wastewater and increase the climate resilience and sustainability of the centralised sewer system.

4. Solutions are chosen taking into account the degree of water pollution, its amount, and the special feature of the location in question. The Riga Development Programme includes several flood mitigation measures related to the reconstruction of the sewer system. More than EUR 7 million has been earmarked for these measures. Financing is also planned for the expansion of wastewater treatment facilities, in the amount of EUR 69.5 million (for the planned expansion of wastewater treatment facilities and installation of storage pools), which would reduce the risks caused by heavy rainfall in the wastewater treatment system. Also, aspects of sustainability and adaptation must be taken into account when implementing the measures included in Task 3.4 of the Riga Development Programme 'Provide citizens with high-quality and accessible utility services'.

11.3.2 Measures Aimed at Mitigating the Effects of Extreme Heat and Drought

5. ***Development of an urban greening plan to mitigate future increases in the urban heat island effect and mitigate other climate risks.***

Such a plan must assess the implementation of the following measures in detail:

- conducting support measures for the implementation of natural shading solutions for buildings;
- use of green infrastructure in the urban environment as an alternative and preventive solution for the accumulation of rainwater to reduce floods caused by rainstorms (see measures in Section 11.3.1), and with the aim of promoting biodiversity and increasing the value of ecosystem services;
- creation of green transport corridors to reduce the fragmentation of natural and semi-natural areas;
- greening of street edges along traffic lines;
- changes in land management regulations to reduce the effects of long droughts in the city's green areas;
- integration of the general principles and priorities of sustainable water resource management in land planning documents, and water management laws and regulations;
- reduction in the proportion of waterproof street surfaces in the urban environment;
- assess the necessity of foreseeing construction restrictions in the routes of the prevailing winds, which supply the central part of the city with fresh/cooler air from the city outskirts/sea.

The aim of this plan would be to comprehensively determine what multi-apartment building neighbourhoods and city streets need measures, and what measures would be suitable for each specific situation. A large part of the greening measures should be integrated into the ongoing street and courtyard renovation projects. Approximate cost of the measure: EUR 100,000.

11.3.3 Measures Aimed at Setting up Sustainable Governance

6. ***Establish a 'climate agency' or other type of entity.***

The direct responsibilities of this entity would be to plan, manage, and control the implementation of adaptation measures, to conduct monitoring, data collection and analysis, and to build cooperation with government institutions in what pertains to the implementation of the measures included in the Latvian Plan for Climate Change Adaptation. This measure does not directly reduce climate risks, but in order for the implementation of adaptation measures in the municipality to be coordinated and well-designed, one must clearly identify the people in charge whose task would be to understand the needs and lead the integration of climate change adaptation measures at all levels of city governance.

7. Create a single database of damage caused by disasters and extreme climate events.

This database would be used to collect data collected by the Traffic Department and other RCC departments, and to start consistently collecting information about the damage caused by extreme climate events that has not been collected so far. Approximate cost of the measure: EUR 50,000.

11.3.4 Measures Aimed at Reducing Threats to Public Health

8. Measures for improving the water quality in public water reservoirs and informing citizens about water quality

Currently, water quality testing of public water reservoirs does not take place often enough in summer to promptly warn local residents or take measures to improve water quality, so one of the first steps would be to test water quality more often in both official and unofficial areas used for swimming by local residents, in order to warn them of the risk of blue-green algae and other types of pollution in time. Approximate cost of the measure: EUR 20,000 per year.

9. Ensuring the availability of drinking water in public places

Approximate cost of the measure: EUR 80,000 per year in the first three years. The measure is already included in the Riga development programme.

10. Identify the most vulnerable government and municipal buildings that would require adaptation to climate change and related risks, and integrate them into the municipal energy management system.

The measures included in the Latvian Plan for Climate Change Adaptation for 2030 and Daugava River Basin Region Management Plan and Flood Risk Management Plan 2022–2027 are binding to the municipal government regardless of other planning documents. Mostly, both local governments and national government institutions are responsible for their implementation, and their implementation should be coordinated in the future within the climate neutrality policy development work subgroup.

A detailed description of the two most important measures, which will solve the problems that are already relevant today, is provided in Annex 4.5. These measures are:

1. Continue the separation of the rainwater drainage system from the general sewer system, and encourage the coordinated reconstruction and sustainable development of the rainwater system.
2. Develop an urban greening plan to reduce the future exacerbation of the urban heat island effect, reduce other climate risks, and improve the quality of life in the urban environment.

12 Environmental Communication

12.1 Basic Principles of Environmental Communication

Despite climate change being a widely discussed topic in the last decade, large numbers of people still deny climate change or consider it exaggerated, and view investments in renewable resources and other green technologies as disproportionately expensive and burdensome. Several studies have found that citizens see climate change as a problem that affects not them, but other people in special circumstances and geographical locations.[170] In addition, climate change processes and their consequences manifest themselves in the long run, are not unambiguously measurable, and are not effectively explained to the public in a way that is comprehensible and clear.

The Special Eurobarometer 513 study[171] on the attitude of Europeans towards climate change (interviews conducted in March and April 2021) shows that 59% of Latvian residents consider climate change a very serious problem, and 24% a relatively serious problem. 71% of respondents agree that the Latvian government is not doing enough to fight climate change problems. However, the survey also shows that respondents in Latvia ranked climate change as only the 4th most important problem (only 10% of the respondents ranked it as the most important problem). More important problems in the view of the public were the economic situation in the country, spread of infectious diseases, and risk of armed conflicts. Given these tendencies, it is important to take into account the public's priorities, values, and concerns when planning the effective communication of environmental and climate issues.

Given that the economy in the country ranks first among the public's priorities, it is important to emphasise how the planned measures and solving of climate issues can improve the economic situation, reduce energy poverty, and improve well-being in general when communicating about climate policy and activities. It is also important to note that the number of people in Latvia who tend to disagree or completely disagree that the costs of the damage caused by climate change are much higher than the funds needed to switch to environmentally friendly technologies, and that adaptation to climate change can have a positive impact on EU citizens, is significantly higher than the EU average. The attitude of Latvian and European citizens towards mitigating climate change is shown in Figure 12.1.

[170] Source: https://www.eesi.org/articles/view/whats-wrong-with-the-way-we-communicate-climate-change
[171] Source: https://europa.eu/eurobarometer/surveys/detail/2273

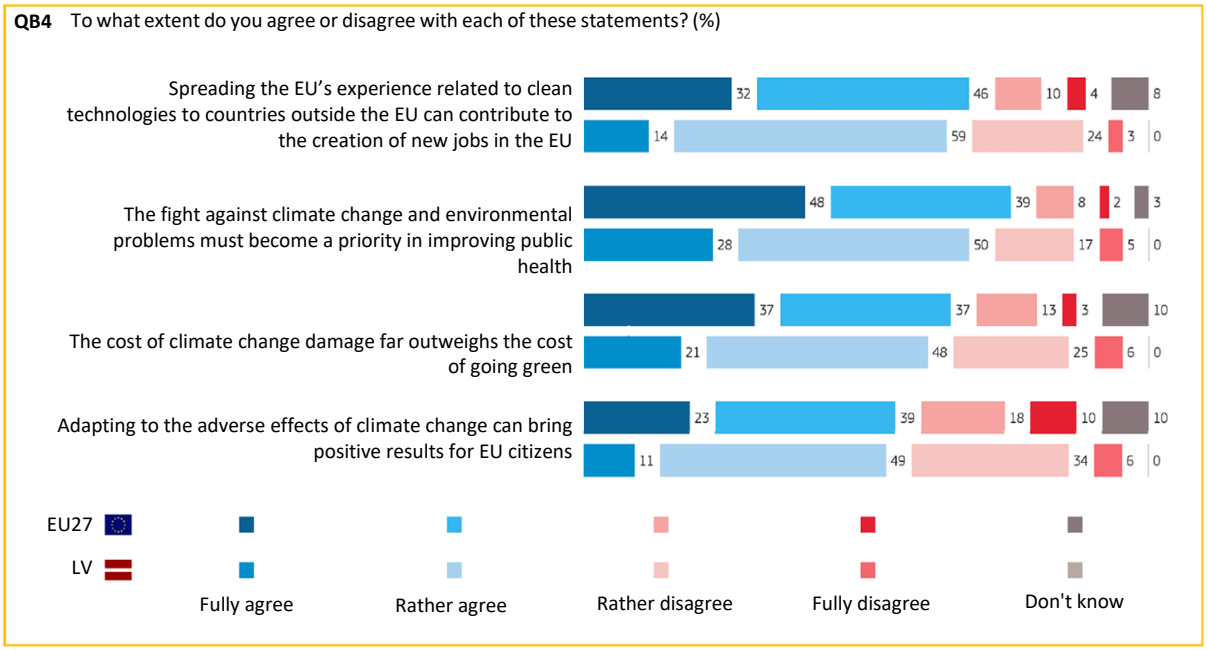


Figure 12.1. Attitude towards climate change mitigation[172]

The Intergovernmental Panel on Climate Change has published Principles of Effective Communication and Public Engagement on Climate Change,[173] which define the key approaches for how to better explain climate change and the necessary actions on the way to climate neutrality.

The principles are based on the latest research in social science, and can also help the Riga City Municipality to create an effective campaign to move towards climate neutrality.

1. Principle.

Talk about the real world, not abstract ideas.

Despite the fact that the 'big numbers' (increase in global average ambient temperature, CO_2 concentration in the atmosphere, etc.) are the most important characteristics of climate change, these numbers are unlikely to be personally engaging for most of the public, and may give the impression that climate change is an abstract technical problem that has little to do with people's daily lives and habits. Accordingly, it can be perceived as a problem that will have an effect in the distant future and in other parts of the world. In order to avoid the spread of such views, it is important to use language understandable to the public and to frame the message through concepts understandable to the target audience. For example, the installation of solar panels can be presented from the point of view of economic benefits or environmental aspects, in each case reaching a different target audience.

The use of metaphors and analogies can also help to explain more complex concepts, but one must make sure that the metaphors and analogies used are understandable to the specific target audience. Successful use of metaphors and analogies can create more inclusive and personal communication about climate science with the broader public. For example, an analogy with the immune system can be used[174] to explain why the question 'Is this weather caused by climate change?' is misplaced. If someone has a weak immune system, they are more susceptible to various diseases, and no one asks if every disease was caused by a weak immune system. The same logic applies to climate change and various extreme weather events: climate change makes them more intense and more destructive.

[172] Source: Special Eurobarometer 513, 2021

[173] Available here: https://www.ipcc.ch/site/assets/uploads/2017/08/Climate-Outreach-IPCC-communications-handbook.pdf

[174] Source: https://www.theguardian.com/sustainable-business/2015/jul/06/12-tools-for-communicating-climate-change-more-effectively

2. Principle.

Talk about what your audience cares about.

Research shows that people's values and political beliefs play a greater role in how they feel about climate change than their knowledge of climate science. That is not to say that science-based facts are meaningless, but they may not be sufficient to effectively elicit broad public interest or raise awareness. Achieving this requires talking through the lens of people's values, finding a common language, because people assess if the information they get threatens their basic values and is in accordance with their perception of the world. Therefore, in order to create the most successful communication campaign possible, it is important to understand what matters most to the target group, what they expect, as well as what their values and understanding are.[175] For example, to organise communication not only with keywords like 'climate neutrality' or 'zero-emission goals', but also with 'sustainable growth', 'urban technological development', 'smart solutions'.

3. Principle.

Tell a story.

Most people see the world through stories and emotions, not numbers and graphs. Storytelling not only helps explain complex concepts more easily, but also makes them easier to remember and understand. It is important for the story to include not only the explanation of the problem and its consequences, but also the solutions and the support provided by the municipal government. Research shows that not adequately explaining how people can act to reduce climate risks can lead to resistance and anxiety.

4. Principle.

Use effective visual information. Just as important as the chosen written or spoken language, visual presentation and images can change a person's attitude towards a given issue. In recent years, a relatively narrow and stereotyped visual language has been used extensively, with polar bears, melting glaciers, plumes of smoke, and relatively polarised images of environmental activists. In order not to cultivate stereotypes, one should follow a few principles:

a. Use images of real people and situations, not staged and clichéd ones.
b. Tell a new story. Do not repeat the usual story of polar bears, but tell a story that is more understandable and closer to the listener's life.
c. Choose images of the local effects of climate change, rather than something distant and incomprehensible to local people.
d. Show images that illustrate solutions rather than consequences, to foster a more positive attitude.
e. Provide quantitative, data-driven information in a rational and easy-to-understand manner.

12.2 Communication Structure

The type and structure of communication largely depends on the specific target audience and the purpose of the communication. 4 key target audiences can be distinguished in the context of the ACTION PLAN: local residents, entrepreneurs, municipal employees, and the government. Each group can be broken down further (see Figure 12.2).

[175] Source: https://zemgalei.lv/files/Klimata_komunikacija_LATVISKI_Mar2019.pdf

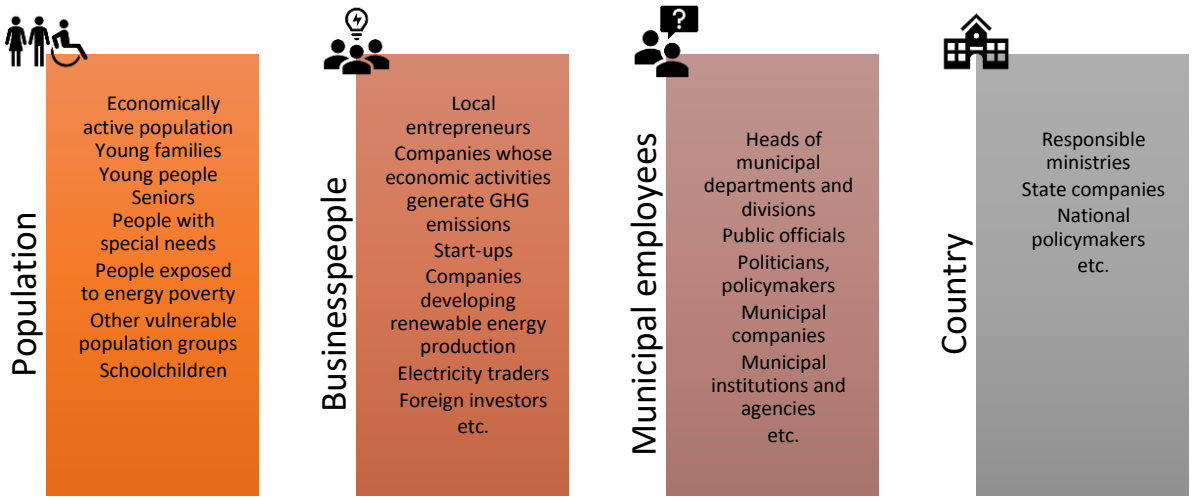


Figure 12.2. Target audience breakdown

The chosen communication channels and communication methods differ depending on whether the goal is to increase public awareness in general, to achieve the involvement of specific groups, or something else. Environmental and energy issues are often very complex for most of the target groups communicated with. Therefore, it is very important to take several principles into account in the communication process:

- Make feedback possible at all levels of communication and with all the parties involved (see Figure 12.3). Feedback can be obtained not only directly, by making it possible for local residents to express their opinion in public consultations or online, but also through other involved parties, such as mediators and trustees, NGOs, municipal companies, education institutions, etc.
- Cooperate with universities and other highly competent institutions, and the non-governmental organisation (NGO) sector. Science and NGOs can enable improvements in competence and provide the necessary knowledge for the municipal government, and serve as one of the communication channels with the broader public and the private sector. Universities and scientific institutions can become innovation centres or energy communities by quickly and successfully implementing pilot projects or innovations, setting a good example for the broader public.
- Cooperate with and conduct extensive measures in municipal education institutions to ensure the understanding of climate change, its mitigation, and adaptation to it.

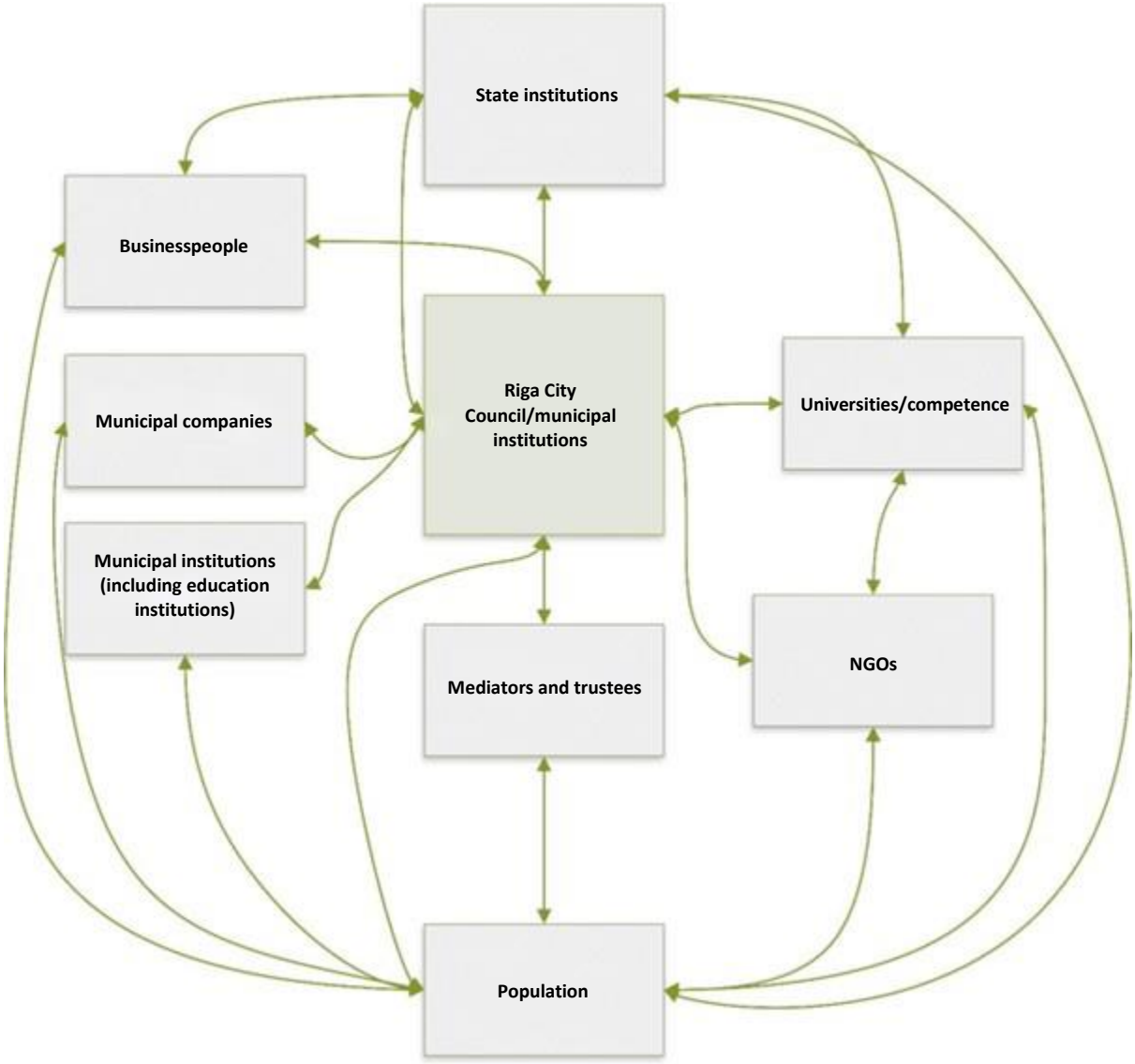


Figure 12.3. Communication structure

Communication in the ACTION PLAN must, above all, be subordinate to the practically implemented measures, so that the communication is based on specific actions and practical examples that are understandable and visible to the public. However, in parallel with these activities, general communication measures should also be carried out so that the public and other interested parties have access to general information about Riga's climate neutrality goals and why they are necessary. Figure 12.4 summarises the general areas of communication for the biggest target groups.

Population

What is a climate-neutral city? Why is Riga moving towards becoming one?

What benefits will its residents get (reduced energy wastage; health benefits with cleaner air, lower noise levels; economic benefits, lower bills)

What is a climate-resilient city? Why is Riga moving towards becoming one?

Why is it important for local residents that the city adapts to climate change?

How will vulnerable population groups be protected; how will energy poverty be reduced? What is energy poverty?

How can citizens get involved, show initiative?

Businesspeople

What is a climate-neutral city? Why is Riga moving towards becoming one?

Vision: what does it mean for business growth?

What potential benefits can this have for different businesses?

How can businesses get involved, show initiative?

What opportunities, support mechanisms will be offered to companies on the way to climate neutrality?

Municipal institutions

What is a climate-neutral and climate-resilient city? Why is Riga moving towards becoming one?

In what way does mitigation differ from adaptation, how can both the areas be integrated into the current day-to-day activities of the municipality?

What can I, a municipal employee, do to help the municipal government achieve its goals, and how do my actions affect the achievement of the municipal government's goals?

Events in education institutions for the students to learn the basic concepts of sustainable energy and climate change.

Country

The vision of the climate neutrality of Riga as the capital of the country!

What are the necessary climate policy mechanisms for Riga to achieve climate neutrality?

What kinds of lack of data, policy, support mechanisms slow down climate-neutral development?

The role and influence of Riga in the achievement of Latvia's national climate goals.

Figure 12.4. Key conceptual areas of communication for the biggest target audience groups

12.3 Measures

All the subject groups of the ACTION PLAN not only plan measures directly aimed at mitigating climate change or adapting the urban environment to climate change, but also measures aimed at educating, informing and, most importantly, involving the public in achieving climate neutrality and climate resilience. In total, more than 27 measures in 6 subject groups were identified in the ACTION PLAN. The body in charge of environmental communication is the environmental communication subgroup (see Section 4.3.1).

12.3.1 General Communication Activities

1. Single municipal campaign/initiative EnergoneatkaRĪGA 2030[176]

The campaign defines a single visual identity, general fields of communication, and plans subordinate activities. The leading coordinator of the campaign is the environmental communication work group, in cooperation with REA and other municipal institutions.

Based on the communication experience so far and the public's resistance to climate measures, the possibility of building a bottom-up approach to communication structure must be considered, initially communicating more intensely through concise news about specific projects and fields of action, and then gradually moving to the explanation of general concepts and the global context. The initial fields of communication could be (here, however, it should also be kept in mind what the actual fields of action are, and communication should be adjusted accordingly):

- Energy efficiency in housing.
- Energy communities (implementation of pilot projects).
- Green infrastructure and green areas.
- Energy efficiency and air quality in education institutions.
- Communication activities and pilot projects/demonstration projects in Riga education institutions.

The city council must also create a single EnergoneatkaRĪGA 2030 platform, to become an [177]easy-to-remember and understandable source of information for finding and accessing detailed information from the websites of relevant institutions or institutions that organise activities. The platform could include a mechanism for citizens, businesses, and other target groups to get involved and offer their suggestions or opinions.

The platform also needs to provide and regularly update information on the progress of the goals set in the ACTION PLAN in such a way that it is convenient for anyone to track the actual results of the implementation of the ACTION PLAN measures. The platform could also include the following information:

- Database with measures implemented by companies, and measures on which the Riga City Municipality writes and reports. Businesses could potentially be awarded at the end of each year, in various categories, such as 'Greatest reduction in CO_2 emissions', 'Best campaign', 'Best measure', etc.
- Agreements on the implementation of the measures with companies, institutions, associations, for example, for the installation of solar panels, reduction of energy consumption, installation of bicycle racks and charging systems, etc.
- Lists, descriptions of various possible measures that building managers, companies can implement; webinars, information campaigns, etc. organised.
- Promoting examples of good practice, etc.
- Creating a platform/section for citizens to ask their questions and express their opinions.
- Etc.

Individual, more narrowly targeted activities and campaigns subordinate to the central campaign must be planned according to the fields of activity defined in the ACTION PLAN, taking the target audience into account. Proposals for the subordinate measures are offered below.

[176] Or other name that appeals to the public and is easy to remember
[177] Or other name that appeals to the public and is easy to remember

2. ***Promotion of and motivation for reduction of energy consumption by municipal companies***.

   All municipal companies must work according to the principle that the municipal government should set a good example for the rest of the public. In order to motivate and work with the public and companies, municipal companies must conduct energy efficiency and other environmental measures in their business. It also requires the involvement of all municipal companies in a single campaign. From the outset, one must create a cooperation model for all participating municipal companies in order to ensure clarity and coherence in the information flow, and to avoid contradictory information.

12.3.2 Information Activities in the Field of Adaptation

3. ***Education campaign on how to act in climate threat situations:*** how to recognise heatstroke, health problems caused by water-borne infections, how to act in these situations, how to protect yourself from heat and other climate threats.

4. ***Information campaign about fire safety during the dry/hot season***, when any activity involving fire outdoors carries an increased fire risk. One of the parties in charge of the implementation of the measures, could be SIA 'Rīgas meži', and it is also desirable to establish close cooperation with the State Fire and Rescue Service.

5. ***Information measures pertaining to waste issues***: the importance of sorting household waste, not to leave waste in the forest, etc., building cooperation for communication with waste companies.

6. ***An environmental education programme*** is currently being implemented, but needs to be expanded, including the active involvement of students in various events and projects related to energy and climate, making it possible for them to learn the principles of sustainable energy in practice, and to understand the principles of adaptation to climate change.

12.3.3 Communication Measures in the Field of Transport:

7. ***Information campaign:***
   a) to promote a change in driving habits, and increase the number of people in the vehicle;
   b) to educate about environmentally-friendly modes of transportation;
   c) a campaign about safe cycling 'Brauc droši uz skolu' (Ride Safely to School) for schoolchildren and youth, etc.;
   d) involvement in international campaigns like Car-Free Days, etc.

8. ***Eco-driving training.***

9. ***Promotion of emission-free and low-emission vehicles in private transport.***

12.3.4 Communication Measures in the Field of Energy and Housing

10. ***Create a public database on the insulation and energy efficiency of apartment buildings.***

    At a time when the interest of the public is focused on energy-related issues, one must provide easily accessible information about what consumption is like in an energy-efficient home and what savings it can provide in order to stimulate public interest in energy saving. Also, publicly available information would enable events like energy competitions for multi-apartment buildings with the aim of educating local residents about energy-saving habits, and addressing local residents through personally relevant information in a more targeted way.

11. ***Information campaign about energy efficiency at home***, solutions for providing heat energy, waste sorting, and other habits promoting climate neutrality.

12. ***In cooperation with businesses, higher education institutions, and NGOs,*** promote and popularise the production of renewables among businesses and the public.

13. ***Involvement of the public and businesses in various initiatives, campaigns, and pilot projects*** to boost engagement in achieving climate neutrality.

14. ***Educating and motivating the public in the use of alternative forms of heating,*** in order to reduce the share of decentralised heating systems, and promote the use of renewables in decentralised heating.

15. ***Information measures to promote the production of electricity for self-consumption in both the business and private sectors.***

12.3.5 Communication Measures to Reduce Electricity Consumption

16. ***Train staff members of education institutions and other municipal buildings on the energy-efficient use of buildings, and on changing habits to reduce energy consumption.***

    One of the ways to actively motivate the people working in the buildings to change their habits is to organise an energy competition among municipal buildings; for example, pre-school facilities, to determine which of them achieves the greatest reduction in energy consumption within one year. All the necessary IT and equipment infrastructure necessary for the implementation of such measures already exists, and often provides an additional 10–20% in savings in renovated buildings.

17. ***Educational events for citizens to promote energy literacy and awareness of the circular economy***, including in schools and pre-school facilities, discussing energy efficiency and climate.

    Educational events in schools and other education institutions are one of the leading communication events in general, and so is the activity mentioned under Measure 7 in the communication section. Accordingly, one must expand the existing environmental education programme, and include various demonstration and interactive events for schoolchildren in it, covering the topics of climate neutrality and energy.

18. ***An important aspect in motivating citizens and providing information is holding regular educational information days/events/seminars on various issues related to energy consumption and the environment in order to promote energy literacy.***

    The information activities may include: Organising Energy Day and/or Mobility Day events in Riga, as well as competitions and contests for energy users in different groups. The events must be organised in conjunction with various partners, intended not only for adults, but also for schoolchildren and children in pre-school education institutions.

19. ***Energy-efficient water management in Riga.***

    The water industry is an important consumer of electricity in Riga, and in 2020, it consumed approximately 43.89 GWh of electricity. SIA 'Rīgas ūdens' is a major consumer of electricity, and has developed an industrial energy audit in accordance with the laws and regulations, determining the main and most important sources of electricity consumption. In 2017, the company introduced a certified energy management system, intended to monitor changes in electricity

consumption, implement energy efficiency improvement plans, and improve energy efficiency indicators.

20. ***Motivating businesses.***

    Although the municipal government does not have tools with which it can directly influence major electricity consumers in Riga, several indirect methods are available. One of them is providing motivation and information about what can be implemented in cooperation with institutions such as the State Construction Control Bureau, etc. Currently, laws and regulations impose an obligation to implement energy efficiency measures, including an energy management system. Companies that do not meet the requirements of the law should also be motivated to introduce such a system. With regard to those municipal companies that meet the requirements of the law, REA can subject these companies to random internal audits stipulated in the ISO 50001 standard in order to ensure the efficient operation of the systems.

12.3.6 Communication Measures in the Public Buildings Sector

The development programme sets various tasks that can also positively affect public buildings; for example, 'Strengthen the city's collaborative ecosystems and support innovative business initiatives' (Task 8.3), 'Improve Riga's image and recognition by promoting investment, tourists, students, and attracting highly-skilled specialists' (Task 8.4), 'Promote more efficient use of environmentally degraded areas' (Task 8.7), 'Develop neighbourhood centres, promoting the functional diversity of public outdoor space' (Task 2.1), and others. More specific measures can be proposed within the framework of the ACTION PLAN.

21. ***Creation of consumption records for all groups of consumers, and records about compliance with the requirements of laws governing energy efficiency in buildings, in conjunction with SCCB.***

    In order to plan more targeted actions and measures, one must collect reliable data on the number, floor areas, and consumption of existing public buildings. The Riga City Municipality can implement this activity in cooperation with SCCB, agreeing together on the most suitable solutions.

22. ***Promotion of cooperation for central heating system connections with AS 'Rīgas siltums'.***

    A large part of public buildings in Riga are not connected to Riga's central heating system and use their own energy sources, such as natural gas boilers. From an environmental point of view, it is important to reduce the number of energy sources and achieve the broader use of renewables. Thus, one of the solutions is to evaluate and connect public buildings to the Riga central heating system.

23. ***Promotion of cooperation with government institutions as an example of good practice.***

    Most of the government buildings are located in Riga, and the state must renovate these in the amount of 3% every year. This can serve as an example of good practice for other institutions as well, and building cooperation between the municipal government and the responsible national institutions could be another positive precondition for Riga's efforts to achieve climate neutrality.

24. ***Cooperation with project developers in creating green areas and improvements in new projects.***

    It is vital to provide green areas in an urban environment, making it possible to improve the diversity and multifunctional nature of the green infrastructure of the urban environment and envisage the introduction of innovative solutions for accumulating and draining rainwater, reducing the heat island effect, promoting biological diversity, reducing noise and air pollution, and creating vertical and horizontal greenery. In order to achieve this, the municipal government,

in cooperation with the RCC Urban Development Department, must set up cooperation with the developers of new projects for the inclusion of the minimum principles in the new projects. Thus, it is important for the municipal government to develop and then expand the minimum climate neutrality and green zone criteria in new projects.

25. ***Cooperation with project developers on energy communities, installation of renewables, and working with the central heating system of AS 'Rīgas siltums'.***

    Any new building is a new energy source, as energy is needed for both heating and hot water, cooling and the operation of various equipment. Taking into account Riga's goal of climate neutrality, any new building or group of buildings must try to achieve individual climate neutrality. To meet the needs of electricity consumption in new projects, one can plan, for example, the installation of solar panels, and for heating purposes, install heat pumps or connect to the Riga central heating system.

26. ***Transition to renewable energy sources.***

    One of the measures that managers of public buildings can implement is related to the use of renewable electricity. As part of this measure, the municipal government can encourage public buildings to purchase electricity produced from renewables.

27. ***Green certification for offices (possible requirement). Establishing criteria for assessing the sustainability of buildings.***

    More and more organisations, especially international companies, are raising the issue of quality, energy and water consumption, indoor air quality in office spaces, and the climate impact of business operations overall. Companies are looking for premises that meet green certification class requirements. As new office buildings are being developed in Riga, setting certain criteria and requirements for assessing the sustainability of such buildings should be considered in the future, and established as mandatory requirements. Introducing different levels of green certification requirements makes it possible for everyone to pursue innovation and the use of new, even more efficient and environmentally friendly technologies, improving the quality of cheaper segments of commercial premises. It also enables support mechanisms for the development of such buildings. Including tax greening. In the past, offices with a green certificate were significantly more expensive, taking into account the limited availability of technology and experts. Today, this market has developed significantly, and the availability of technology and qualified experts has greatly improved. At the same time, building certification requires higher safety requirements at the construction site, better construction management and other requirements that can encourage the implementation of sustainable practices in the construction sector as a whole.

A detailed description of three important environmental communication measures is given in Annex 4.6:

1. EnergoneatkaRĪGA 2030 platform.
2. Education events for citizens to promote energy literacy and awareness of the circular economy, including in schools and preschool education institutions, on energy efficiency and climate issues.
3. Cooperation with project developers, in the fields of energy communities, installation of renewable energy sources, and cooperation with the central heating supply of AS 'Rīgas siltums'.

13 Climate Neutrality Policy

In order to achieve the goals of the ACTION PLAN, the plan already includes a series of measures that will lead to a significant reduction in energy consumption and CO_2 emissions in various sectors, including municipal infrastructure, public buildings, transport, and elsewhere. However, these measures alone will not be enough, and there are various barriers and obstacles to the full implementation of many of these measures. For example, in order for a local government to implement a street lighting modernisation project, raise third-party financing for its implementation, and demand a long-term energy efficiency guarantee, a complex resource- and time-consuming procedure must be completed in accordance with the Law on Public-Private Partnership (PPP). The same applies to the renovation of municipal buildings. In other European countries, legislative gaps have already been eliminated, making it possible for energy efficiency projects to be implemented through, for example, a simplified PPP procedure. Using such a procedure in Riga would ensure the possibility of boosting the private financing of energy efficiency and renewable energy projects, which in turn would have a significant positive impact on the goal of climate neutrality.

At the moment, a number of different issues can be identified in each of the sectors that the Riga City Municipality should address at the national level (mostly in direct cooperation with the Ministry of Economics, which is responsible for energy at the national level, as well as with the Ministry of Transport and the Ministry of Finance) in order to achieve the goals of climate neutrality.

13.1 Heat Energy and Electricity Generation Sector

- Replacement of natural gas cogeneration plants (TEC 1 and TEC 2 thermal power plants) with energy production from renewable energy sources for the needs of Riga. If both the TPPs are necessary for the production of electricity for national needs, then taking into account the fact that Riga must purchase heat energy from these stations, the state must offer a solution for how the energy produced from fossil fuels for national needs is compensated to Riga. For example, Latvenergo invested in the construction of solar power plants in Lithuania and Estonia in 2020.[178] The construction of such plants and the use of other solutions can also be implemented in Latvia and included in Riga's energy balance.
- Tax greening: include a component that depends on the CO_2 intensity of the fuel consumed by the building in the real estate tax rate it is charged.
- Creation of a new state support mechanism for the production of renewable electricity. Since 2012, a moratorium has been in place in Latvia on the installation of new renewable energy capacity; one must start negotiations with the Ministry of Economy on the development of a new policy for increasing the share of renewables. This will make it possible to meet Riga's demand for renewable electricity.

13.2 Apartment building sector

- One must make it easier to make decisions about the renovation of a building. For example, if a quorum for the first general meeting of the building's residents is not reached, then in the second general meeting the decision can be made by all the residents entitled to vote who participate in the meeting. This will facilitate and speed up the decision to renovate the building.
- Direct support to households subject to energy poverty enabling them to cover renovation costs, on the condition that the apartment building owners vote for the renovation of the building. This will motivate households subject to energy poverty to support building renovations and reduce household energy bills in the long run. The municipal government, for example, could cover the difference in the increase in the monthly payment for all expenses combined, if any.

[178] Source: https://www.lsm.lv/raksts/zinas/ekonomika/latvenergo-sak-saules-panelu-parku-buvniecibu-igaunija-un-lietuva. a377636/

- Set up an obligation for apartment owners to renovate multi-apartment buildings if their total heat energy consumption is above a certain consumption level, for example 150 kWh/m^2 per year.[179] This will motivate local residents to agree to renovate their homes.
- Economic incentives for energy efficiency projects should be increased and the 'greening' of taxes should be initiated. For example, by reducing the value added tax rate for energy efficiency-boosting measures, or by continuing to provide real estate tax benefits if the building meets the minimum energy efficiency requirements.
    - Tax greening: include a component that depends on the CO_2 intensity of the fuel consumed by the building and its energy efficiency regarding the real estate tax rate charged.
- Examples of technical documentation must be developed for energy efficiency support programmes, incl. standardised engineering solutions for the faster and better preparation of building construction designs.
- Eliminate all barriers (financial, economic, administrative, etc.) and launch a refinancing facility or fund for the building renovation project. This will stimulate the achievement of the goal of renovating apartment buildings in Riga, potentially also raising funding.
- Include a five-year energy efficiency guarantee in building renovation construction contracts and a requirement to submit a common instruction manual for the use of the building to apartment owners, also providing them with training. This will protect apartment owners, making sure that they will receive what they have paid for, i.e., a renovated building with a certain heat energy consumption.
- The monitoring of energy efficiency support programmes related to the quality of engineering projects could be partially delegated to the institutions responsible for them: Urban Development Department and the State Construction Control Bureau, while strengthening the capacity of construction management specialists.
- Energy efficiency and emissions limits for heating boilers must be introduced. Zoning with the aim of reducing solid particles and local pollution in densely populated areas, limiting the use of heating boilers. Introduce labelling for heating boilers.

Several laws related to energy efficiency contain requirements, which are not actually enforced at the moment. In cooperation with the responsible government institutions, one must develop a mechanism in Riga that enforces compliance with the requirements of existing laws:

- Actively conduct checks for the issue and use of energy certificates for buildings (and flats) when selling/buying and leasing buildings (and flats). Currently, this duty is assigned to the Consumer Rights Protection Centre. No active enforcement of the requirements of this legislation actually takes place.
- Train/inform representatives of the Urban Development Department on the requirements set for the construction of new near-zero energy buildings, which must effectively be complied with by all buildings starting from 2021. In addition, one must train/inform representatives of building authorities about the need for energy certificates when the building is put into operation, about 'how to read' an energy certificate, and how to understand if the almost-zero-energy building requirements for newly constructed buildings and the minimum energy efficiency requirements for renovated buildings are met.
- Actively engage in the supervision and training/informing of building managers and residents about the minimum energy efficiency requirements set for existing buildings in Section 21 of Cabinet Regulation No. 907 'Rules for the inspection, technical

[179] This requirement is included in Cabinet Regulation No. 907 'Rules for the inspection, technical maintenance, regular repairs, and minimum energy efficiency requirements of residential buildings' of 2010 (Section 21).

maintenance, regular repairs, and minimum energy efficiency requirements of residential buildings'.

13.3 Municipal Infrastructure

- Create a simplified PPP procedure for the implementation of energy efficiency projects by raising third-party financing, with an energy efficiency guarantee. This will enable Riga to raise funding for the implementation of energy efficiency projects in a timely and efficient manner, without imposing an additional burden on the municipal budget.
- Develop energy certificates for municipal buildings in accordance with the requirements of laws and regulations. Currently, only about 30% of municipal buildings have valid energy certificates.
- Update green procurement guidelines, and the use of already developed standardised forms in municipal procurement, especially related to the purchase of household electrical equipment, energy production, and renovation of buildings. Preparation and updating of standardised procurement documentation samples.

13.4 Adaptation to Climate Change

- In cooperation with VARAM and the scientific sector, develop a data collection, compiling, and analysis methodology to determine the impact of climate on public health and productivity, on road and street infrastructure, as well as on the maintenance of green areas, etc. Knowing the real impact of climate, one can estimate the potential future increase in costs and losses as a result of climate change, which would enable a more complete assessment of the need for financing adaptation measures and payback periods.
- To assess the energy consumption of buildings, heating and cooling loads, and wind and snow loads, historical climatic data and their average values are used over the entire period of observations, usually for the last 30 or 50 years, assuming that the climate data will remain within the average values in the future. However, taking into account the risks caused by climate change, it would be necessary to not only assess historical climate data, but to develop engineering solutions based on possible future changes in climate. This would help one find the best technical solutions for the renovation of buildings and the construction of new buildings. Currently, no such climatic data forecasts are available.
- Use of local resources with the aim of reducing embodied emissions during the production and transportation of construction materials. The amount of carbon absorbed by wood as a building material is determined. This amount of absorbed carbon can be taken into account when evaluating the CO_2 emissions generated during the building's lifecycle (the amount of CO_2 absorbed by the wood used in the building's construction materials reduces the CO_2 emissions generated during the building's lifecycle). A methodology for determining the amount of CO_2 emissions generated during the building's lifecycle and determining lifecycle costs should be developed. This methodology should take into account the CO_2 emissions and costs generated during the construction of the building, the production and transportation of the building materials, and the CO_2 emissions that occur during the operation of the building involving the consumption of energy for the building's heating, cooling, ventilation, hot water, and lighting. BREEAM (Great Britain), LEED (USA), DGNB (Germany) sustainable building certification systems can be used as examples.
- One must develop guidelines for the procurement of construction designs and construction activities with the aim of taking into account the emissions and costs generated during the entire lifecycle of the building.

- A study is necessary to determine flood risks, with an assessment of maximum levels of precipitation under different climate change scenarios. On the basis of the forecasts, guidelines for the recommended capacity reserve for the sewer infrastructure and changes to the building standard LBN 223-15 'Sewer structures' should be developed.
- It is necessary to try to reduce the number of connections draining rainwater to the centralised sewer system as much as possible.
- As part of energy efficiency financial support programmes, allocate costs related to the technical survey of foundations, and the renovation of rainwater systems, gutters, drainage, and waterproofing of foundations.

13.5 Urban Planning

- Develop a long-term vision and strategy for the development and planning of green and blue infrastructure, with the aim of reducing the heat island effect and vulnerability during floods caused by heavy rainfall. Such a strategy would make it possible to gradually integrate the development of green infrastructure into the planned projects of street renovation and reconstruction, and to determine the minimum requirements for the use of green infrastructure elements for developers of new residential blocks. At the same time, one must define the assignment of responsibilities for solving rainwater management problems within RCC institutions, incl. responsibilities for the implementation and development of blue and green solutions.

13.6 Transport Sector

- One must define the responsibilities/interactions of the national and local government in the organising and implementation of support measures to promote an increase in the share of low-emission and zero-emission vehicles, incl. support programmes for writing off inefficient vehicles, financial support for the purchase of low-emission and zero-emission vehicles in the private sector, for the creation of electric vehicle and other alternative fuel/charging stations.
- State support measures are needed to move towards the goal of reaching at least 50% of renewable energy in public transport buses.
- State support measures are needed to increase the number of zero-emission and low-emission vehicles in public procurement.

14 Plan Monitoring System, Monitoring Criteria

Table 14.1 shows the indicators for a qualitative assessment of the current situation and progress in relation to the set goals of the ACTION PLAN, for which one must implement and maintain a database.

Table 14.1. Key indicators for the assessment of the current situation and progress

Indicator	Unit	Baseline value	Trend/ result	Source
Central Heating System				
1. Share of renewables in the central heating system of Riga	%	31	↑	AS 'Rīgas siltums', State Environmental Service GHG permit database LEGMC '2-Air' database; demand by operators
2. Relative heat energy losses in heating lines	%	11.77	↓	AS 'Rīgas siltums'
Decentralised Heat Supply				
3. Share of renewables in the manufacturing and service sector	%	47	↑	LEGMC 'Summary on air: fuel' public report database
4. Natural gas consumption, housing sector (households)	GWh/year	295	↓	AS 'Gaso', calculation methodology
5. Natural gas consumption, public sector (other users)	GWh/year	213	↓	AS 'Gaso', calculation methodology
Electric Power Supply				
6. Installed renewables electrical capacity	MW	15.61	↑	Collected by REA from mandatory procurement reports, AS 'Latvenergo pārskati'; AS 'Rīgas siltums' reports; State Environmental Service reports, AS 'Sadales tīkls'
7. Amount of electricity produced from renewables	GWh/year	77.97	↑	Collected by REA from mandatory procurement reports AS 'Latvenergo pārskati' State Environmental Service reports, AS 'Sadales tīkls'
8. Number of energy communities established	quantity	-	↑	SCCB
9. Changes in total electricity consumption	GWh/year	1960	↓	AS 'Sadales tīkls' (not taking into account transport power consumption)
10. Amount of CO_2 emissions caused by power consumption	$ktCO_2$/year	214	↓	REA (calculation methodology)

Municipal sector				
11. EMS certificate	-	none	implemented	REA
12. Total amount of funding for measures	EUR	-	↑	REA
13. Energy efficiency guarantee in procurements	Number of procurements	0	↑	REA
14. Number of renovated municipal buildings	quantity		↑	REA
15. Specific energy consumption in municipal buildings	kWh/m^2	144	↓	REA
16. Length of unlit streets	km	78	↓	Rīgas gaisma
17. Number and type of lights replaced	%	11%	↑	Rīgas gaisma
18. Specific consumption per light	kWh/light	597	↓	Rīgas gaisma
19. Number of vehicles by vehicle type (cars, light and heavy goods vehicles, other) and fuel type (including alternative fuels)	quantity	1,441 in total	↓	Municipal companies and agencies
20. Annual mileage of vehicles, km/year	km/year	-	↓	RCC
21. Fuel consumption by types	litres (tonnes) or MWh	Total 1,388.8 litres + 62 MWh	↓	REA
22. Renewables share in end energy consumption	%	0	↑	Calculated; REA
23. Number of low-emission/zero-emission vehicles purchased	Quantity	10	↑	Riga City Council Traffic Department
24. Number of electric vehicle charging stations near municipal buildings	Quantity	0	↑	Riga City Council Traffic Department
25. Total CO2 emissions in the municipal vehicle fleet	tCO_2	3,618	↓	REA
26. Specific fuel/energy consumption in municipal companies and agencies	litres/100 km or kWh/100 km	-	↓	Calculated, REA
Private transport				
27. The number of registered and vehicles in good technical order, broken down by fuel type and age, incl. electric vehicles and other alternative fuel vehicles	quantity	Total 247,136	↓	CSDD
28. Average fuel consumption by vehicles	l/100 km / kWh/100 km	-	↓	CSDD, mobility surveys
29. Annual vehicle mileage	km/year	-	↓	CSDD, mobility surveys
30. Average age of vehicles	years	-	↓	CSDD
31. Traffic flow on roads leading to Riga	quantity/24 h	256.7 thousand	↓	VSIA LVC

32. Map of publicly available fuel/charging stations for electric vehicles and other alternative fuels in Riga	quantity	Electric vehicle stations 19	↑	Currently, several incomplete sources of information (CSDD, Elektrum, 'Bezizmešu mobilitātes atbalsta biedrība', chargemap.com, etc.)
33. Amount of fuel sold at fuel stations in Riga, by type	t/year or MWh/year	3,009 MWh	↓	Fuel station operators
34. Share of private vehicle users of the total traffic volume	%	~70%	↓	Calculations on the basis of various sources of information
35. CO_2 emissions generated by private vehicles	$ktCO_2$/year	675	↓	Estimated
Public transport access				
36. Number of vehicles by type	units/year	871 in total	-	RP SIA 'Rīgas satiksme'
37. Consumption of energy resources by type	tonnes/year or GWh/year	165 GWh in total	-	RP SIA 'Rīgas satiksme'
38. Annual vehicle mileage	million km/year	440	-	RP SIA 'Rīgas satiksme'
39. Average fuel consumption by vehicles	l/100 km or kWh/100 km, or Wh/pkm	51 l/100 km, 260 kWh/100 km	↓	Estimated
40. Number of passengers transported, by type	million passengers/year	89.7 million in total	↑	RP SIA 'Rīgas satiksme'
41. Renewables share in end energy consumption	%	18.2%	↑	Estimated
42. Share of emission-free vehicles in the bus fleet	%	0	↑	Estimated
43. Share of electricity in end consumption of energy	%	29%	↑	Estimated
44. CO_2 emissions in public transport	$ktCO_2$/year	39	↓	Estimated
45. Breakdown of trips by type: (1) private car, (2) public transport, (3) cycling, (4) pedestrians	%	(1) 42.4% (2) 46% (3) 3.5% (4) 7.3%	(1) ↓ (2) ↑ (3) ↑ (4) ↑	Mobility surveys, survey 'Riga resident satisfaction with the activities of the municipal government and processes taking place in the city'
46. Positive opinion of the availability of public transport among local residents	%	85%	↑	Mobility surveys
47. Positive opinion of the public transport service among local residents	%	81%	↑	Mobility surveys

Apartment Buildings				
48. Specific heat energy consumption by multi-apartment buildings connected to the central heating system of Riga (without climate correction)	kWh/m^2	147	↓	REA (calculation methodology)
49. Specific heat energy consumption in renovated multi-apartment buildings	kWh/m^2	-	↓	REA, ALTUM programme data, other sources of information
50. Heat energy consumption in multi-apartment buildings connected to the central heating system	GWh/year	2,123	↓	AS Rīgas Siltums
51. Buildings not yet managed by their residents	Quantity	2,500–3,500	↓	RCC Housing and Environment Department
52. Number and floor area (usable and/or heated, if available) of renovated multi-apartment buildings	Quantity, m^2	159	↑	RCC, ALTUM programme data. Other sources of information if the building is renovated without participation in any of the support programmes
Environmental Communication				
53. Number of information events organised	quantity	-	↑	Environmental Communication Work Group
54. Number of participants who attended information events	quantity	-	↑	Environmental Communication Work Group
55. Number of information materials prepared	quantity	-	↑	Environmental Communication Work Group
56. An information website for climate neutrality created (see section on environmental communication), and its information regularly expanded and updated.	Website visit statistics	-	↑	RCC Communication Administration
57. Number of demonstration or pilot projects implemented	quantity	-	↑	Communication Administration, REA
Adaptation to Climate Change				
58. Total length of new rainwater system lines constructed	km	-	↑	Riga City Council Traffic Department
59. Number of projects implemented that reduce the flow of rainwater into the central sewer system	quantity		↑	Riga City Council Traffic Department
60. An accounting system for recording the effects of climate change introduced	-	-	implemented	Information collected by REA and departments and companies of the Riga City Municipality
61. Number of households exposed to significant flood risk or significantly vulnerable to flooding	quantity	-	↓	Flood forecasts modelled by LEGMC
62. Average annual municipal losses as a result of climate events	EUR	-	↓	Information collected by REA and departments and companies of the Riga City Municipality

Annex 1: Energy Flow and Historical CO_2 Emissions

RIGA ENERGY FLOWS IN 2020

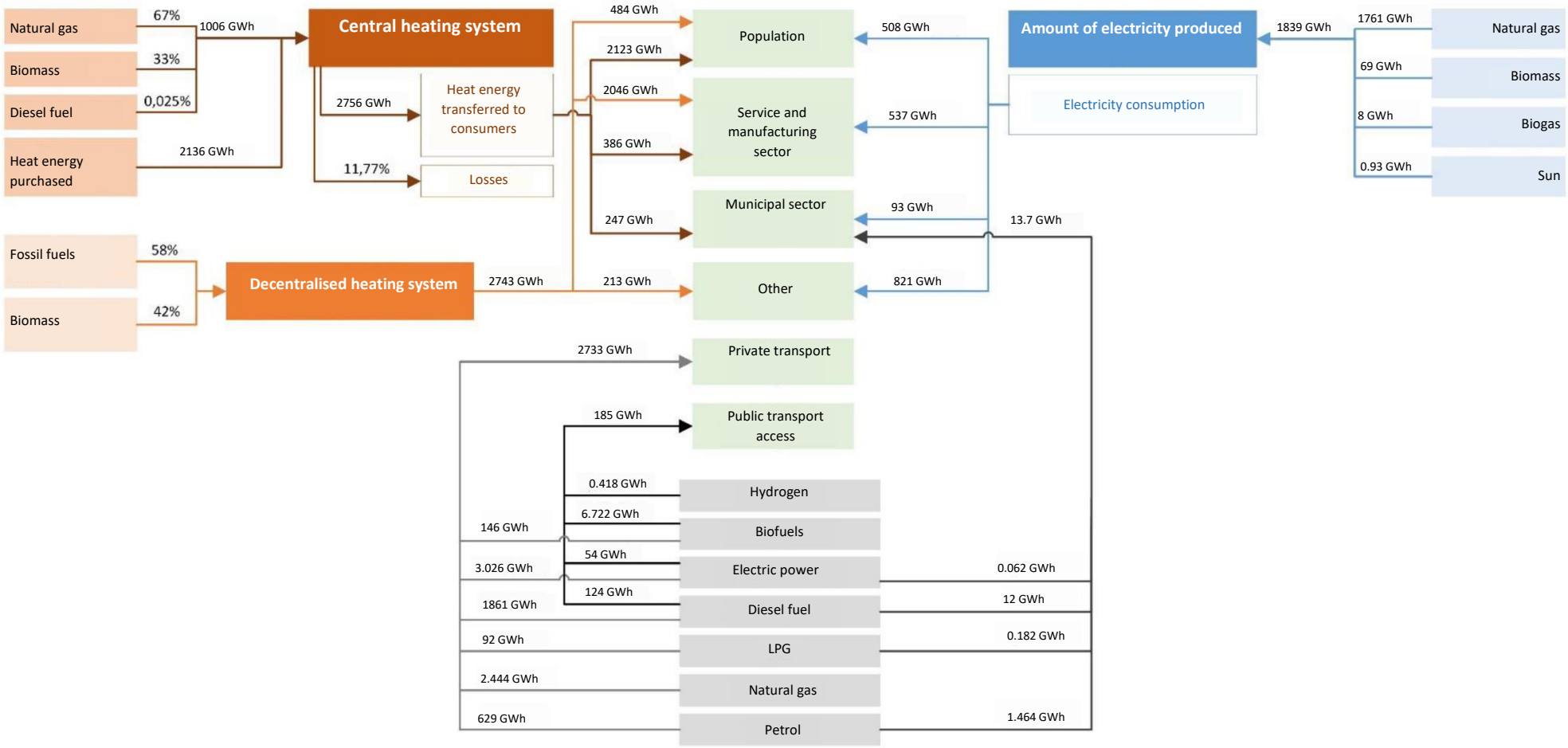


Figure P1.1. Riga energy flows in 2020

CHANGES IN CO_2 EMISSIONS GENERATED BY RIGA SINCE 1990[180]

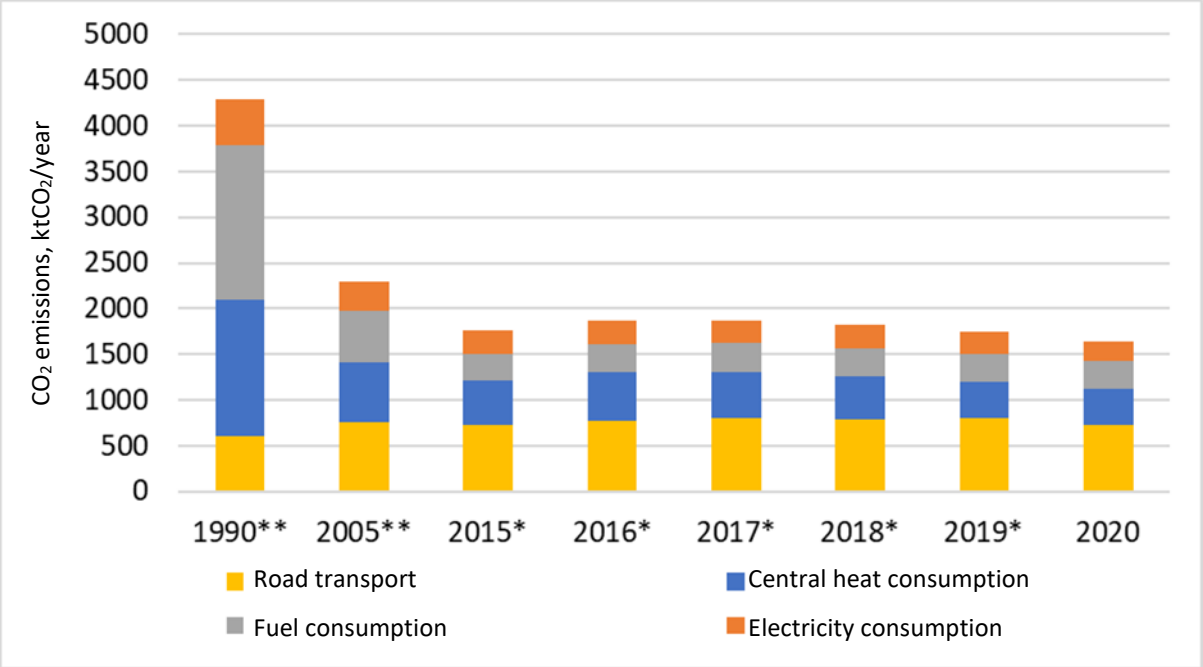


Figure P1.2. Changes in CO2 emissions generated by Riga since 1990

[180] *The 2015–2019 CO_2 emissions data were taken from the 'Riga City Sustainable Energy Action Plan for a Smart City 2014–2020 final progress report for the calculation of CO_2 emissions in 2015–2020'.
** The 1990 and 2005 CO2 emissions figures were obtained from the Riga City Sustainable Energy Action Plan for a Smart City 2014–2020.

Annex 2: Non-Energy-Related Emissions

As part of the ACTION PLAN, non-energy emissions cover the waste and wastewater management sector and the forestry sector. As part of the deliverables, waste and wastewater management emissions were calculated in accordance with IPCC guidelines, while forestry emissions were obtained from the management plan of SIA 'Rīgas meži'.

WASTE AND WASTEWATER MANAGEMENT

Table P2.1 shows the GHG emissions generated by the waste and wastewater management sectors in 2020. The waste and wastewater management systems in Riga generated 5.903 ktCH_4 and 0.034 ktN_2O emissions, which put together, are equivalent to 157.6 kt$CO2_{eq}$ in emissions.

Table P2.1. 2020 emissions from waste and wastewater management in Riga

	CH_4 emissions, kt	N_2O emissions, kt	CO_2eq, kt
Waste disposal	5.365		134.1
Wastewater, including:	0.538	0.034	23.5
– *Household wastewater produced by residents of Riga, not connected to the central system*	*0.192*	*0.034*	*14.875*
– *Industrial wastewater*	*0.013*	*0.00000297*	*0.334*
– *Biogas produced by AS 'Rīgas ūdens'*	*0.096*		*2.395*
– *Sludge stored by AS 'Rīgas ūdens'*	*0.237*		*5.915*
TOTAL	**5.903**	**0.034**	**157.6**

The calculation methodology should be improved to obtain more accurate results in the future. At the level of Latvia, calculations are carried out according to a Tier 2 methodology, which requires much more detailed input data and calculations of emission factors. To do this, it would be necessary to define Riga-level emission factors and implement a data monitoring system. Table P2.2 shows the indicators for which a monitoring system needs to be implemented or defined for Riga. These are preliminary indicators; one can list specific indicators after developing the calculation methodology.

Table P2.2. Data are needed for the calculation of future emissions produced by Riga waste and wastewater management

Indicator	Unit	Data source
Amount of waste produced (with the potential to cause emissions) since 1970	kt/year	LEGMC waste reports
Amount of waste delivered to landfills since 1970	kt/year	Getliņi
Recovered amount of CH_4 emissions since 1970	kt/year	Getliņi
CH_4 potential of waste deposited in Riga	tCH_4/t waste	Calculation based on IPCC methodology
Number of local residents connected and not connected to Riga's central sewer system	local residents	AS 'Rīgas ūdens', RCC Housing and Environment Department
Amount of household wastewater produced (both for local residents connected and not connected to the central system)	m^3/year	AS 'Rīgas ūdens', RCC Housing and

Indicator	Unit	Data source
		Environment Department
Amount of industrial wastewater, treatment method, drainage	thousand m^3/year	LEGMC '2-Water' reports.
Total amount of nitrogen in outgoing industrial wastewater	t/year	LEGMC '2-Water' reports.
Amount of sludge collected and stored as part of the wastewater treatment process	kt/year	AS 'Rīgas ūdens'
Amount of biogas produced as part of the wastewater treatment process	m^3/year	AS 'Rīgas ūdens'

LAND USE AND FORESTRY

For the purposes of the ACTION PLAN, data for emissions/capture by the forestry sector were obtained from the management plan of SIA 'Rīgas meži' for 2018–2026. [181] In 2018, the company prepared an emissions estimate for 2017 according to the methodology of the Latvian Greenhouse Gas Inventory Report.

The company's management plan includes separate descriptions of the company's forests in Riga, which cover 4,462.12 ha, and outside Riga, with 4,311.33 ha. The total area of the forests of SIA 'Rīgas meži' is 8,773.45 ha. According to the SIA 'Rīgas meži' management plan for 2018–2026, in 2017, the forests of SIA 'Rīgas meži':

- in Riga accumulated 398,672 tonnes of carbon, sequestering 22,345 tonnes of CO_2 a year;
- outside Riga accumulated 166,399 tonnes of carbon, sequestering 10,955 tonnes of CO_2 a year.

In total, the forests of SIA 'Rīgas meži' sequestered 33,300 tonnes of CO_2 emissions in 2017. In the future, the ACTION PLAN emissions calculation for the forestry sector can also be carried out by SIA 'Rīgas meži'.

In order to calculate emissions from land use, land use change, and forestry, a methodology based on the IPCC guidelines should be developed. Table P3.3 shows the initial indicators that need to be implemented in a monitoring system or defined for Riga in order to calculate emissions in accordance with the IPCC guidelines.

Table P3.3. Data required for further emissions calculations

Indicator	Unit	Data source
Area of forest lands (since 1970): ● area preserved as forest land; ● area whose type has changed.	thousand hectares	'Rīgas meži' State Forestry Service State Land Service
The proportion of mineral soil and organic soil in forest land.	thousand hectares/thousand ha of total area	Calculation
Amount of forest resources damaged by controlled burning.	kg dm	State Forestry Service
Amount of forest areas affected by forest fires.	ha	State Forestry Service
Amount of products originating from the forests of Riga, broken down by category.	tonnes	

[181] Source: https://www.rigasmezi.lv/lv/mezi/par_meziem___fakti_/meza_apsaimniekosanas_plans/?doc=10346

TOTAL EMISSIONS

Figure P2.1 shows the total emissions for 2020. The forests of SIA 'Rīgas meži' captured 1.85% of the total CO_2 emissions in 2020.

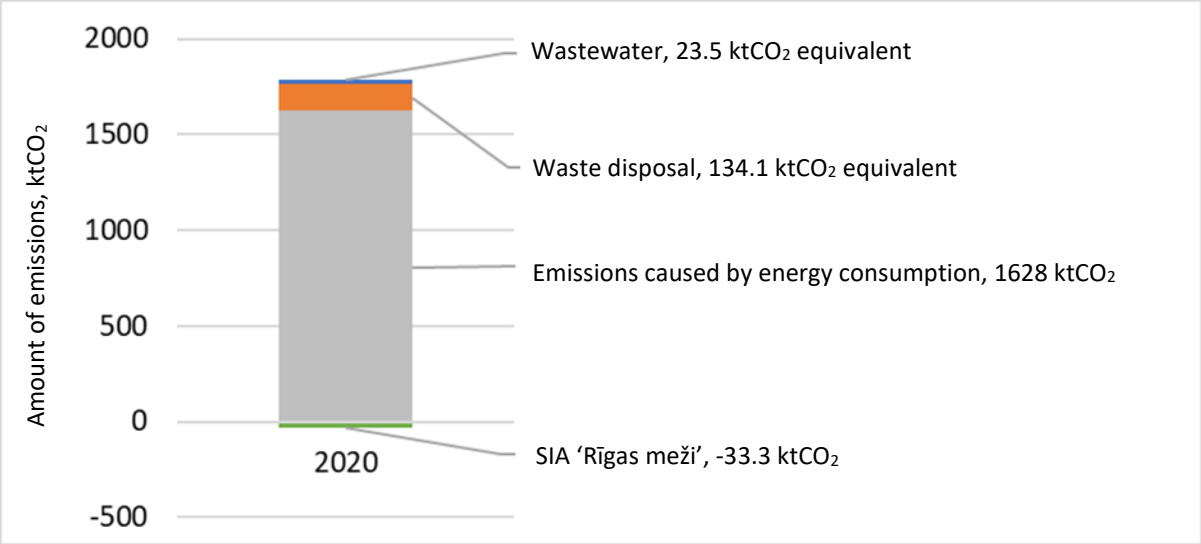


Figure P2.1. Total 2020 emissions

Annex 3: Summary of All Measures

No.	Measure	Energy savings, MWh/year	Renewables, MWh/year	Reduction in CO_2 emissions, tCO_2/year	Investments, thousand EUR	Implementation deadlines
Municipal infrastructure (areas of responsibility of the municipal infrastructure subgroup)						
1	Creation, continuous improvement, and certification of EMS	15,939		2,311	150	2022–2030
2	Procurement of 100% renewable heat energy in municipal buildings;		150,006	21,751	500	2023–2030
3	Procurement of 100% renewable electric power in municipal buildings;		33,298	3,629	250	2022–2030
4	Drafting of a municipal building renovation plan for 2030				50	2022–2023
5	Installation of forced ventilation systems in education institutions				88,665	2023–2030
6	Renovation of municipal buildings and more extensive use of renewable energy sources in municipal buildings	1,600		232	4,800	2022–2030
7	Gradual construction of climate-neutral new buildings by 2030				50	2022–2030
8	Compliance with the principles of circular economy				50	2022–2030
9	Creation and maintenance of an energy management system, including ICT implementation for energy monitoring	711		108	20	2022–2030
10	Preparation of an investment plan for street lighting, replacement of electric line infrastructure and poles, also assessing the possibility of concluding a long-term energy efficiency service contract				100	2022–2023
11	Street lighting modernisation project, potential signing of an energy efficiency service contract	12,617		1,409	15,420	2024–2026
12	Installation of energy-efficient street lighting in unlit areas				1,280	2022–2030
13	Achieve the use of 100% renewable electricity for street lights, traffic lights and clocks in 2030		17,445	1,901	100	2022–2030
14	Create and maintain a data/information records system for the municipal fleet	137		36	40	2022–2030
15	Increasing the efficiency of the use of vehicles by municipal employees	823		217	8	2022–2030
16	Promotion of the use of public transport for work among employees of the Riga City Municipality	686		181	9	2022–2030

17	Transition to low-emission/zero-emission vehicles in companies, municipal institutions		12,066	3,185		2022–2030
Energy generation (areas of responsibility of the energy generation subgroup)						
18	Draft a long-term planning document for the Riga energy sector to achieve climate neutrality goals				80	2022–2023
19	Increasing the efficiency of heat energy production in energy sources	101		15	50	2022–2030
20	Gradual transition to the 4th generation heating supply system	65		9.4	84	2022–2030
21	Foster the digitisation of the heat supply system	19		2.8	20	2022–2030
22	Renewables promotion in the Riga central heating system		401,883	81,180	74,995	2022–2030
23	Implementation of innovative pilot projects					2024–2030
24	Achieve connection of new clients to the central heating system of Riga				300	2022–2030
25	Promote the use of renewables in decentralised heat supply or connecting to the central heating supply system of Riga		166,486	46,199	133,593	2023–2030
26	Promote the use of renewables in the production of electricity for the needs of Riga		529,500	57,716	476,550	2022–2030
Multi-apartment buildings (areas of responsibility of the multi-apartment building subgroup)						
27	Improving the availability of information and data about the energy efficiency of multi-apartment buildings				15	2022–2023
28	Developing and updating a renovation programme for Riga multi-apartment buildings				100	2022–2030
29	Creation and operation of the Energy Efficiency Centre	410,784		59,563.7	150	2022–2030
30	Involvement of local residents in the renovation of apartment buildings				979,000	2022–2030
31	Establishment of the Riga Energy Efficiency Fund				29,370	2022–2023
32	Searching for new standardised solutions for building renovation, reducing building renovation costs				200	2025–2030
Transport (areas of responsibility of the transport subgroup)						
33	Urban planning aimed to create a city where local residents and guests are less dependent on private cars	185,000		45,300	1,000	2022–2030

34	Measures to promote distance working and e-services for increasing the availability of services.					
35	Increasing passenger-kilometres travelled on foot and by bicycle	103,000		27,500	150,000	2022–2030
36	Increasing the number of passenger-kilometres travelled by public transport	185,700		49,600	370,000	2022–2027
37	Restrictions on private transport	131,500		32,440	10,000	2023–2027
38	Other measures to reduce passenger-kilometres travelled by car					
39	Promoting the use of renewables technologies	74,000	14,200	22,080	430	2022–2030
40	Assessment of the gradual transition of vehicles necessary for municipal functions (e.g., waste management transport) to clean technologies				30	
41	Assessment of the impact of delivery vehicles on CO_2 emissions in Riga, possible solutions for reducing CO_2 emissions, cooperation between the municipal government and businesses				30	
42	Transition to low-emission and zero-emission technologies in the fleet of RP SIA 'Rīgas satiksme', including the creation of the necessary infrastructure	63,500	34,900	28,200	100,000	
43	Assessment of possible future development trends in the number of electric vehicles in Riga, and their impact on the energy supply system				30	
44	Development of low-emission water transport in Riga					2022–2030
45	Mobility surveys				800	2022–2030
46	Regular recording of vehicles					2022–2030
47	Develop the use of modelling tools for predicting future trends in the transport sector					2022–2030
Climate change adaptation (climate change adaptation subgroup responsibility fields)						
48	Update the Flood Risk Management Plan for Riga and update all related planning documents				50	2022–2023
49	Implement flood mitigation and environmental protection measures				4,525	2022–2030
50	Continue to separate the rainwater drainage system from the overall system and support the integration of decentralised rainwater solutions into a centralised rainwater system				7,476	2022–2030

51	Transfer of essential infrastructure from areas at risk of erosion or flooding, withdrawal from high-risk areas					2022–2030
52	Development of an urban greening plan				100	2022–2023
53	Create a ‘climate agency’ or similar entity					2022
54	Create a single database of damage caused by disasters and extreme climate events				50	2022–2023
55	Measures for improving the water quality in public water reservoirs and informing citizens about water quality				20	2022–2030
56	Ensuring the availability of drinking water in public places				80	2022–2023
57	Identify the most vulnerable state and municipal buildings					2022–2030
Environmental communication (areas of responsibility of the environmental communication subgroup)						
58	Single municipal campaign/initiative EnergoneatkaRĪGA 2030				100	2022–2023
59	Promoting and motivating the reduction of energy consumption by municipal companies				100	2022–2023
60–63	Communication measures in the field of adaptation				150	2022–2030
64–66	Communication measures in the field of transport	22,000		5,670	160	2022–2030
67–72	Communication measures in the field of energy and housing	85,920		12,458	210	2022–2030
73–77	Communication Measures to Reduce Electricity Consumption	5,080		554	40	2022–2030
78–85	Communication Measures in the Public Buildings Sector	1,673	3,346	607	50	2022–2030
Climate neutrality policy (fields of responsibility of the climate neutrality policy subgroup)						
86–112	26 different policy measures					2022–2030

Annex 4: Detailed Project Measures

Annex 4.1: Municipal Infrastructure

Basic information	
Sector	Municipal infrastructure: municipal buildings
Name	Provision of 100% Renewable Heat Energy in Municipal Buildings
Brief description of the activity	In order to achieve the goal of climate neutrality, the municipality must ensure the use of heat energy produced from renewable energy sources. At the moment, most of the municipal buildings and sites are connected to the central heating system, and the municipal government has to work with the main heat energy supplier—AS 'Rīgas Siltums' — to agree on a gradual transition to heat energy from renewable energy sources with proof of supply, reaching 100% in 2030. The municipal government will evaluate and implement other solutions, especially in buildings where fossil fuel heating equipment is installed (first by reducing the building's energy consumption to a minimum), and introduce CO_2 compensation mechanisms, for example, through capturing additional CO_2 emissions, and planting trees.
First actions	• Inform AS 'Rīgas Siltums' about the measure and achieve a common understanding with all the parties involved of the progress of the implementation of the measure, its next steps, and its distribution over the years, and how the increase in the share of renewables will be gradually accomplished • Inclusion of proof of origin in the regulatory framework implemented by the climate neutrality policy subgroup • Procurement documentation/signing of a contract with AS 'Rīgas Siltums' for the supply of renewable heat energy to municipal buildings • Raise funding from EU structural funds, the Modernisation Fund, or RRF • Achieve 100% transition of municipal buildings not connected to the central heating system to renewables, and/or the connection of these buildings to the central heating system
Main benefits	• Reduced CO_2 emissions • Reduced impact on climate change • The municipal government sets a good example in achieving climate neutrality goals
Linking with ACTION PLAN subject groups	• Climate neutrality policy subgroups (for the prevention of regulatory obstacles) • Energy production subgroups (production of heat energy from renewable energy sources)
Linking with the Development Programme	Priority 3 'Good environment quality and sustainable urban ecosystem for mitigating climate change', Task 3.6 'Reduce climate change'.
Responsible institutions	Municipal infrastructure subgroup; REA; RCC Property Department
Implementation	
Implementation period	2022–2030
Expenses	EUR 5,000 (for the preparation of the procurement document); EUR 500 thousand for replacing boiler equipment
Source of funding	Municipal budget; AS 'Rīgas Siltums' budget funds
Impact in 2030	
Renewables increase	150,006 MWh/year
Reduction of emissions	21,751 tCO_2/year
Indicators for supervision	

- Indicator 1	Annual amount of heat energy produced from renewables in municipal institutions, MWh/year
- Indicator 2	Share of heat energy produced from renewables per year, %

Basic information	
Sector	Municipal infrastructure: municipal buildings
Name	Provision of 100% renewable electricity in municipal buildings
Brief description of the activity	The use of electricity in municipal buildings is the second largest source of CO_2 emissions that the municipal government can reduce by having its own electricity production, for example by installing solar panels on municipal buildings, and/or by implementing CO_2 compensation mechanisms, such as purchasing renewable electricity whose CO_2 emissions are 0. Given that the price of renewable electricity could be higher than electricity from the grid, the municipal government can also introduce this measure gradually, reaching 100% in 2030. The implementation of the measure will ensure the achievement of the goal of climate neutrality set by the municipal government in 2030, when the electricity used in municipal buildings will come from renewable energy sources.
First actions	● Determine the annual amounts of electricity produced from renewables ● Prepare procurement documentation ● Arrange and conduct a procurement
Main benefits	● Reduced CO_2 emissions ● Reduced impact on climate change ● The municipal government sets a good example in achieving climate neutrality goals
Linking with ACTION PLAN subject groups	● Climate neutrality policy subgroups (for the prevention of regulatory obstacles) ● Energy production subgroups (renewables electricity supply)
Linking with the Development Programme	Priority 3 'Good environment quality and sustainable urban ecosystem for mitigating climate change', Task 3.6 'Reduce climate change'.
Responsible institutions	Municipal infrastructure subgroup; REA; RCC Property Department
Implementation	
Implementation period	2022–2030
Expenses	EUR 5,000 (for the preparation of procurement document); EUR 250 thousand for renewable energy facilities
Source of funding	Municipal budget; AS 'Rīgas Siltums' budget funds
Impact in 2030	
Renewables increase	33,298 MWh/year
Reduction of emissions	3,629 tCO_2/year
Indicators for supervision	
- Indicator 1	Annual amount of electric power produced from renewables in municipal institutions, MWh/year
- Indicator 2	Share of electric power produced from renewables per year, %

Basic information	
Sector	Municipal infrastructure: street lighting
Name	Street lighting modernisation project, signing of an energy efficiency service contract
Brief description of the activity	Based on the drafted investment plan (see Section 7.3), this measure will require the preparation of all the necessary procurement documentation, including an energy efficiency service contract, the announcement of the tender, and the implementation of the modernisation project. The measure can be implemented by obtaining third-party funding, which also provides a guarantee of energy efficiency.
First actions	● Preparation of procurement documentation ● Procurement announcement ● Informing of potential tenderers ● Conclusion of contract and implementation of the project
Main benefits	● Energy savings ● Quality lighting ● Better citizen satisfaction ● Reduced impact on climate change
Linking with ACTION PLAN subject groups	Environmental communication subgroup (municipal government communicates and sets a good example)
Linking with the Development Programme	Priority 2 'Urban environment promoting the quality of life'; Task 2.7 'Create a safe urban environment for the residents and guests of the city'
Responsible institutions	Municipal agency 'Rīgas gaisma' in cooperation with REA; municipal infrastructure subgroup
Implementation	
Implementation period	2024–2026
Expenses	EUR 13–15 million
Source of funding	Third-party funding; EU structural funds; other financial instruments
Impact in 2030	
Energy savings	12,309 MWh/year
Reduction of emissions	1,342 tCO_2/year
Cost savings	EUR 1.5 million per year
Indicators for supervision	
- Indicator 1	Number of lights replaced
- Indicator 2	Specific energy consumption for street lighting, kWh/light per year
- Indicator 3	Electricity consumption for street lighting, MWh/year
- Indicator 4	Length of illuminated streets (km)
Examples of good practice	
Examples of good practice	Liepaja City Council

Basic information	
Sector	Municipal infrastructure: municipal transport
Name	Transition to low-emission/no-emission vehicles in companies, municipal institutions, etc.
Brief description of the activity	The city's goal is a 100% transition to environmentally-friendly zero-emission vehicles in the municipal fleet by 2030. The measures to be implemented include the development of criteria for the purchase of environmentally friendly vehicles and services, vehicle procurement (or service procurement) following the established criteria, and assessment of the purchase of work bicycles for municipal authorities. The increase in emission-free vehicles must go hand in hand with the development of the charging infrastructure. The municipal government will install electric vehicle charging infrastructure at municipal institutions in proportion to the increase in the number of electric vehicles.
First actions	● Use and evaluation of existing vehicles, employee travel habits and needs; recommendations and potential measures ● Development of criteria for the purchase of an environmentally-friendly vehicle ● Assessment of buying bicycles for municipal authorities to perform their duties ● Procurement of vehicles based on set criteria
Main benefits	● Reduced CO_2 emissions and impact on the climate ● Reduced fuel costs ● The municipal government sets a good example for the local residents ● Increase in the use of renewable energy sources
Linking with ACTION PLAN subject groups	Environmental communication subgroup (municipal government communicates and sets a good example)
Linking with the Development Programme	Priority 1 'Comfortable and environmentally friendly travel in the city'
Responsible institutions	Municipal infrastructure subgroup
Implementation	
Implementation period	2022–2030
Expenses	Depending on the chosen solution
Source of funding	Municipal budget; EU structural funds; government co-financing; other financial instruments
Impact in 2030	
Renewables increase	12,066 MWh/year
Reduction of emissions	3,185 tCO_2/year
Indicators for supervision	
- Indicator 1	Fuel consumption, l/100 km
- Indicator 2	Renewables share, %
- Indicator 3	Average age of vehicles

Annex 4.2: Energy Production

Basic information	
Sector	Heat and electricity production
Name	Draft a long-term planning document for the Riga energy sector to achieve climate neutrality goals
Brief description of the activity	The main goal of the planning document is to develop an action plan to achieve 'zero' CO_2 emissions in the energy sector in Riga by no later than 2050. This document covers centralised and decentralised heat supply and power supply. The development of the plan should be seen in the context of the planned activities of the subject groups of the ACTION PLAN, their effect on the development of the energy sector, and how the measures planned for the energy sector will affect other sectors. The following issues should initially be addressed in drafting the planning document: ● availability of raw data and improvements in data quality; ● future role of AS 'Latvenergo' TEC-1 and TEC-2 in providing the national energy supply and in achieving the climate neutrality goals of Riga; ● use of modelling tools for predicting future trends and developing various scenarios. It is essential within the framework of the planning document to set ten-year goals (2030, 2040, 2050 goals) for the sector as a whole and for each individual field, in order to then determine clear measures to achieve these goals.
First actions	● Decide on the necessity for drafting a planning document, determining one person responsible for its development ● Begin cooperation and discussions with the Ministry of Economics regarding the achievement of Riga's climate neutrality goals for the energy sector ● Start cooperation with industry specialists and scientific institutions on the use of modelling tools for predicting future trends and developing different scenarios for achieving climate neutrality in the energy sector
Main benefits	● A prerequisite for increasing the share of renewables in the production of heat energy and electricity in Riga ● Support for the achievement of climate neutrality goals ● Potential for reduction in heat energy fees
Linking with ACTION PLAN subject groups	● Climate neutrality policy subgroup (address regulatory barriers, see Section 12.1) ● Apartment building subgroup (effect of reducing heat energy consumption on heat energy production) ● Municipal infrastructure subgroup (achieving 100% renewable energy sources for heat and electricity consumption) ● Environment communication subgroup (energy efficiency measures in decentralised heat supply, reduction of electricity consumption) ● Transport (possibility of using electricity and other sources of energy in the transport sector in the future) ● Adaptation and urban planning subgroup (necessity for cooling energy for cooling buildings in the future, construction of new/renovated energy sources and their inclusion in the urban environment)
Linking with the Development Programme	Priority 3 'Good environment quality and sustainable urban ecosystem for mitigating climate change'. Task 1 'Improving the environmental quality and climate change impact monitoring and public information system'.
Responsible institutions	Climate neutrality work group, heat and electricity subgroup
Implementation	
Implementation period	2022–2023
Expenses	EUR 80,000
Source of funding	Municipal budget, national budget, EU funding
Indicators for supervision	
- Indicator 1	Annual share of renewable energy sources (%) in the heat supply (central heating system, decentralised heating)
- Indicator 2	Annual share of renewable energy sources (%) in electricity production
- Indicator 3	Annual decrease in natural gas consumption (thousand m^3, GWh)

Basic information	
Sector	Heat and electricity production
Name	Renewables promotion in the Riga central heating system
Brief description of the activity	The aim of this measure is to foster the increase in the share of renewables in the Riga central heating system. This measure is to include the following main actions: ● promote the use of solar system solutions and heat pumps in low-capacity boiler houses of the central heating system. As part of this measure, it would be necessary to assess the possibility of replacing each boiler house with renewables solutions. It is necessary to start implementing renewables projects in natural gas boiler houses that need reconstruction, or the implementation of measures that offer the shortest payback time. Then, all other natural gas plants should be gradually switched to renewables. In addition, it must be ensured that new small boiler houses of any capacity installed only use renewables; ● foster the utilisation of surplus heat. Currently, 3 renewable energy plants and 6 industrial companies, which theoretically meet the conditions for using surplus heat, have been identified in Riga. Notably, however, the use of surplus heat in the central heating system is determined by the temperature levels and heat media used.
First actions	● Carry out an assessment of the existing small-capacity natural gas boiler houses of AS 'Rīgas siltums' for the possibility of replacing the existing boiler equipment with renewables solutions. ● Carry out an assessment of nine potential energy sources for the possibility of using surplus heat in the central heating system of Riga.
Main benefits	● Increase in the use of renewables ● Reduction in CO_2 emissions
Linking with ACTION PLAN subject groups	● Climate neutrality policy subgroup (address regulatory barriers, see Section 12.1) ● Municipal infrastructure subgroup (achieving 100% renewable energy sources in heat consumption) ● Apartment building subgroup (effect of reducing heat energy consumption on heat energy production) ● Environment communication subgroup (energy efficiency measures in decentralised heat supply, reduction of electricity consumption) ● Adaptation and urban planning subgroup (necessity for cooling energy for cooling buildings in the future, construction of new/renovated energy sources and their inclusion in the urban environment)
Linking with the Development Programme	Priority 3 'Good environment quality and sustainable urban ecosystem for mitigating climate change'. Task 6 'Mitigate climate change'.
Responsible institutions	Heat energy and electricity subgroup, AS 'Rīgas siltums'
Implementation	
Implementation period	for 2022–2030
Expenses	EUR 34.9 million
Source of funding	AS 'Rīgas siltums' funding, EU funding, government co-financing, and other financial instruments
Impact in 2030	
Renewables increase	38,883 MWh
Reduction of emissions	7,854 tCO_2 emissions
Indicators for supervision	
- Indicator 1	Consumption of heat energy produced from renewables in low-capacity natural gas energy sources of AS 'Rīgas siltums', MWh/year
- Indicator 2	Number of projects implemented (number of connections for the use of surplus heat, amount of heat energy transferred to the central heating system of Riga)
Examples of good practice	

Examples of good practice	AS 'Salaspils siltums' (https://salaspilssiltums.lv/par-uznemumu/siltumavoti-un-kurinama-diversifikacija/)

Basic information	
Sector	Heat and electricity production
Name	Achieve connection of new clients to the central heating system of Riga
Brief description of the activity	The purpose of this measure is to promote the more efficient use of energy resources and improvement of air quality in Riga by connecting potentially new and existing decentralised plants to the central heating system of Riga.
First actions	● Prepare standard solutions for connecting decentralised sites to the central heating system, which should be able to compete with the individual natural gas heating system in terms of cost; ● create financial support instruments to encourage users of fuel-burning equipment to connect to the central heating system of Riga; ● implement information measures to boost awareness; ● encourage the installation of heating fee assignment systems in multi-apartment buildings, for example the installation of allocators.
Main benefits	● improved air quality; ● increased efficiency in the use of energy resources compared to decentralised heat supply; ● local residents get access to quality utility services (heat supply).
Linking with ACTION PLAN subject groups	Energy generation work group (environmental communication subgroup: information measures for decentralised heat supply).
Linking with the Development Programme	Priority 3 'Good environment quality and sustainable urban ecosystem for mitigating climate change'. Task 4 'Provide citizens with high-quality and accessible utility services'
Responsible institutions	AS 'Rīgas siltums', heat energy and electricity subgroup
Implementation	
Implementation period	2022–2023
Expenses	EUR 300,000
Source of funding	AS 'Rīgas siltums' funds, municipal funds
Impact in 2030	
Renewables increase	No direct effect
Reduction of emissions	No direct effect
Indicators for supervision	
- Indicator 1	The annual number of new clients connected to the central heating system of Riga

Basic information	
Sector	Heat and electricity production
Name	Promote the use of renewables in decentralised heat supply or connecting to the central heating supply system of Riga
Brief description of the activity	The purpose of this measure is to promote the more efficient use of energy resources and improvement of air quality in Riga by connecting potentially new and existing decentralised plants to the central heating system of Riga, and to increase the share of renewables in the municipality.
First actions	● Balance air quality improvement goals with climate goals ● prepare a simple calculation tool for lifecycle cost assessment ● limit the installation of new fossil fuel boilers (including replacements) starting from 2025, whenever technically and economically feasible ● before 2025, develop a support programme for compensating additional costs ● conduct information measures to boost awareness.
Main benefits	● Improved air quality; ● reduced CO_2 emissions; ● increased efficiency in the use of energy resources; ● increased proportion of renewables in the decentralised heating supply; ● local residents get access to quality utility services (heat supply).
Linking with ACTION PLAN subject groups	Energy generation work group (environmental communication subgroup: information measures for decentralised heat supply)
Linking with the Development Programme	Priority 3 'Good environment quality and sustainable urban ecosystem for mitigating climate change'. Task 4 'Provide citizens with high-quality and accessible utility services'
Responsible institutions	AS 'Rīgas siltums', heat energy and electricity subgroup
Implementation	
Implementation period	2022–2024
Expenses	EUR 133,593,000
Source of funding	AS 'Rīgas siltums' funds, funds of private individuals, and municipal funds.
Impact in 2030	
Renewables increase	166,486 MWh/year
Reduction of emissions	46,199 tCO_2/year
Indicators for supervision	
- Indicator 1	The annual number of new clients connected to the central heating system of Riga
- Indicator 2	Share of renewables in the manufacturing and service sector
- Indicator 3	Natural gas consumption, housing sector (households)
- Indicator 4	Natural gas consumption, public sector (other users)

Annex 4.3: Apartment Buildings

Basic information	
Sector	Apartment Buildings
Name	Developing and updating a renovation programme for Riga multi-apartment buildings
Brief description of the activity	The purpose of the programme is to encourage local residents to implement projects for the renovation of multi-apartment buildings, preparing a legal and administrative framework for organising these processes in Riga. During the development and maintenance of the programme, the following issues should be addressed: ● assessment of the current situation in relation to the potential number of multi-apartment buildings and energy savings, determining the period for monitoring the progress (i.e., the number of renovated buildings and reduction in energy consumption) and defining the frequency of the monitoring (annual, semi-annual, etc.); ● drafting of rules for the establishment and implementation of the Energy Efficiency Centre as part of the Housing Competence Centre — a one-stop-shop solution for local residents to address issues related to housing; ● a clearly defined allocation of duties and responsibilities among all the parties (RCC departments, agencies, companies) involved in the renovation of buildings in Riga, so that both municipal employees and local residents are clear about which of the institutions should be contacted with what problems; ● conditions for managing and implementing the programme (drafting of binding regulations); ● supportable activities and stricter requirements for the renovation of buildings; ● mechanisms for raising funding (funds, programmes, commercial banks, ESP, etc.). Once developed, the programme should be revised and improved at certain intervals for more efficient operation, for example, once every five years after the programme is developed. Mandatory revision and improvement of the programme must be carried out before setting multi-apartment building sector goals for the next period (2030–2040).
First actions	● Decide on the necessity for drafting a programme, determining one person responsible for its development ● Define the goal of the programme, the main actions and results to be achieved, and based on them, develop the programme
Main benefits	● Prerequisite for an increase in the number of renovated apartment buildings ● Support for the achievement of climate neutrality goals ● Promote the improvement of the living space and environment for the residents of Riga
Linking with ACTION PLAN subject groups	● Climate neutrality policy subgroup (address regulatory barriers, see Section 12.2) ● Heat and electricity production subgroup (reduction of heat energy consumption and impact on energy production) ● Adaptation to climate change (building renovation projects and their ability to stem the rising urban heat island effect in the future, provision of cooling opportunities for buildings in the future) ● Urban planning (energy-efficient housing construction)
Linking with the Development Programme	Priority 5 ‘Availability of diverse and high-quality housing’. Task 3 ‘Promote the comprehensive renovation of housing stock and the improvement of living spaces’
Responsible institutions	Multi-apartment building subgroup, RCC Housing and Environment Department, REA
Implementation	
Implementation period	2022–2030
Expenses	EUR 100,000 (for drafting documentation)
Source of funding	Municipal budget, EU funds

Indicators for supervision	
- Indicator 1	Number of multi-apartment buildings renovated per year
- Indicator 2	Reduction in heat energy consumption (MWh/year)

Basic information	
Sector	Apartment Buildings
Name	Creation and operation of the Energy Efficiency Centre
Brief description of the activity	The goal of the Energy Efficiency Centre is to provide support to the residents of Riga in matters of building renovation, starting with the development of an energy audit and ending with support for the start of construction work. The activities of the Energy Efficiency Centre would be as follows: ● in the future, maintain and implement RCC support programmes for renovating and improving the energy efficiency of housing, including multi-apartment buildings; ● collect and update quality information about housing stock in the municipality (number of buildings and heated floor area, including buildings connected to the CSS/decentralised heating, renovated/not renovated, technical condition of the buildings, number of homeowner associations, etc.); ● collect knowledge and examples of good practice pertaining to energy efficiency in housing; ● involve existing sources of financing and participate in the introduction of new financial instruments (cooperation with ALTUM, commercial banks, ESP, AS 'Rīgas siltums', building managers); ● implement monitoring activities, e.g., maintaining a heat energy database for multi-apartment buildings; ● ensure the development of architectural solutions for standardised renovation projects, and develop standardised building insulation projects in cooperation with other scientific institutions and industry specialists; ● advise local residents on the topics of energy efficiency in buildings, using visual materials and interactive outdoor facilities, on the possibilities of receiving aid for the renovation of buildings, etc.; ● provide assistance in issuing long-term loans beneficial to local residents (rotating fund, and other sources), in accordance with the Riga multi-apartment building renovation programme; ● provide technical support to local residents (building managers, homeowner associations, etc.) in the preparation of documentation.
First actions	● Decide on and determine the person responsible for the establishment of the Energy Efficiency Centre ● Define the goal, the main actions and the result to be achieved
Main benefits	● Increase the level of knowledge and awareness among the public ● Contribute to the increase in the number of renovated apartment buildings ● Support for the achievement of climate neutrality goals ● Promote the improvement of the living space for the residents of Riga
Linking with ACTION PLAN subject groups	● Climate neutrality policy subgroup (address regulatory barriers, see Section 12.2)
Linking with the Development Programme	Priority 5 'Availability of diverse and high-quality housing'. Task 3 'Promote the comprehensive renovation of housing stock and the improvement of living spaces'
Responsible institutions	Multi-apartment building subgroup, RCC Housing and Environment Department, REA
Implementation	
Implementation period	2022–2030
Expenses	EUR 150,000
Source of funding	Municipal budget, EU funds
Indicators for supervision	

- Indicator 1	Number of serviced multi-apartment buildings/local residents (consultations, preparation of documents, etc.) per year
- Indicator 2	Number of multi-apartment buildings that applied for renovation per year
- Indicator 3	Number of measures implemented, incl. participation in projects, per year
- Indicator 4	Number of collaborations with other institutions and industry specialists
Examples of good practice	
Information material	'One-stop shops for residential building energy renovation in the EU' https://publications.jrc.ec.europa.eu/repository/handle/JRC125380
Organisation	Centre for Sustainable Energy, UK (https://www.cse.org.uk/)

Basic information	
Sector	Apartment Buildings
Name	Establishment of the Riga Energy Efficiency Fund (REF).
Brief description of the activity	The purpose of the Energy Efficiency Fund is to ensure the availability of long-term financing for the renovation of multi-apartment buildings in Riga. REF will address the following issues: ● introducing legislative initiatives and creating a legal framework for the creation and operation of the fund; ● defining technical documentation, compliance criteria, and quality requirements for multi-apartment building renovation projects, in order to receive financing through REF; ● establishing a governance structure that will enable effective establishment, maintenance, and operation of REF; ● defining the financing mechanisms, including innovative financing schemes for building renovations based on energy efficiency/renewables investments and low-cost energy efficiency measures; The work on these topics must be coordinated with the development of the Riga multi-apartment building renovation programme, as some of the issues overlap; ● develop a results-based business model for the Riga Energy Efficiency Fund; ● prepare a portfolio of renovation projects and an investment plan; ● educate local residents and homeowners in the topics of energy efficiency and renewables. These activities and responsibilities should be delegated to the Energy Efficiency Centre.
First actions	● Develop an investment concept for the creation of REF within the framework of the EU European City Facility (EUCF) initiative ● Launch the activities of REF
Main benefits	● Contribute to the increase in the number of renovated apartment buildings ● Support for the achievement of climate neutrality goals ● Promote the improvement of the living space for the residents of Riga
Linking with ACTION PLAN subject groups	Climate neutrality policy subgroup (address regulatory barriers, see Section 12.2)
Linking with the Development Programme	Priority 5 'Availability of diverse and high-quality housing'. Task 3 'Promote the comprehensive renovation of housing stock and the improvement of living spaces'
Responsible institutions	Apartment buildings subgroup, REA
Implementation	
Implementation period	2022–2023
Expenses	EUR 29.3 million
Source of funding	Municipal budget, EU funds
Impact in 2030	
Energy savings	Part of the total heat energy reduction in the apartment building sector
Reduction of emissions	Part of the total reduction in CO_2 emissions in the apartment building sector
Indicators for supervision	
- Indicator 1	Number of apartment buildings/local residents advised per year

- Indicator 2	Number of apartment buildings that received financing as part of REF, per year

4.2. Annex: Transport

Basic information	
Sector	Transport
Name	Measures to promote distance working and e-services for increasing the availability of services.
Brief description of the activity	Mobility surveys in Riga show that going to work is the primary purpose of travel in the city. Traffic intensity measurements at the city boundaries show that the number of cars entering Riga is increasing every year. The purpose of the measure is to implement actions that promote the reduction of the need to travel for work among the residents of Riga and its suburbs (going to and from Riga).
First actions	**Measures implemented by the municipal government:** ● A survey of Riga City municipal employees, which includes questions about travel habits (in relation to getting from home to work and from work to home, and need for travel during work), and their opinion of whether they would be interested in using work sharing spaces ● Identification of municipal premises potentially suitable for shared workplaces ● Starting negotiations with Riga suburban municipalities on the possibility of offering residents of these municipalities who go to work in Riga (municipal employees) an opportunity to use shared work spaces in their 'home' municipalities ● Study of financing opportunities, incl. municipal budget, co-financing by European funds, public/private partnerships; review of good practice examples **Measures implemented by the municipal government in cooperation with other parties:** ● A pilot project for creating work sharing spaces in conjunction with one of Riga suburban municipalities ● Assistance to businesses in managing the lease of premises ● A survey of Riga residents on their interest in using shared workplaces, their potential locations, the cost threshold that people would be willing to pay for using shared workplaces; publicising of the results of the survey and discussing them with the existing work sharing space providers, and other interested parties
Main benefits	● Reduced CO_2 emissions ● Reduced impact on climate change ● Less air pollution caused by transport ● Less time spent commuting ● The municipal government sets a good example in achieving climate neutrality goals
Linking with ACTION PLAN subject groups	● Municipal infrastructure (provision of premises for distance working in shared offices) ● Environmental communication subgroup (pursuing cooperation with Riga suburban municipalities and the private sector) ● Climate neutrality policy subgroup (cooperation policy with Riga suburban municipalities and the private sector) ● Urban Planning
Linking with the Development Programme	Priority 1 'Comfortable and environmentally friendly travel in the city', Priority 2 'Urban environment promoting the quality of life', Priority 7 'Healthy, socially inclusive, and supportive city', Priority 8 'Competitive city with an innovative economy'
Responsible institutions	Transport subgroup; municipal infrastructure subgroup; REA; RCC Property Department; RCC Urban Development Department

Implementation	
Implementation period	2022–2024
Expenses	EUR 1000 thousand
Source of funding	Municipal budget; EU structural funds; government co-financing; other financial instruments
Impact in 2030	
Energy savings	Depends on the number of municipal employees and local residents involved. ~1.6 MWh/year/person
Reduction of emissions	Depends on the number of municipal employees and local residents involved. ~0.5 tCO_2/year/person
Indicators for supervision	
- Indicator 1	Number of municipal employees distance working; number of people or % of the employees
- Indicator 2	Share of residents of Riga and Riga suburbs distance working (based on mobility survey results), %
- Indicator 3	Number and floor area of work sharing spaces (m^2) in Riga
Examples of good practice	
Examples of good practice	Examples of good practice for creating an open workspace in London with local government support https://www.london.gov.uk/sites/default/files/regeneration_guide_2_-_creating_open_workspace.pdf
Additional materials	Research on shared workplace models in the private, public, and non-governmental sectors http://socialinnovation.lv/wp-content/uploads/2013/12/ENG_IO1_FINAL.pdf

Basic information	
Sector	Transport
Name	Restrictions on private transport Measures to reduce passenger-kilometres travelled by car
Brief description of the activity	Private cars are the main source of CO_2 emissions in the transport sector. The purpose of the measure is to promote the transition from private cars to sustainable modes of transportation (walking, cycling, public transport) by setting a high payment (or fee) for parking a car (including at workplaces) and thus reducing the advantages of the car compared to other modes of transportation, especially public transport.
First actions	• Determine the number of parking spaces to which the conditions apply • Study the experience of other European cities in parking pricing policy with the aim of reducing the number of cars in the city • Develop of a long-term pricing policy, assess the impact of increased parking fees (or tolls) on businesses • Expand the RCC car park concept with a vision of the impact of the price of parking spaces on the reduction of the number of cars, with regular updates, taking into account data on traffic intensity • Separate the parking fee (and/or toll) revenue from the overall revenue of RP SIA 'Rīgas satiksme' and allocate it to sustainable mobility projects • Communication about upcoming changes with businesses, citizens
Main benefits	• Reduced CO_2 emissions and reduced air pollution from transport • Increased share of sustainable modes of transportation • Implementation of the 'polluter pays' principle • More revenue for the municipal budget
Linking with ACTION PLAN subject groups	• Environmental communication subgroup (educating and informing citizens and businesses)
Linking with the Development Programme	Priority 1 'Comfortable and environmentally friendly travel in the city'
Responsible institutions	RP SIA 'Rīgas satiksme' (which manages car parks), RCC Transport Department; REA
Implementation	
Implementation period	2023–2027
Expenses	EUR 500 thousand
Source of funding	Municipal budget
Impact in 2030	
Energy savings	13,150 MWh/year
Reduction of emissions	3,240 tonnes of CO_2/year
Indicators for supervision	
- Indicator 1	Share of public transport users, %
- Indicator 2	Share of users of physically active modes of transportation, %
- Indicator 3	Share of private car users, %
- Indicator 4	Budget revenue from parking fees (or tolls), million EUR/year
- Indicator 5	Budget allocation for sustainable mobility projects, million EUR/year
Examples of good practice	
Examples of good practice	**Parking fees at workplaces.** Since 2012, Nottingham (Great Britain) has charged a fee for parking spaces near workplaces, if their number exceeds 10. The fee paid by the employer per parking space is £ 428 (~EUR 440) per year and is revised annually. The parking fee applies to approximately 50% of parking spaces in the city and since its introduction has brought EUR 90 million in municipal budget revenue. With this money, the city has extended two tram lines, modernised the central railway station, and bought electric buses. It is estimated that carbon emissions have decreased by 33% compared to 2005. Of this, 13% is directly due to the change in the mode of transportation. As a result of the measure, 40% of trips to work are made by public transport.

Additional materials	Parking Policy in Nottingham https://www.transportxtra.com/publications/parking-review/news/68005/the-workplace-parking-levy-nottingham-pioneers-the-way-ahead/

Basic information	
Sector	Transport
Name	Promotion of the use of renewables technologies, measure 'Electric vehicle charging infrastructure development integrated with the production of renewable energy and innovative solutions for using energy storage potential'
Brief description of the activity	As the number of electric vehicles registered in Riga increases, the number of charging stations must increase proportionally. The availability of charging infrastructure is a prerequisite for citizens to increasingly opt for electric vehicles. The forecasts for the increase in the number of electric vehicles in Latvia are between 18 and 60 thousand electric vehicles by 2030. Assuming 1 charging station per 10 electric vehicles, the number of charging stations needed is in the range of 1800-6000, a large part of which should be located in Riga. This includes both public charging stations near public buildings, car parks, etc., and municipal electric vehicles for the municipal electric vehicle fleet, and stations near residential buildings. In order to achieve the goal of climate neutrality, it is important that all the electricity used in the city is produced from renewables.
First actions	**Measures implemented by the municipal government:** ● Create a system and define the persons to take charge of the centralised registration of new charging stations (public, semi-public, private), updating the corresponding information on the map of charging stations (public, semi-public) ● Develop criteria for the public procurement of electric vehicle charging stations for municipal authorities, with integrated production of renewables electricity at the charging station as one of the criteria ● Public procurement according to the criteria, gradually moving to 100% CO_2-neutral charging stations in the municipal infrastructure ● Exhibition devoted to the electric vehicle charging infrastructure strategy, defining how the electric vehicle charging infrastructure will be developed, including an assessment of the impact of electric vehicle charging capacity on the energy system, ways to introduce innovations in energy consumption management and energy storage (e.g., smart charging stations) ● Encourage households and the private sector to install charging stations (especially 100% CO_2-neutral charging stations and slow charging stations near residential buildings) **Measures implemented by the municipal government in cooperation with other parties:** ● Identification and registration of existing electric vehicle charging stations (public and semi-public) on a publicly available map (for example, in cooperation with the 'Bezizmešu mobilitātes biedrība' association, which already keeps a map of electric vehicle charging stations, ĢEOLatvija.lv, or by creating a new Riga mobility service app) ● Pilot project for the demonstration of a 100% CO_2-neutral charging station by 2025 ● Educating the public in managing electricity consumption in cooperation with the Elektrum Energy Efficiency Centre
Main benefits	● Reduced CO_2 emissions in transport ● Increased share of renewables in electricity production ● Reduced CO_2 emissions, reduced air pollution created by transport
Linking with ACTION PLAN subject groups	● Electricity production (renewable electricity production) ● Municipal infrastructure (municipal fleet, charging infrastructure at municipal institutions)

	• Environmental communication subgroup (educating the public, encouraging the private sector and households to install renewable energy charging stations, municipal government setting a good example)
Linking with the Development Programme	Priority 1 'Comfortable and environmentally friendly travel in the city'
Responsible institutions	RCC Urban Development Department (Mobility Administration; Geomatics Administration); REA; Municipal transport subgroup; Environmental communication subgroup
Implementation	
Implementation period	2022–2030
Expenses	EUR 500,000
Source of funding	Municipal budget, national budget, EU funding
Impact in 2030	
Energy savings	74,000 MWh/year (due to the increase in the number of electric vehicles)
Renewables increase	14,200 MWh/year Depends on the number of 100% CO_2-neutral charging stations
Reduction of emissions	22,080 tCO_2/year
Indicators for supervision	
- Indicator 1	Number of electric vehicles registered and in technical order
- Indicator 2	Number of electric vehicle charging stations (public, semi-public, private)
- Indicator 3	Number of electric vehicle charging stations with integrated renewable electricity generation
Examples of good practice	
Examples of good practice	**Smart charging.** As part of the *FlexPower Amsterdam* project, more than 450 charging stations in Amsterdam have been adapted to the trends in electricity consumption in the power grid. This means that the charging speed for electric vehicles is faster when the overall electricity consumption in the grid is lower, and slower when the total electricity consumption in the grid is high. Smart charging can also help successfully integrate renewable electricity with variable generation into the power system.
Additional materials	*FlexPower Amsterdam* project to adapt the city to an increasing number of electric vehicles and the use of electric vehicles to manage power consumption https://www.elaad.nl/projects/flexpower-amsterdam/

4.3. Annex: Adaptation to Climate Change

Basic information	
Sector	Adaptation to climate change: water supply and sanitation
Name	Separation of the rainwater system from the general sewer system and sustainable management of rainwater
Brief description of the activity	In some of Riga, a common central sewer system has been installed, which discharges household/industrial wastewater and rainwater through one pipeline, and which is equipped with rainwater spillways near watercourses or water bodies. During rainstorms of a certain intensity, wastewater is drained into the environment through emergency discharges in order to avoid overloading of the BAS 'Daugavgrīva' treatment plant, which could cause significant disruptions in wastewater treatment, technical damage, and a negative impact on the environment. As a result of climate change, it is expected that both the average amount of precipitation and the intensity of rains will increase, which increases the risk of untreated wastewater entering the environment. Therefore, the ACTION PLAN envisages that the separation of the rainwater system from the general sewer system should continue, the coordinated reconstruction and development of the rainwater drainage system should be encouraged, and various green solutions for rainwater management should be introduced, whereby such solutions must be appropriate to the situation, including buildings, structures, and biological methods for rainwater management, storage, natural water treatment and soil infiltration that relieve or replace centralised rainwater drainage systems. Solutions may include infiltration cassettes and wells, permeable street paving, lining, filter strips, sedimentation or runoff ponds, biofilters, or rain gardens. When developing new and rebuilding existing areas, ditches, ravines, and other types of water bodies can be created to accommodate heavy rainfall, which can also be functionally used during the rest of the year. Rainwater management measures should be carried out in a comprehensive manner, together with street surface restoration and/or replacement in the city. Solutions are chosen taking into account the degree of water pollution, its amount, and the special feature of the location in question.
First actions	● Continue the work started by SIA 'Rīgas ūdens' creating a computer model of the centralised sewer system. ● Create a work group that includes all the institutions that are responsible for the rainwater collection system in Riga (RCC Traffic Department, RCC Housing and Environment Department, Riga Neighbourhood Community Centres, Riga Urban Development Department, and SIA 'Rīgas ūdens') in order to jointly plan the arrangement of the rainwater system in Riga. ● Implement measures already planned.
Main benefits	● Modernised wastewater collection system ● Reduced risk of environmental pollution during heavy rain ● The municipal government sets a good example in achieving climate resilience goals
Linking with the Development Programme	Priority 3 'Good environmental quality and sustainable urban ecosystem for mitigating climate change'; Task 3.3 'Mitigate flood risks' and Task 3.4 'Provide citizens with high-quality and accessible utility services'
Responsible institutions	Municipal infrastructure subgroup; REA, RCC Traffic Department, RCC Housing and Environment Department, Riga Neighbourhood Community Centres, RCC Urban Development Department, and SIA 'Rīgas ūdens'
Implementation	
Implementation period	2022–2030
Expenses	~EUR 7,475,730 (measures APS0434, APS0595, 3043 in the Development Programme)
Source of funding	Municipal budget; SIA 'Rīgas ūdens' budget funds
Indicators for supervision	
- Indicator 1	The part of Riga where rainwater is collected in the general sewer system

Basic information	
Sector	Adaptation to climate change: urban environment
Name	Develop a detailed urban greening plan
Brief description of the activity	As a result of climate change, extremely hot summers and intense rains are predicted to become more frequent. When planning the development of the city, these factors must be taken into account, and the city must be designed in such a way so as to minimise the impact of climate change on the population, the population's health and productivity. The goal of this measure is the development of an urban greening plan to mitigate future increases in the urban heat island effect and mitigate other climate risks. Such a plan should identify those neighbourhoods, streets, and blocks of Riga that need improvement immediately, where such improvement can be planned for the future and as part of other infrastructure development measures. In each location, one must choose the most useful type of measures so that it is coordinated with the rest of the city's development. These measures can be, for example, creating natural shade, using green infrastructure in the urban environment as an alternative solution for the collection of rainwater, additional greenery and green areas, reduced proportion of waterproof pavements, etc. A large part of the greening measures should be integrated into the ongoing street and courtyard renovation projects.
First actions	● Identify areas, streets, and blocks where action and a common vision of adaptation are needed ● Organise and carry out a procurement for the development of the plan ● Develop a plan of measures for each location so that one can coordinate these
Main benefits	● Reduced heat island effect and improved microclimate at street level, improving the comfort of local residents, and public health ● Reduced vulnerability to climate change ● The municipal government sets a good example in achieving climate resilience goals
Linking with ACTION PLAN subject groups	● Transport subgroup (mobility planning for pedestrians and cyclists)
Linking with the Development Programme	Priority 2 'Urban environment promoting the quality of life'; Task 2.1 'Develop neighbourhood centres by promoting the functional diversity of public outdoor space'; Task 2.2 'Preserve, improve and sustainably manage green infrastructure in Riga'; Task 2.3 'Promote better access to waterfronts and water spaces and their use, and develop the necessary infrastructure'; Task 2.7 'Create a safe urban environment for the residents and guests of the city'.
Responsible institutions	RCC Housing and Environment Department, REA
Implementation	
Implementation period	2022–2023
Expenses	EUR 100,000 (research, drafting of documentation)
Source of funding	Municipal budget;
Indicators for supervision	
- Indicator 1	Implemented green infrastructure projects

4.4. Annex: Environmental Communication

Basic information	
Sector	Environmental Communication
Name	EnergoneatkaRĪGA 2030 platform
Brief description of the activity	Based on the experience of other European cities, and in order to organise and foster communication with the public more successfully, one must create a single platform or website to ensure uniform two-way communication with the public and other parties involved. The platform should become an easy-to-remember and understandable source of information for finding and accessing detailed information from the websites of relevant institutions or institutions that organise activities. The platform could include a mechanism for citizens to get involved and offer their suggestions or opinions. The platform also needs to provide and regularly update information on the progress of the goals set in the ACTION PLAN in such a way that it is convenient for anyone to track the actual results of the implementation of the ACTION PLAN measures. The platform could also include the following information: ● The progress of REK implementation and the progress of achieving climate neutrality, clearly showing through visual tools how much energy is saved, how much renewable energy is used, and how much emissions are reduced. ● Database with measures implemented by companies, and measures on which the Riga City Municipality writes and reports. Businesses could potentially be awarded at the end of each year, in various categories, like 'Greatest reduction in CO_2 emissions', 'Best campaign', 'Best measure', etc. ● Agreements on the implementation of the measures with companies, institutions, associations, for example, for the installation of solar panels, reduction of energy consumption, installation of bicycle racks and charging systems, etc. ● Lists, descriptions of various possible measures that building managers, companies can implement; webinars, information campaigns, etc. organised. ● Promoting examples of good practice, etc. ● Creating a platform/section for citizens to ask their questions and express their opinions. ● Etc.
First actions	● Develop the logo and visual identity of the campaign ● Create a platform plan and structure for procurement purposes ● Conduct a procurement for the development of the platform
Main benefits	● Clearly recognisable and easy-to-remember source of information ● Better participation of companies and citizens in achieving goals ● Clear, traceable and transparent communication about achieving climate neutrality goals
Linking with the Development Programme	Priority 6 'Modern and open city management'; Task 6.5 'Promote uniform communication, information, and data availability'
Responsible institutions	REA, RCC Urban Development Department, Environmental communication work group
Implementation	
Implementation period	2022–2023
Expenses	~EUR 100,000
Source of funding	Municipal budget
Indicators for supervision	
- Indicator 1	Information website for climate neutrality has been created

Basic information	
Sector	Environmental communication: measures in the field of municipal buildings and infrastructure
Name	Educational events in municipal education institutions
Brief description of the activity	An effective measure to promote the energy literacy of the general public is educating children and teenagers in schools by involving them in various practical activities. The Riga City Municipality is already implementing an environmental education programme, which should be expanded and include the issues of climate change, its mitigation and adaptation to it, and the principles of circular economy. In order to promote the energy literacy of the population, young people should be taught about energy labelling, energy saving habits and changing your behaviour; for example, how to effectively ventilate rooms, adjust radiators, choose efficient electrical appliances, etc. In order to promote a broader understanding of sustainable energy production, pilot projects involving the installation of solar panels could be implemented in schools, allowing schoolchildren to be practically involved in the implementation of the pilot project and then to record and analyse the energy produced. This can educate not only the schoolchildren, but, indirectly, their households.
First actions	● Make a list of desired activities ● Conduct a procurement for the development of content for the activities, and organising of the activities in schools
Main benefits	● Improved energy literacy among children, teenagers, and their families ● Promotion of energy efficiency in the household sector ● The municipal government sets a good example for its residents and other cities
Linking with ACTION PLAN subject groups	● Municipal infrastructure subgroup (energy literacy in schools can improve energy efficiency in schools, as a result of changing habits) ● Apartment buildings subgroup (improve energy efficiency in households)
Linking with the Development Programme	Priority 4 ‘Accessible quality education’
Responsible institutions	REA
Implementation	
Implementation period	2022–2023
Expenses	EUR 30,000 (for organising activities over a period of 8 years)
Source of funding	Municipal budget
Indicators for supervision	
- Indicator 1	Number of schoolchildren educated

Basic information	
Sector	Environmental communication: measures in the public buildings sector
Name	Creation of energy communities
Brief description of the activity	New blocks that are under construction or development are suitable projects in which to consider implementing the principle of energy communities in energy production. In order to implement them, one must establish cooperation with project developers, in the fields of energy communities, installation of renewable energy sources, and cooperation with the central heating supply of AS 'Rīgas siltums'. Any new building is a new energy consumer, as energy is needed for both heating and hot water, cooling and the operation of various equipment. Taking into account Riga's goal of climate neutrality, any new building or group of buildings must try to achieve individual climate neutrality. To meet the needs of electricity consumption in new projects, one can plan, for example, the installation of solar panels, and for heating purposes, install heat pumps or connect to the Riga central heating system.
First actions	● Identify developers who plan to develop new areas in Riga ● Prepare information materials on the principles of energy communities for educating developers and initiating dialogue with them ● Establish cooperation for the creation of a pilot energy community project
Main benefits	● Increased share of renewable energy sources in Riga ● Lower energy costs for community residents and increased energy independence ● The municipal government sets a good example for its residents and other cities
Linking with ACTION PLAN subject groups	● Heat energy and electricity subgroup (energy resource production and supply systems)
Linking with the Development Programme	Priority 5 'Availability of diverse and high-quality housing'; Task 5.4 'Development of new housing'.
Responsible institutions	REA
Implementation	
Implementation period	2022–2023
Expenses	EUR 5,000 (for the preparation of informative materials). The costs depend on the level of involvement of the municipal government in the implementation of the pilot project
Source of funding	Municipal budget
Indicators for supervision	
- Indicator 1	Number of energy communities in Riga