



Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan

of the

City of Mannheim

STADT MANNHEIM ²





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Summary

Textual element

CONTENT OF THE 2030 CLIMATE NEUTRALITY ACTION PLAN

<https://buengerinfo.mannheim.de/buengerinfo/getfile.asp?id=8179827&type=do>

The Climate Action Plan (Klimaschutz-Aktionsplan 2030 - KSAP) was tailored for the EU Mission "100 Climate Neutral and Smart Cities by 2030" based on the criteria of the Climate City Contract by decision of the City Council. The Climate Action Plan is thus the basis for the negotiation of the Climate City Contract within the framework of the NetZeroCities Transition Map. The Climate Action Plan was developed by decision of the City Council on the basis of the criteria of a Climate City Contract for the EU Mission.

The Mannheim Climate Action Plan 2030 (KSAP) is the central strategy document on the way to climate neutrality in Mannheim by 2030. It includes not only targets and fields of action for the administration, but for the entire city society including businesses and citizens.

The action plan was developed over a period of 1.5 years in a **broad participation process** with the city society consisting of citizens, businesses, associations, initiatives, science, politics and the city administration. The Wuppertal Institute provided scientific support for the entire process and drew up the action plan with broad expertise.

In total, 81 bundles of measures with over 200 activities were developed in the eight fields of action of energy production, industry, trade and services, land use, green-blue infrastructures, mobility, private households and municipal administration, which form the basis for Mannheim's climate neutrality. As particularly important on the way to climate neutrality, 34 of these measures were identified as so-called TOP measures for priority implementation.

In principle, the implementation of all measures of the KSAP is necessary to achieve the objectives. However, **due to the enormous financial and personnel requirements, not all measures can be started at the same time.** The implementation of the climate protection measures is carried out in the departments together with the relevant actors. **The acquisition of funding, the creation of the necessary human resources for implementation and the efficient use of funds are therefore of great importance.** The KSAP is the strategy and action framework on the way to climate neutrality and will be further concretised. The implementation phase that follows the adoption of the resolution leads to a large number of projects of **local political significance.** These measures are subject to the decision and financing of the municipal council and will be presented to it for consultation.

The KSAP is generally to be **understood as a flexible strategy** that must be continuously adapted **and updated to changing framework conditions.** Nevertheless, it is important to establish the KSAP as a guideline for action for the entire city society consisting of the administration, businesses, citizens, associations, initiatives, etc. and to start the implementation ambitiously and quickly. **The goal of climate neutrality is a central joint task in which every contribution of all actors counts.** On the way to 2030, the impact control of the KSAP will be continuously and transparently presented by means of **CO2 balances and a monitoring tool.**

The KSAP is **integrated with the concept "Adaptation to Climate Change in Mannheim"** (V117/2019) and considered together as an integrated climate energy and action plan (SECAP) suitable to **fulfil the commitments of the City of Mannheim in the Covenant of Mayors.** At the same time, the **SECAP was harmonised throughout the process with the Mobility Master Plan 2035, which is currently being prepared as a Sustainable Urban Mobility Plan (SUMP).** After the resolution was passed, the content of the KSAP was unchanged and also graphically prepared and made available to the public in a suitable form and information about it was disseminated. **It will be further developed and concretised within the framework of the Local Green Deal "iDEAL for Mannheim".**



1 Introduction

Introduction

The **IPCC reports** make it clear that the climate has changed due to human influence to an extent that has not been the case for centuries to millennia. There is growing evidence that changes in extreme events such as heat waves, droughts and heavy rainfall are due to human-induced climate change. In all IPCC emissions scenarios, from very low to very high greenhouse gas emissions, global temperatures will continue to rise until the middle of the 21st century. Mannheim was actively involved in the global consulting group for the **“Summary for Policy Makers”** and has contributed with the Local Green Deal approach and the Climate Neutrality Plan.

With the emergency plan (V446/2019), an acceleration of climate protection measures was already decided in Mannheim in 2019. The goal of a climate-neutral city by 2050 was also anchored in the mission statement "Mannheim 2030" in 2019 and **pushed towards 2030 by the city council in the run-up to the application as one of the 100 Climate Neutral Cities**. With the present **"Climate Protection Action Plan 2030 - On the Way to a Climate Neutral City of Mannheim" (KSAP), measures on the way to climate neutrality are described and the Urgent Action Plan as well as the mission statement are thus concretised**. Together with the concept "Adaptation to Climate Change in Mannheim" (V117/2019), the KSAP will be merged into an integrated climate concept (SECAP - Sustainable Energy and Climate Action Plan) and will thus fulfil the City of Mannheim's commitments in the Covenant of Mayors. Furthermore, **the KSAP is the basis for the negotiation of the Climate City Contract within the framework of the EU mission "100 Climate Neutral and Smart Cities by 2030" (100 CNC)**. The City of Mannheim was selected in April 2022 as one of nine German cities in the EU Mission and consequently follows the transition map with the Local Green Deal.

Thus, the KSAP has overlapping contents with the Local Green Deal as well as the Climate City Contract of the 100 CNC, which is yet to be concluded. The measures of the respective strategies have high degrees of overlap, but partly have different focal points beyond that.

Figure 1: Mannheim's activities on the path to climate neutrality 2030
Source: own representation



Throughout the process, it was and is ensured that the three strategies are and will be harmonised in terms of content with the KSAP as the central strategy and hinge document. The KSAP supports the climate change objective in the Local Green Deal and sets the ambition. The 100 CNC Climate City Contract sets out the investment plan for achieving climate neutrality by 2030, which in turn is essential for the implementation of the KSAP once adopted.



The KSAP pursues the goal of climate neutrality by 2030, which makes it all the more important to drive forward the transformation process to a climate-neutral city of Mannheim decisively and at an accelerated pace with the entire city society consisting of politics, initiatives, associations, science, business, citizens and the city administration.

However, not only the activities and acceptance of measures by actors from Mannheim are essential for a successful path to climate neutrality, but also changed framework conditions at state, federal and European level.

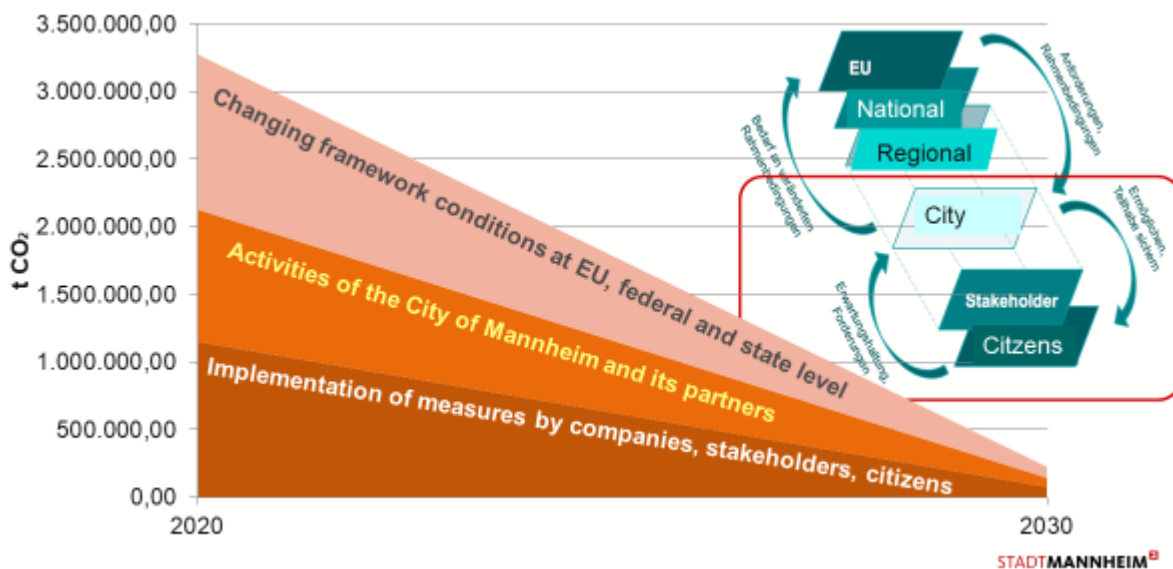


Figure 2: Stringency in the political multi-level system for implementing the KSAP at the municipal level
Source: Wuppertal Institute

Figure 3: Schematic representation of the interaction of activities and ambition increase on all implementation-relevant levels - Source: Wuppertal Institute

Therefore, the KSAP focuses on approaches to action for the municipal practice of the entire Mannheim city society (administration, companies, interest groups, citizens), but also identifies necessary framework conditions to be changed, without which the goal cannot be achieved. The necessary reduction paths on the way to climate neutrality 2030 can only be achieved through the interaction of suitable framework conditions on higher political levels, ambitious activities of the city of Mannheim and its partners as well as an active implementation of the local companies, interest groups, associations and all Mannheim citizens.

Against this background, it is important to understand the KSAP as a flexible concept that can react to changing conditions accordingly. **The KSAP is a developed basis and, as a "living object", should be permanently reviewed, refined, supplemented and adapted.** This may mean that some of the measures developed here are redundant in the future, but also that windows of opportunity or framework conditions arise that enable or require new or different measures. For successful climate protection in Mannheim, the KSAP must establish processes and structures that **enable flexible action and reaction** through Monitoring, Evaluation and Learning in Learning Loops with sensemaking processes.



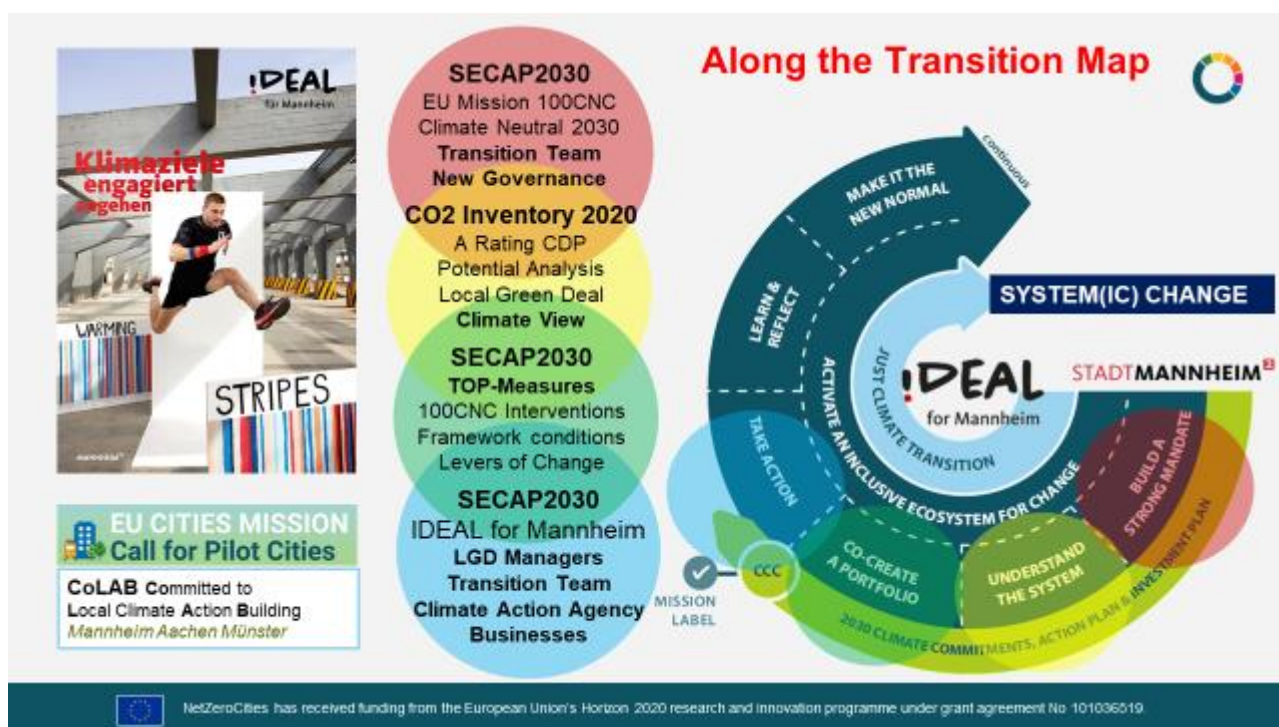
2 Work Process

Work Process - combination of textual and visual elements

TRANSITION MAP MANNHEIM

Mannheim works closely with the **transition core team**, which is composed of the EU Mission team to a Climate Neutral City and the Local Green Deal team, along the Transition Map. This consistent path **following the Transition Map** is also pursued by the city with the Pilot Cities Project CoLAB „Committed to Local Action Building“, with which Mannheim, together with Aachen and Muenster, successfully applied to NetZeroCities as part of the EU Mission.

Bild Transition Map Mannheim



MANDATE TO ACT

Based on the **political decisions** of the necessary system change to make the city climate-neutral, but also climate-resilient and sustainable for everyone socially just, the **goal of climate neutrality** was given top political priority within the framework of the Mannheim 2030 Mission Statement and the Local Green Deal. The **mandate to act** was given, with broad political support and the will of the people of Mannheim for a green, healthy, clean city with high quality of life.

A **strong mandate** enabled the 2030 Climate Neutrality Decision (Decision 05/2021 on Local Green Deal pilot city and 100CNC model city with target 2030, strengthened with KSAP 11/2023 decision) and the establishment of the transition team as a **new innovative governance structure** acting between the municipality and the ecosystem citywide and the cooperation with networks and **multi-level structures** (local, regional, national). **Additional staff** was hired, in the Climate Department, in the Local Green Deal Team, in the Climate Action Agency and further departments as for Urban Planning, Transport and Energy Management.



New governance structure transition team and the work with the ecosystem via the Local Green Deal Platform (House of Change – activity in the Pilot Cities CoLAB – Committed to Local Climate Action Building)

UNDERSTANDING THE SYSTEM

The **current CO₂ balance for 2020 is available** (national standard BSKO ifeu), **transparent monitoring has been and is still being set up via Climate View**, **progress reporting via CDP** has been prepared again and an **A rating** has been achieved for the first time, as the only German city.

The **largest emission domains** are identified with the **energy consumption of electricity/heat in buildings and transport**, and for the first time Scope 3 was recorded for food/consumption in the 2020 balance.

In order to understand the **challenges in the different emission domains**, the current CO₂ balance (2020) was used as a basis for **defining the scenarios for climate neutrality** in 2030 and the **emission pathways** were defined. In this way, the **gaps in CO₂ reduction** could also be identified and assigned to the sectors. For the **development of appropriate measures**, the different **levers of change were analysed** and the **framework conditions** for the successful implementation of the measures were examined. You will find all levers of change in all action fields, because Mannheim is working with the **Local Green Deal** approach to climate neutrality, what does mean, not only to be climate neutral in 2030, but to co-create in an **integrated way** (with integrated goals in the different strategies from energy to mobility, from adaptation to biodiversity, from industries to citizens actions) measures, that lead to mobilising the entire urban society with knowledge transfer, research and social innovation, and leaving no one and no place behind realising **just transition**. So you will find all these levers of change in the Action Plan.

The Climate, Nature and Environment Department is responsible for monitoring and updating the KSAP, based on the understanding of a flexible strategy that must be continuously adapted to changing framework conditions and the successes in CO₂ reduction. As a basis for this, the CO₂ balance is determined annually and for the first time for 2020 with the separate reporting of the municipal administration's balance.

The entire transition team with the Local Green Deal managers will secure, that suitable deals will be co-created and lead to a new mindset of collective action and concretise the action fields and activities in the KSAP.

CO-DESIGN A PORTFOLIO

Thus with the **completion and resolution of the KSAP**, the **ambition for climate neutrality 2030** has been defined, the **theoretical model for climate neutrality has been calculated** and along the emission pathways the **measures and responsibilities** have been identified.



In a broad participation process over 1.5 years, **measures and interventions for climate neutrality 2030** were developed together with the urban community using the KSAP. The various actors from the city administration, politics, companies, science and initiatives and citizens' representatives developed measures in all fields of action along the emission paths and contributed them to the KSAP. **From the beginning, the measures were thought together with the interventions from the 100CNC process and further developed within the KSAP and assigned to the actors.**

PARTICIPATION PROCESS – CO-DESIGN PORTFOLIO OF ACTION



The conception phase is immediately **followed by the implementation phase**, in which the details of the content are further refined, **concrete deals in the LGD are negotiated with different actors**, the **financing of the implementation of measures is concretised** and **impact monitoring is established**. The implementation of the measures is decentralised and carried out in cooperation with relevant actors and in close cooperation with the activities of the Local Green Deal in a suitable form.



*From the conception phase to the implementation phase of the KSAP
Source: own representation*

Where possible, **funding is obtained at state, federal and EU level**. They are essential for achieving the goals and significantly accelerating the activities on the path to climate neutrality, as financing entirely from **the city's own resources** would far exceed the possibilities of the **City of Mannheim's budget**.



The KSAP will be merged with the concept "Adaptation to Climate Change in Mannheim" (V117/2019) to form an integrated climate protection concept (SECAP) and thus fulfil the obligations of the City of Mannheim in the Covenant of Mayors. At the same time, it is important to continue to harmonise the SECAP with the Mobility Master Plan 2035, which is currently being prepared as a Sustainable Mobility Plan (SUMP). Furthermore, the KSAP is the basis for the negotiation of the Climate City Contract within the framework of the EU mission "100 Climate Neutral and Smart Cities by 2030".

FURTHER PROGRESS WITH COLAB

As CoLAB investigates the reduction of behavioural CO₂ emissions and their impacts/side-effects, the activities directly affect and are linked to all planning areas of the cities. Through activities to build an transition team, engage stakeholders and build a portfolio of actions in the ecosystem, and mobilise citizens to make climate-friendly, sustainable choices, CoLAB fully integrates with the overall programme of participating cities and supports the co-design of the Climate City Contracts. This means that all departments are affected and involved across departments to identify synergies between plans and potentials for civic engagement, including the departments of citizen participation/strategic management. In doing so, CoLAB examines the effectiveness of the enabling measures. Mannheim has already started consolidating/analysing existing strategies/plans; SECAP2030, SUMP, SUDP and Mission Statement have been aligned with the Local Green Deal to ensure that the ambitions achieve the necessary transformation. In addition to bringing plans and measures together, Mannheim is building a network of local partners with the city community and has a strong local partner in the Climate Action Agency.

The 100CNC cities Mannheim, Aachen, Muenster want to rapidly expand their climate city contracts with CoLAB, based on inclusive governance with strong stakeholder involvement and citizen participation. CoLAB cities bring insights from experimental Living Labs (EU dimensions) directly into pilot activities, e.g. on systemic approaches to governance, energy/climate policy, participation, social innovation, and have built up a wealth of knowledge on peer learning, transformation skills and capacities. CoLAB cities have identified consumption-related emissions from energy, mobility, land use, waste as the overarching, most difficult challenge to solve for achieving climate goals. CoLAB aims to test new effective solutions for individual climate neutral action, combining multiple levers of change such as social innovation, governance/policy, democracy/participation, learning/skills at the same time, to enable a real transformation of urban society, with interactions between top-down and bottom-up actions. To bridge the barriers, CoLAB is developing innovative services for CO₂-related behaviour change and linking them to the new governance model of the Transition Team, which breaks down silo thinking and anchors the integrative approach of a sustainable, climate-neutral city, not only in the city administration but also in the city's ecosystem, where so far more individual but less collective community action takes place. The CoLAB logic is the interplay of the integrative structure and the impact on the city society, so that a person-centred approach creates more ownership and self-efficacy for action. The pilot centre is the transformative House of Change model that inspires and mobilises for real, sustainable action in everyday life, supported by the establishment of a 2030 Agency and a digital tool for climate-friendly citizen decision-making to overcome complex barriers to sustainable behaviour change. CoLAB creates new causal chains between innovative governance and new offers to activate urban society to promote collective local climate action. CoLAB comprises a set of coordinated activities that require stakeholder collaboration and generates engaging, effective long-term impacts and co-benefits for a climate neutral and sustainable, healthy and green city. CoLAB embodies system innovation by addressing the complexities of capacity, capability, culture, participation and social innovation, and governance, policy/ regulation for climate neutrality.

LEVERS OF CHANGE IN COLAB

The CoLAB pilot centre is the transformative House of Change model, a local Green Deal platform (Mannheim) that inspires and mobilises for real sustainable action in daily life, including the establishment of a 2030 Agency (Aachen) and a Digital Tool for Climate Friendly Citizens' Decisions (Muenster) to overcome complex barriers to sustainable behaviour change. CoLAB builds new causal chains on how collective local action towards climate neutrality is promoted by linking innovative governance through the establishment of cross-departmental city transition teams and the development of new services or participation models. The pilot activities are precisely coordinated with each other and with the various target groups and open up new entry points for overcoming identified obstacles (see Understanding the problem) that stand in the way of climate-friendly citizen action. Thus, CoLAB, through the House of Change with its different spaces for



community co-creation, knowledge sharing, bottom-up ideas, smart challenges, cultural change and promotion of local successes (the spaces of the House of Change), works to enable more stakeholders and citizens to turn their ideas into action and also to develop an understanding of the impact of their actions by developing new values for their lives along the 1.5 degree lifestyle. The design of a city-wide Transition Team allows CoLAB to develop new relationships between top down and bottom up activities and with each other. If the city administration thinks and acts more in the interplay of urban greening, biodiversity, climate protection, urban planning, mobility, energy and waste management, for example, and opens these transparently to the city society via the municipal co-creation rooms, this invites stakeholders and citizens to act. By fostering collaboration, newly generated community knowledge and a collective expertise and intelligence in the House of Change, citizens can recognise and evaluate the possibilities and effectiveness of their actions, showcase the successes in the Local Success Rooms and thus make them more visible. The House of Change couples the complexities of capacity and skill building, cultural change, participation and social innovation, governance, policy and regulation to establish a shared vision of a liveable (and climate neutral) city and set new social behaviours and norms. CoLAB's person-centred approach to system thinking enables each citizen to bring their own vision and values to the table and align their individual everyday choices in energy consumption, mobility, food, consumption with the shared vision. For CoLAB cities, this process is crucial in order to fill the Climate City Contracts with action from the beginning, with the commitment of stakeholders and citizens, and to jointly develop and implement solutions to improve individual and collective well-being and a just transition, thus linking local grassroots initiatives to larger policies or political goals, such as the Local Green Deal, the mission statements and the SECAPs in the cities. CoLAB relies on the recognition that technological solutions for climate neutrality must go hand in hand with the other levers of change to address economic and social challenges, because without complementary innovation in organisations and institutions and acceptance by consumers/citizens, new products and solutions in the technical field will not be readily adopted. This is where psychological barriers stand in the way, which CoLAB, together with its partners from social science, climate and energy research, as well as in the monitoring and effectiveness measurement in the consortium, wants to counteract through the appropriate target group-specific design and an effectiveness measurement and presentation of the success of the pilot activities. Important entry points and at the same time basic principles in CoLAB are that it also takes social needs into account and, for example, helps to overcome energy and transport poverty; that citizens are involved in the co-production of the Houses of Change from the very beginning so that they take ownership; that capacity building in the citizenry contributes to cultural and behavioural change. CoLAB offers tailor-made solutions for cities along local needs and resources, providing the context for different consumption models to support long-term climate goals. Thus, for example, through the improved impact of the Climate Protection Agency Mannheim and the newly to be established 2030 Agency Aachen as real sites of impact of the Houses of Change in combination with the Digital Platform for Climate Friendly Decision Making, more citizens will be empowered, encouraged and supported to take their own action in energy retrofitting, energy saving, in their mobility choices or even in sustainable food and consumption choices, so that a corresponding self-efficacy and self-understanding for the 1.5 degree lifestyle is developed.

STAKEHOLDER INVOLVEMENT IN COLAB

CoLAB - Committed to Climate Action Building aims to develop a strong coalition of change with urban society and a shared vision for a sustainable and climate neutral city; in one of the most challenging emission areas of cities, people's consumption patterns, which cannot be directly reduced by city government action. So CoLAB needs a strong commitment to local action, and local knowledge of the actors to create a wave of taking ownership of action. With these local partners, CoLAB aims to test new, innovative ways of participation. In this sense, all actors of the city society are part of the CoLAB activities from the very beginning, as a network of all stakeholders, from city administration and politics to actors of the city society and citizens, to create a powerful city-wide transition team for the co-productive implementation of the SECAPs. For this purpose, the different pilot activities will be developed in a co-productive process after analysing all stakeholders involved in sustainable and climate-friendly action and their places of action in the CoLAB cities and recruiting them according to their relevance as contributors to the pilot activities House of Change Mannheim, 2030 Agency Aachen and the Digital Platform for Climate-friendly Citizens' Decisions Muenster. Particularly active stakeholders for climate neutrality and as part of the urban transition team are already nominated for CoLAB and contribute local stakeholder knowledge: the Climate Action Agency Mannheim, the Energy and Climate Advisory Council and the Association Regional Resilience Aachen, Advisory Councils for Climate Protection, Sustainability and City Marketing, Muenster (see stakeholder list, roles). In order to bring in a broad expertise and to increase the effectiveness and



acceptance of the CoLAB measures in the citizenry, important consortium partners have been won for the implementation of the pilot activities, besides the identified climate stakeholders of the cities, who already support the Lead City Mannheim as a research partner and for monitoring/evaluation and also already have contacts to the other cities, the IFEU institute Heidelberg and ClimateView. In addition, Scaling4Good and WeChange, experts in behaviour change and transformation platforms, have been recruited to contribute valuable social science knowledge in the design of effective non-technical measures and to help shape the operating models of the pilot activities

CITIZEN ENGAGEMENT IN COLAB

CoLAB involves citizens as the main addressees in the co-production of the pilot activities for collective local action from the very beginning. Together, the cities of Mannheim, Aachen and Muenster want to develop innovative transformation formats that involve citizens as co-decision-makers and co-designers of a liveable city with the goal of climate neutrality 2030 and as equal committed partners in the Climate City Contract and develop a citizen endorsement for CCC with the citizens. The centre of CoLAB is the joint design of the transformation model House of Change, which inspires and mobilises citizens to sustainable action and commitment according to their needs and values and thus connects the city society in the Local Green Deal approach. The city is only a supporter and enabler in the districts, but the citizens are the actual owners of the House of Change, who design the spaces and places of action according to their needs and make them usable. The citizens are planners, designers, early testers of solutions, and all groups are involved, including vulnerable groups or "distant" groups. This is achieved through simple language, multilingualism and social justice in the House of Change, which is accessible to all and has offerings for all target groups. In the 2030 Agency Aachen, for example, the aim is to facilitate citizens' access to advisory and funding services for sustainable and climate-neutral action, offer networking and create synergies. Muenster wants to use a digital tool to enable climate-friendly decisions for citizens' consumption behaviour in everyday life and to communicate the effectiveness. The focus in CoLAB is to generate direct local effectiveness that enables, values and makes visible the contribution of citizens. The chain to bridge the Value Action Gap is to be closed together with the experience and knowledge of citizens, from "I should, to I Would, I Can to I do" local action. The CoLAB cities have all been very active in citizen participation for years, winning over citizens from schoolchildren to senior citizens, in neighbourhood projects and voluntary climate councils, right up to participatory budgeting. These capacities and capabilities for citizen engagement flow into CoLAB. The task of CoLAB is to inspire even more citizens to take part in local actions and to expand the many offers and make them more effective, this can only succeed by and for the citizens.

To develop a shared vision Mannheim has designed a communication campaign for Local Green Deals: IDEAL for Mannheim. It means at the same time „I – deal for Mannheim“, I take my own contribution for a Ideal Mannheim.



3 Part A – Current State of Climate Action

3.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

GHG BASELINE INVENTORY MANNHEIM 2020

→ Source: City Council Information V679_2022_Attachment CO2 Balance Ifeu Institute

NOTE: The City of Mannheim is working with science based targets and does regularly report the progress over the CDP City Reporting and forwards the reports to MyCovenant (on CO2) and Compact of Mayors (on Adaptation). So our GHG Baseline Inventory is already proofed by the CDP/Covenant of Mayors and is worked out according the Framework Reporting Guidelines, set by CDP/Covenant of Mayors! The City of Mannheim reports so far also against the tool kit of the EU Mission, considering all rules to report on all Scopes. Mannheim is A-rated for the report of 2022 in 2023. In the EU Mission Webinars for the CCC we were told, that there will be NO additional reporting if we already report to the CDP/CoM. We would like to mention this. In our opinion, a GHG inventory should be a condition/requirement for the CCC, but not as a content in a CCC.

The current balancing in Mannheim for the year 2020 is also based on the **nationwide balancing method BSKO National Municipal Accounting Standard**. The "Climate Protection Planner" software is used for this.

See: https://www.ifeu.de/energie/pdf/Bilanzierungs-Systematik_Kommunal_Kurzfassung.pdf

See: www.klimaschutz-planer.de

See: https://www.umweltbundesamt.de/sites/default/files/medien/479/publikationen/cc_19-2020_endbericht_sv-gutachten_bisko.pdf



The mileage of the **different modes of transport** is recorded **within the city limits** and multiplied by the Germany-wide **transport emission factor (TREMOD)**. "TREMOD" (Transport Emission Model) maps motorised traffic in Germany. www.ifeu.de/methoden-tools/modelle/tremod/

The aim of the BSKO standard is to establish comparability between municipal balances in Germany, which is why the **municipal boundary is defined as the balance limit**. The final energy "consumed" in this area is **balanced and extrapolated with a CO2 emission factor to the CO2 emissions of the municipalities**. CO2 is used in the following as a proxy for all greenhouse gases including the process chain in **the sense of CO2 equivalents**. The BSKO balance is a record of the current situation.

KEY DATA OF THE BSKO CALCULATION METHOD ARE:

- The calculation in the energy sector is based on the "**end energy-based territorial principle**". This means that the annual energy consumption within the city limits is linked to emission factors.
- For the calculation of **CO2 emissions in the electricity sector**, the current national electricity mix is used.
- The **local heat extraction** of the combined heat and power (CHP) plants is evaluated exergetically, i.e. on the basis of the working capacity of electricity and heat.
- The **CO2 emission factors are calculated including upstream chain** and the **equivalent emissions of nitrous oxide and methane as CO2 equivalent**.
- For the **baseline balance**, the consumption not corrected for weather conditions is used first, as is also done at the level of the national greenhouse gas inventory. This enables a comparison with the development in Germany.
- In the 2020 report, **the weather-corrected values are also used and presented**. This makes it possible to interpret the time series of CO2 emissions in Mannheim without the influence of the weather.

In the area of **transport**, considerable adjustments were necessary in the 2018 balance due to methodological adjustments by the State Statistical Office and the **change in the TREMOD emission data**. Therefore, all balance sheet years from 2005 to 2018 had to be completely restated. These methodological changes were continued for the 2019 and 2020 balances.

For the first time, the city and its municipal enterprises were also included in the balance sheet as the "**Mannheim Group**". These were previously located in the commercial sector and are therefore presented separately from it.

For **information purposes**, an **estimation of non-energy GHG emissions** was also made for the first time. This serves as an **initial overview of the relationships between the energy sector and the waste/wastewater, agriculture and industrial processes sectors**. This assessment does not replace a detailed assessment in these sectors. If measures are to be based on this, a separate commission is recommended.

In addition to this **BSKO standard**, there are also extended accounting boundaries (dashed), e.g. those of the citizens' account and the company account, which are also - **but only partially** - included in BSKO. For example, **the areas of consumption and food** play a major role in the citizen calculator, which are mostly not produced in the municipality, but are imported from outside. In the company calculator, activities outside the company boundaries (so-called SCOPE 3 emissions) are also taken into account.

For the development of the Climate Action Plan, the most recent **CO2 balance sheet 2020** served as a **starting point** as well as the definition of the term "**climate neutrality**" in order to create a common understanding for the target direction of the measures to be developed in the respective fields of action.



NOTE:

The **final energy consumption** for the **waste sector** (we understand this to mean electricity and heat consumption for waste and wastewater plants) and **agriculture** (electricity and heat consumption of agricultural businesses) is **located in the trade, commerce, services GHD sector** in our evaluation and (so far) not shown separately. We have presented the **non-energy GHG emissions of these two sectors accordingly in the current balance** (and are accordingly also without energy consumption).

The **same applies to IPPUs**. **Process and space heating for the industrial sector** are found in the **industry sector**. **Non-energy process-related GHG emissions are shown separately**, but are not linked to energy consumption.

So, there is **no double counting for the energy related emissions** in buildings and transport. Therefore, we have set the **energy consumption of the three sectors** to zero in **table A-1.1** and indicate that the first two are included in trade, commerce and services.

A-1.1: Final energy use by source sectors				
Base year	2020			
Unit	MWh/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings total	1,471,000	6,201,000		7,672,000
Electricity		2,181,000		2,181,000
Natural gas		1,988,000		1,988,000
District heating		2,032,000		2,032,000
Heating oil	352,000			352,000
Renewables	1,119,000			1,119,000
Transport total	1,843,000			1,843,000
Petrol	567,032			567,032
Biopetrol	25,888			25,888
Diesel	1,072,572			1,072,572
Biodiesel	85,976			
Electricity	76,391			
Others	15,141			
Waste			GHG emissions see A-1.4	
(Fuel type/energy used)				
Industrial Process and Product Use (IPPU)			GHG emissions see A-1.4	
(Fuel type/energy used)				
Agricultural, Forestry and Land Use (AFOLU)			GHG emissions see A-1.4	
(Fuel type/energy used)				

NOTE: table A-1.2 See BISCO method: for the cities it is a disproportionately high effort to make this distinction for all factors or to do additional research. We do not see this as expedient. There are equivalents for this, so that all greenhouse gases are taken into account in a single factor. We would like to point this out.



A-1.2: Emission factors applied							
(please specify for primary energy type and GHG emission factor according to methodology used)							
For calculation in t or MWh of primary energy							
(Please indicate method used, e.g. GPC, IPCC, CRF, national etc.)							
Primary energy/energy source	t CO _{2eq} / MWh	Carbon Dioxide (CO ₂)	Methane (CH ₄)	Nitrous Oxide (N ₂ O)	F-gases (hydrofluorocarbons and perfluorocarbons)	Sulphur hexafluoride (SF ₆)	Nitrogen trifluoride (NF ₃)
District heating	0.201442						
PV electricity	0.04						
Natural gas	0.247						
Heating oil	0.318						
Coal	0.438						
Electricity	0.429						

We can provide here the main achievements and activities from the past, already provided by EOI (Expression of interest):

Current policies and activities – energy

- Nearly Zero Energy Buildings (NZEBS) (new buildings)
- Positive Energy Buildings
- Nearly Zero Energy Buildings (NZEBS) (renovation of existing buildings)
- Energy renovation/retrofit of existing buildings (below NZEB level)
- Building electrification
- Energy efficient electrical appliances
- Integrating RES systems into the building
- Building Automation and Control Systems (BACS) /Building Energy Management Systems (BEMS)
- Nearly Zero / Positive Energy Districts
- Digitalisation and smart city solutions
- Local heat/cold storage
- Street lighting
- Citizen and renewable energy communities
- On-site and nearby renewable energy generation (electricity, heat/cold)
- Local (off-site) renewable energy generation (electricity, heat/cold)
- District heating/cooling
- Demand response
- Virtual power plants
- Urban heat island effect mitigation
- Mixed-use development and sprawl containment
- Urban regeneration
- Behavioural changes
- Regulatory (e.g. building codes / standards, minimum energy performance standards, public procurement rules, energy supplier obligations)
- Financial incentives and fiscal instruments (e.g. grants, loans, soft loans, taxes, subsidies)
- Public Private Partnerships
- Information/awareness raising (e.g. energy audits, certification and labelling of energy efficiency performance)
- Education/capacity building (e.g. qualification programmes in the sector, trainings)
- Infrastructure measures (e.g. upgrade of power plants, increase of RES capacity, smart grids)
- Planning solutions (e.g. integrated land use and urban planning, integrated long-term strategies for sub-sectors, such as institutional buildings)
- Voluntary measures (e.g. industry voluntary agreement programmes)
- Technical measures (e.g. smart metering, provision of energy efficient products and services)



Current policies and activities – transport

- Cleaner/efficient vehicles
- Clean buses
- Electric vehicles (incl. infrastructure)
- Investment in metros and railways
- Accessibility of public transport
- Modal shift to walking & cycling, incl. infrastructure
- Car sharing
- Ride-sharing/car-pooling initiatives
- Park and ride facilities
- Multi-modal hubs/integration between transport modes
- Micromobility
- Mobility as a Service (MaaS)
- Improvement of logistics and urban freight transport
- Road network optimisation aiming at emission reduction
- Mixed use development and sprawl containment
- Digitalisation and smart city solutions
- Eco-driving (driving behaviour and style to reduce fuel consumption and emissions)
- Technical measures (e.g. smart cards for public transport)
- Infrastructure measures (e.g. cycling lanes, recharging stations for electric cars)
- Regulation based measures (e.g. vehicle access regulations like Low or Zero Emission Zones)
- Planning solutions (e.g. SUMP or integrated land use and transport planning)
- Financial incentives and fiscal instruments (e.g. subsidies, taxes, congestion pricing schemes)
- Public Private Partnerships
- Voluntary measures with stakeholders
- Information/awareness raising (e.g. awareness campaigns)

Current policies and activities – waste/waste water

- Use of recycled and recyclable, renewable and sustainable materials
- Management of biodegradable municipal waste
- Municipal waste prevention
- Food waste prevention
- Redirecting food surplus and food scraps
- Litter prevention in public spaces and/or marine litter prevention
- Industrial symbiosis between local businesses
- Sustainable buildings
- Circular economy business models, aimed at encouraging the reuse, repair and/or recycling of products
- Efficient thermal treatment/ landfill management
- Efficient waste /landfill gas to energy / fuel
- Wastewater reuse
- Stormwater management
- Public Private Partnerships
- Information/awareness raising (e.g. litter prevention campaigns, recycling campaigns)
- Infrastructure measures (e.g. reprocessors, recycling centres, waste-to-energy facilities)
- Voluntary measures with stakeholders
- Regulatory (e.g. bans or restrictions on single use or non-recyclable materials, regulations for durability, reparability and recycling in public procurement)
- Financial incentives and fiscal instruments (e.g. grants, loans, soft loans, taxes, subsidies, fees / incentives for volume based waste collection)



5 IMPLEMENTED KEY CLIMATE CHANGE MITIGATION MEASURES



5 Achievements and activities in the main action fields – Text Measure 1 - 5

Measure 1: cross-sectoral – buildings and transport

Energy Efficiency and Electromobility Quarter Franklin is a cross-sectoral innovative mixed district development (energy, transport, smart city) with a high replication factor on a conversion site: FRANKLIN is being developed by the municipal development company MWSP into an urban model quarter for around 10,000 residents. With the Franklin certificate, building culture, inclusion and ambitious climate goals for existing and new buildings are ensured in a selection process together with almost 20 investors. Buildings that are future-oriented in terms of energy, and the use of renewable energy, and of emission-free mobility, are model of for living and mobility for other districts.

Measure 2: transport

Enhancing shift from private to emission-free public transport - Expansion of the light rail network through the new construction of **Stadtbahn North** with reorganisation of pedestrian and cycle traffic: "Stadtbahn Nord" connects since 2016 the neighbourhoods along the new line to the city centre and the main railway station. It is also the site of important educational and recreational facilities and has connected around 32,000 citizens to the light rail network with a passenger increase of 33% and a CO₂ reduction of about 1500t annually. Many kilometres of footpaths and cycle paths were renewed in the corresponding areas of the city, thus also improving active mobility of the citizens.

Measure 3: waste/waste water

With a variety of measures, the **sewage treatment plant EBS** is gradually implementing its ambitious goal of covering 100 per cent of its **electricity and heating needs from self-generated energy**: The wastewater treatment plant with high electricity and energy requirements is to be largely self-sufficient in the future. The old high-temperature drum dryers will be replaced by low-temperature belt dryers and operated with waste heat from the combined heat and power plants. To increase the gas yield, liquid waste is also treated in the digester. The heat generated will be fed into the newly built heat storage facility and released again as required. This will save around 40,000 t CO₂/a.

Measure 4: energy generation

Green district heating: up to 30% of the annual heating requirements in Mannheim and the region already come from climate-friendly energies over the district heating grid of 592 km: In Mannheim alone, more than 60 percent of households, or 120,000 households, use the environmentally friendly district heating. The thermal waste incineration plant is operated using highly efficient cogeneration.



We use the resultant heat to supply steam to neighboring industries and feed it into the district heating grid in Mannheim and the surrounding region.

Measure 5: Buildings

Energy efficient Refurbishment of the Housing Stock: The GBG housing company consistently pursues the goal of sustainably improving the energy efficiency and CO2 emissions of its building stock: Within the framework of modernisation measures, the existing buildings concerned are comprehensively upgraded in terms of energy efficiency, the heating systems are renewed/optimised. In the period 2010- 2019, GBG modernized the energy systems of around 4,250 apartments and equipped them with a modern heating system. For these apartments, GBG was able to reduce the demand for heating by 43% and CO2 emissions by 69%. The wave of redevelopment continues in the neighbourhoods.

NOTE: Table A-1.3. It is not clear what additional information is required in table A-1.3. All activities in the action fields from the “old” Climate Action Plan “Klimaschutzkonzeption 2020”? If yes, we can attach the document, just for informational use, in the CCC to climate neutrality we don’t use this activities till 2020, because they are already included for the design of the new KSAP Climate Action Plan via a learning and evaluation process.

A-1.3: Activity by source sectors			
Base year 2020			
	Scope 1	Scope 2	Scope 3
Buildings			
(Activity)			
Transport			
(Activity)			
Waste			
(Activity)			
Industrial Process and Product Use (IPPU)			
(Activity)			
Agricultural, Forestry and Land Use (AFOLU)			
(Activity)			

For 84 % of total GHG emissions in Germany currently result from energy consumption. Industrial processes, agriculture and waste (and wastewater) are the main contributors to the remaining 16 % of GHG emissions.

In municipal GHG accounting, the focus is currently on accounting for energy-related GHG emissions. This is partly due to the low availability of data at the municipal level. Data relevant for balancing (animal numbers, industrial process data) are not available on an annual or municipality-specific basis. Also, not all methodological questions have been conclusively clarified (e.g. allocation of GHG emissions from waste water). Initial proposals for a simplified presentation were presented in the Practical Guide to Communal Climate Protection in order to show the relationship between energetic and non-energetic emissions in a descriptive balance sheet information: Non-energy GHG emissions in the Mannheim urban area.



PROCEDURE AND RESULTS IN THE DIFFERENT SECTORS

Industry

There are two ways to **determine non-energy emissions in industry**. Using average GHG emission rates per employee, an order of magnitude can be given for the GHG emissions based on the local industries and employment figures. **In Mannheim, the list of companies participating in the European Emissions Trading Scheme (ETS) and collecting their GHG emissions accordingly has proven to be a more useful source. Non-energy-related emissions** from industrial combustion can be found for the **chemical, metal and mineral processing industries** as well as for other industrial plants in the Emissions Trading Act, Annex I, No. VI-XVIII. These data were compared with the existing energy consumption data of the manufacturing industry from the State Statistical Office and the **non-energy GHG emissions were determined accordingly**.

Agriculture

On the basis of animal numbers and agricultural land, GHG emissions can be calculated using indicators based on average fertiliser use, land use, and the number of animals and livestock farming. The data required for the balance sheet could be retrieved from the pages of the State Statistical Office for the City of Mannheim.

Waste and waste water

In the area of waste, larger landfills with a high organic content (especially household waste) play an important role in non-energy GHG emissions. The Friesenheim Island landfill was not operated as a household waste landfill. When backfilling began, almost exclusively mineral wastes such as building rubble, road debris, excavated soil and foundry sands were deposited. Due to the low organic content of the deposited waste, no landfill degassing facilities are required. In the waste sector, waste-related GHG emissions are also included in the balance sheet on the basis of inhabitant-specific parameters for composting and fermentation. For GHG emissions from wastewater, a population-specific value was also assumed.

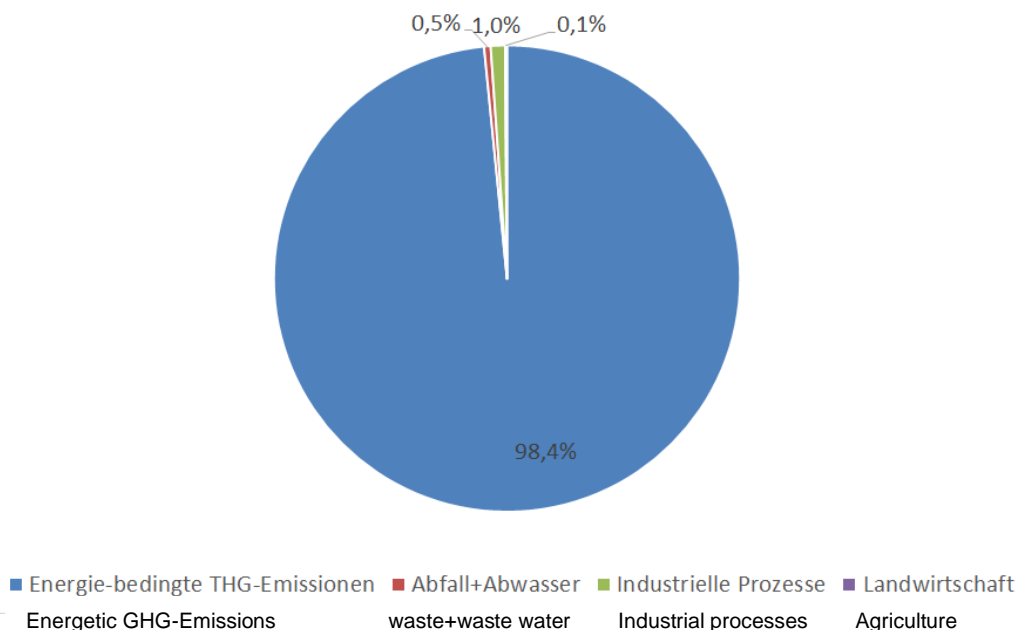
Results

From the calculations presented, the **non-energy-related GHG emissions for the city of Mannheim amount to just under 41,000 tonnes of GHG emissions**. About half of these are due to GHG emissions from the basic chemical industry in Mannheim (26,000 tonnes). Agriculture (3,000 tonnes) and waste+wastewater (12,000 tonnes) play a minor role.

Together with the energy-related GHG emissions, this results in GHG emissions of 2.548 million tonnes for the city of Mannheim in 2020. The energy-related GHG emissions account for a large part of this, at 98.4 %. Non-energy GHG emissions from industry account for 1 %, waste, waste water 0.5 % and agriculture 1 %.



Energetic and non-energetic GHG-Emissions in the city's boundaries – Mannheim 2020



A-1.4: GHG emissions by source sectors				
Base year	2020			
Unit	tCO2equivalent/year			
	Scope 1	Scope 2	Scope 3	Total
Buildings	142,850	1,836,114		1,978,964
Transport	582,344			582,344
Waste			11,974	11,974
Industrial Process and Product Use (IPPU)			25,728	25,728
Agricultural, Forestry and Land Use (AFOLU)			3,232	3,232
Total	725,194	1,836,114	40,934	2,602,242

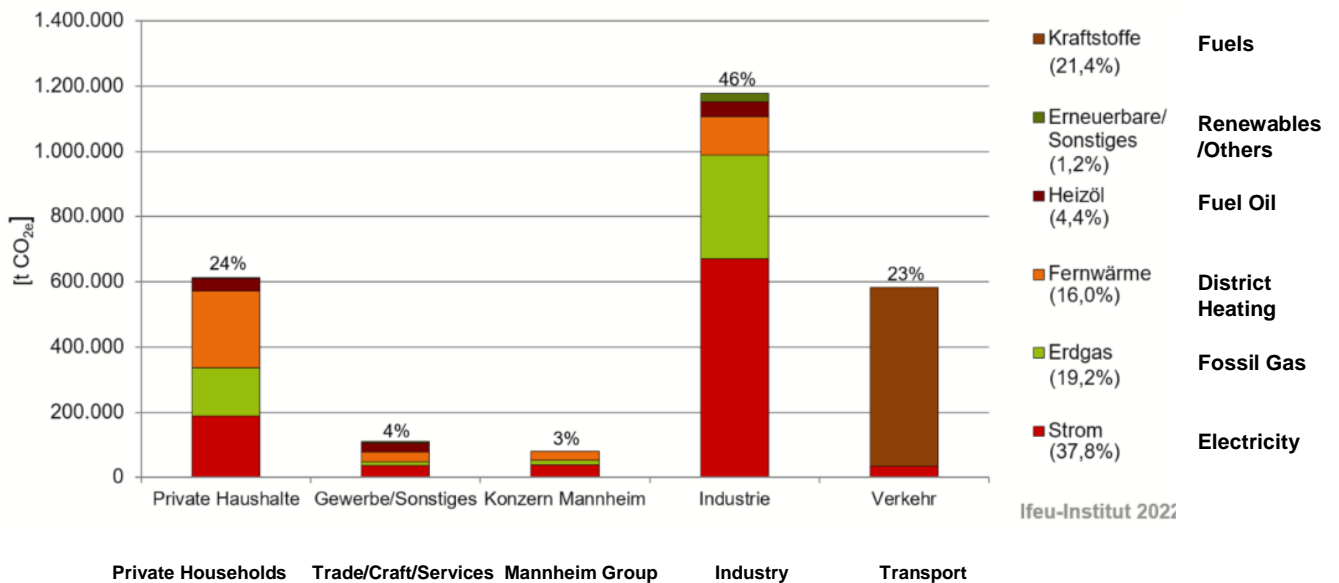


A-1.5: Graphics and charts

(Please include visualisations of GHG emissions baseline) **CO2 Inventory Mannheim**

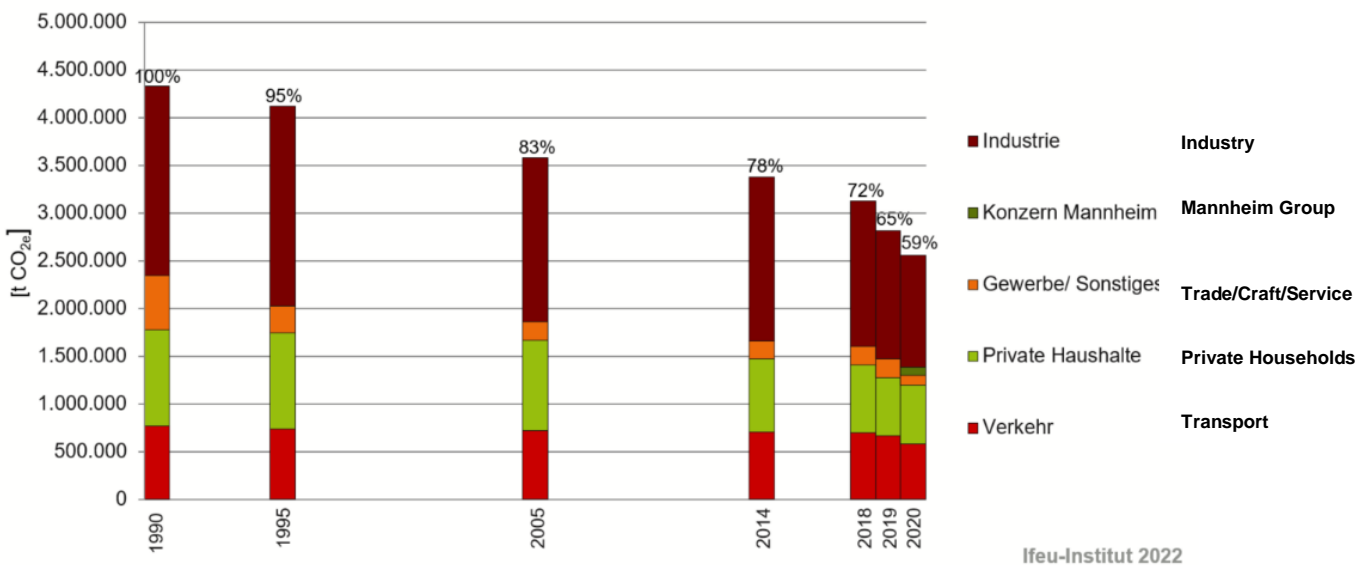
1. CO2 emissions 2020

CO₂-Emissionen in Mannheim 2020



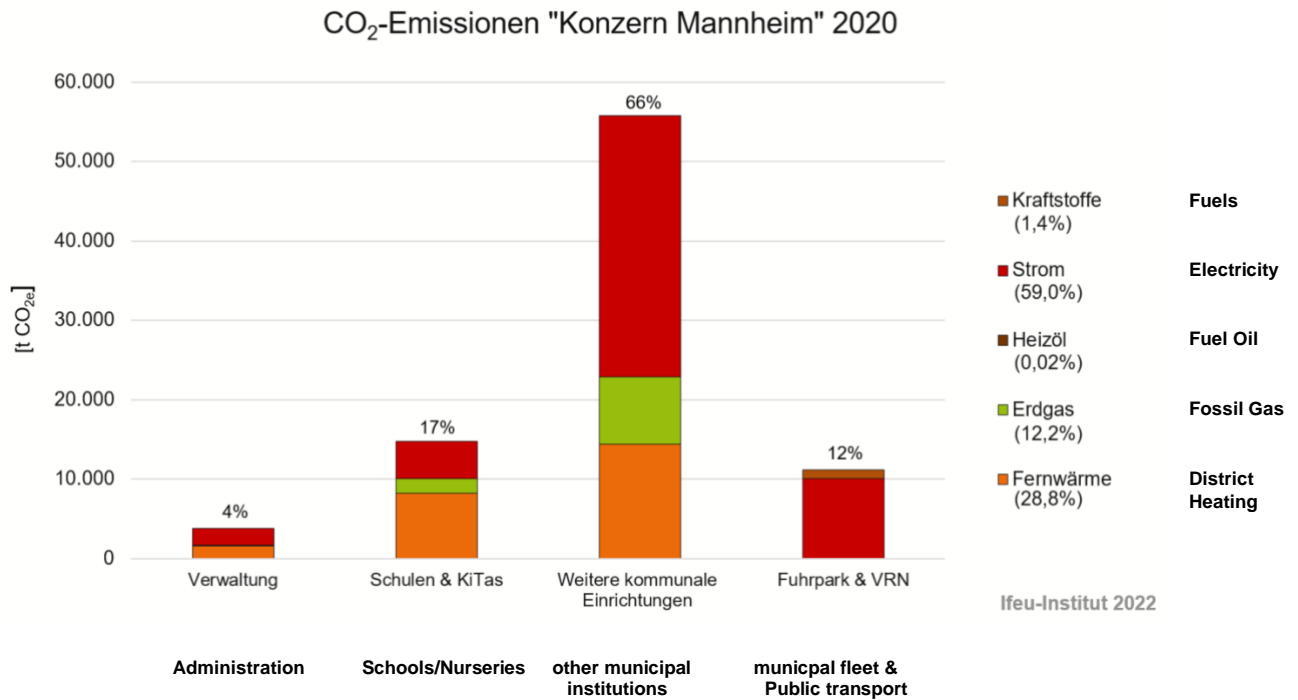
2. CO2 emissions 1990-2020

CO₂-Emissionen in Mannheim 1990 bis 2020

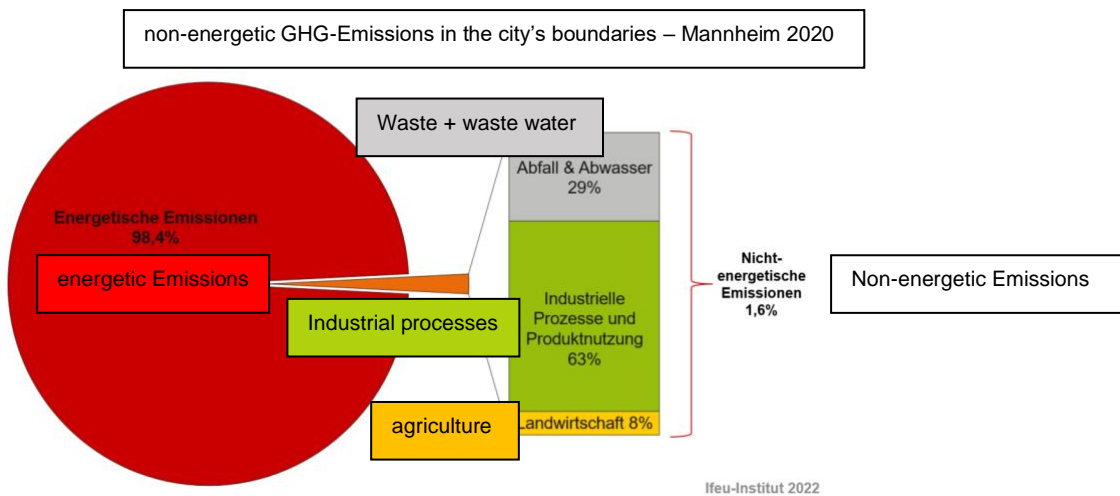




3. Municipal emissions 2020



4. Non-energetic vs. energetic emissions





A-1.6: Description and assessment of GHG baseline inventory

DESCRIPTION AND ASSESSMENT

The City of Mannheim has set itself the goal of being climate neutral by 2030 and, with the Climate Action Plan 2030, has the central strategy document on the way to climate neutrality. In order to make the achievement of goals transparent, it is essential to regularly draw up an energy and greenhouse gas balance as an important component of a climate protection strategy.

For this reason, the city administration has commissioned the Ifeu Institute Heidelberg to prepare the CO₂ balance for 2020. In contrast to the previous balances (2-year cycle), this balance also shows the "City of Mannheim Group" as an independent sector for the first time, as well as non-energy emissions in a secondary balance from the three sectors Industrial Processes and Product Use, Waste & Wastewater and Agriculture.

One of the key findings of the Ifeu Institute's final report is that CO₂ emissions fell by a total of 40.9% in the period from 1990 to 2020. This means that the climate protection goals from the Climate Protection Concept 2020 have basically been achieved.

However, this is not the sole success of the city's climate protection efforts and also includes special effects. In order to correctly classify the considerable reductions in 2019 and 2020, it should be noted that these are also based on Corona-related savings in the transport sector and a more climate-friendly electricity supply throughout Germany.

The savings target of 40% set out in the Climate Protection Concept 2020 was thus achieved, but the main reductions are based little on permanent efficiency measures.

It is also worth mentioning that the carbon footprint is part of the international reporting. This year, **Mannheim was one of 123 cities worldwide to receive the highest rating from the non-profit organisation CDP and is part of the CDP "A List" for the first time (12% of cities assessed in 2022 received an A rating).**

RESULTS IN DETAIL

1. For the **year 2020, CO₂ emissions amount to 2,561 million tonnes**. The shares of the sectors correspond roughly to those of final energy consumption. Here, too, **the industrial sector** has a high share of **46%**, followed by **private households (24%)**, **transport (22%)** and finally the **commercial/other sectors (4%)** and the **Mannheim Group with 3%**.

In terms of energy sources, electricity dominates with 38%, followed by fuels (21%), natural gas (19%), district heating (16%), heating oil (4%) and renewable energies (1%).

2. **Overall, CO₂ emissions fell from 4.332 million to 2.561 million tonnes of CO₂ (40.9%) between 1990 and 2020.**

In the private household sector from 1.011 million to 0.613 million tonnes of CO₂ (39%) and in the transport sector from 0.767 million to 0.582 million tonnes of CO₂ (24%). In the combined sector of Industry, Commercial & Other and the Mannheim Group, they fell by a total of 47% from 2.554 million to 1.366 million tonnes.

The significant savings in 2020 compared to 2018 are mainly due to two factors which is why the results must be put into perspective:

a. **corona-related savings in the transport sector:** 40% of the CO₂ savings between 2019 and 2020 are attributable to the transport sector. In the course of the effects of the Corona pandemic, a massive decrease in transport performance could be identified in the transport sector compared to the pre-pandemic year 2019 (by 15% in total).

In particular, the reduced mileage of private motorised transport is reflected in a 19% decrease in final energy consumption compared to 2019. In all likelihood, this decrease will still be partially evident to a small extent in 2021 and will and in 2022 will be at or even above the level of 2019.

b. **climate-friendly electricity supply:** just under 60% of the CO₂ savings between 2019 and 2020 are attributable to the reduction of CO₂ emissions in electricity consumption. In the BSKO methodology uses the current national electricity mix, which will change between improved significantly between 2018 and 2020 due to a more climate-friendly electricity supply. improved. However, it is foreseeable that the federal electricity mix will rise again at least in 2021 to the level of 2019.



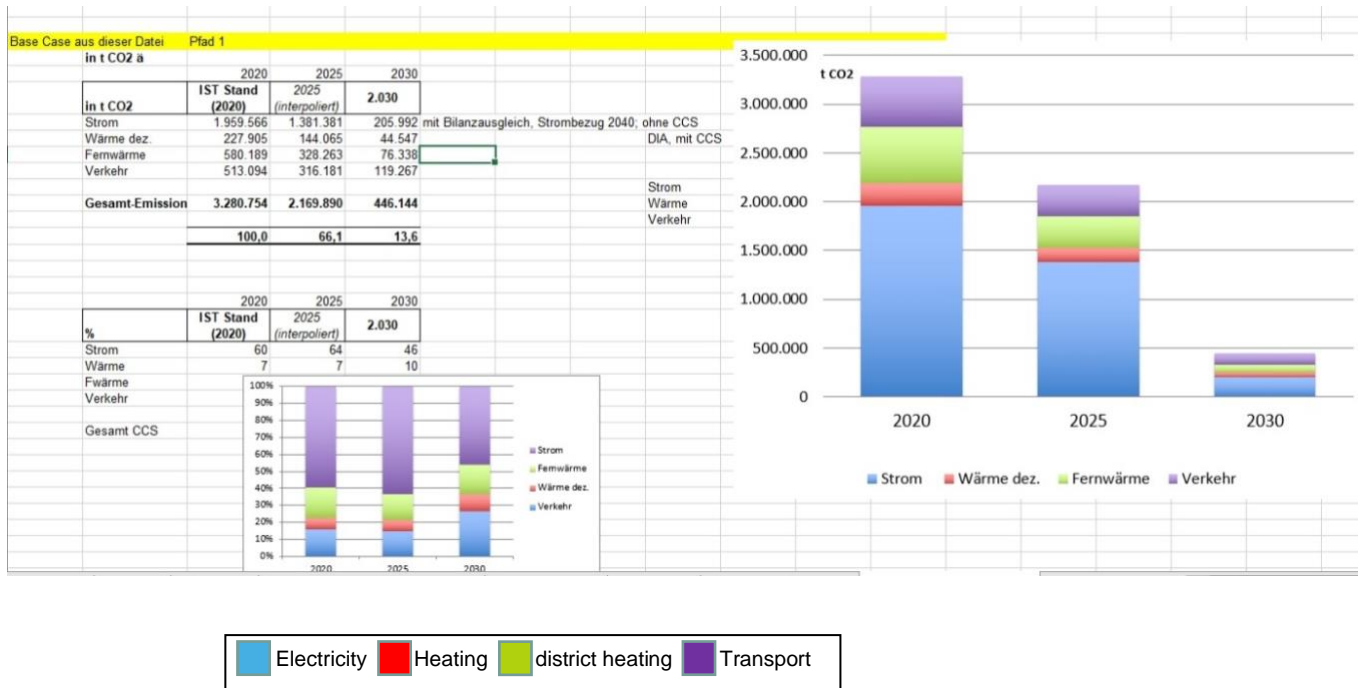
to the 2019 level, at least in 2021. For electricity consumption in 2021 itself, on the other hand, it is not yet whether the reduction in 2020 described above is due to permanent efficiency measures or to corona or by Corona-related savings.

3. Mannheim Group : A total of approx. 84,000 tonnes of CO2 were emitted, with the shares of the consumption groups roughly corresponding to those of **final energy consumption**.. Here, too, the other municipal facilities facilities accounted for 66%, schools and day-care centres for 17%, the vehicle fleet and VRN for 12% and the administrative buildings for administrative buildings 4%. Due to the high emission factor of electricity, this energy source is responsible for the majority of the emissions (59%). District heating has a share of 29%, natural gas 12% and the energy sources fuels (1.4%) and heating oil (0.02%) also play a subordinate role here.

4. The results show that **non-energy-related greenhouse gas emissions** for the city of Mannheim are of approx. 41,000 tonnes and that energy-related greenhouse gas emissions dominate with 98.4%. Half of the non-energy emissions are attributable to the basic chemical industry (26,000 tonnes of CO2; 63%). Agriculture (3,000 tons CO2; 8%) and waste & wastewater (12,000 tonnes CO2; 29%) play a subordinate role.

A 1.7.

A 1.7. in the guide actually should be reported here **gap emissions between 2020 and target 2030:** SECAP pathway 2 is the 93% reduction target - currently 2.561 million tonnes subtract from this – gap is: **0.227 million tonnes gap to the target of 2.334 million t CO2.**





3.2 Module A-2 Current Policies and Strategies Assessment

NOTE: It is a great (**disproportionately high**) effort to **list all the regulations here**. The specialist units of the City of Mannheim are well informed about the policies and strategies at regional, national and EU level. This is also ensured by our memberships in the EUROPEAN city networks EUROCITIES and ICLEI, for example, or GCoM nationally, also via the Association of Cities in Baden-Württemberg and Germany, in which Mannheim is a leading player. Mannheim is also very active regionally in the Rhine-Neckar metropolitan region and is represented there in the association with leading positions.

In Table A 2.1 we have therefore listed the **local** and the currently **main regional, national and EU** policies/strategies for the Climate Action Plan. In the Climate Action Plan 2030 are listed all strategies and policies as well.

Overview regional climate policies: <https://um.baden-wuerttemberg.de/de/klima/klimaschutz-in-bw>

Overview regional climate policies: <https://www.bmwk.de/Redaktion/DE/Artikel/Industrie/klimaschutz-deutsche-klimaschutzpolitik.html>

Additionally Mannheim's Local Green Deal Office developed a **potential analysis**: In each of the 8 fields of action, we identified over 150 local Green Deal potentials in **strategies, plans and projects**, starting from the objectives based on the **EU Green Deal targets** in the field of action and the framework from **the EU level to the implementation at the national level via the state level to the local level**. In these templates the **Local Green Deal Managers** regularly improve and complete the analysis about strategies and policies at all levels, from EU to national, regional and local level. That is how it works in Mannheim – normal background work, not to be mentioned in a CCC in our opinion, but it is important to do that work.





A-2.1: List of relevant policies, strategies & regulations					
Type	Level	Name & Title	Description	Relevance	Need for action
(regulation/ policy/ strategy/ action plan)	(local, regional, national, EU)	(Name of policy/ strategy/ plans)	(Description of policy/ strategy/ plans)	(Describe relevance/ impact on climate neutrality ambition)	(list any suggested action in relation – to be further picked in Module C-1)
Strategy/Action Plan	local	Klimaschutz-Aktionsplan 2030 - SECAP 2030 SECAP Sustainable Energy and Climate Action Plan - Climate Action Plan 2030 (DE: Klimaschutz-Aktionsplan 2030)	See table A 2.2	See table A 2.2	
Strategy/Action Plan	local	Konzept zur Anpassung an die Folgen des Klimawandels in Mannheim	See table A 2.2	See table A 2.2	
Strategy/Action Plan	Local (regional)	Masterplan Mobilität 2035 - SUMP Sustainable Urban Mobility Plan (SUMP) - Masterplan Mobility 2035 (DE: Masterplan Mobilität 2035)	See table A 2.2	See table A 2.2	
Strategy	Local (regional)	Model Spatial Order (SUDP) Sustainable Urban Development Strategy (SuDs) - Model of spatial order (DE: Modell Räumlicher Ordnung)	See table A 2.2	See table A 2.2	
Strategy	Local (regional, national)	Local Green Deal	See table A 2.2	See table A 2.2	
Strategy	Local	Smart City Strategy	See table A 2.2	See table A 2.2	
Policy	Regional	Klimaschutz- und Klimawandelanpassungs-gesetz Baden-Württemberg Climate Protection and Climate Change Adaptation Act Baden-Württemberg		The central element of the Climate Protection Act is the climate protection targets for the years 2030 and 2040. In addition, the Climate Protection Act also contains concrete measures. These include, in particular, municipal heating planning and the obligation to install photovoltaic systems on newly constructed buildings and in the case of fundamental roof renovations. The further development underlines that with advancing climate change, the ambitious efforts in climate protection must be supplemented more strongly than before by measures to adapt to the unavoidable consequences of climate change ("climate change adaptation").	
Policy	regional	Verwaltungsvorschrift VwV-LGVFG	It is recommended that the Climate Mobility Plan be	climate mobility plans Municipalities, cities and districts can draw up climate mobility plans. With the help	



		<p>über Klimamobilitätspläne</p> <p>Administrative Regulation VwV-LGVFG on climate mobility plans</p>	<p>prepared in accordance with § 4 (1) sentences 2 and 3 of the State Municipal Transport Financing Act (LGVFG).</p>	<p>of these plans, municipalities should permanently reduce their greenhouse gas emissions in the mobility sector. A holistic view of the transport sector against the backdrop of climate protection goals is essential in order to advance the transport turnaround. The state of Baden-Württemberg has set itself the goal of reducing emissions in the transport sector by at least 55 percent (compared to 1990) by 2030.</p> <p>Commitment to climate mobility plans offers municipalities numerous advantages. The preparation of climate mobility plans is currently funded with up to 50 percent of the eligible costs (maximum 200,000 €). For the implementation of projects that are anchored in climate mobility plans in accordance with § 4 paragraph 1 sentences 2 and 3 of the LGVFG, an increased funding rate of up to 75 percent of the eligible costs is possible.</p>	
Policy	National	<p>Bundes-Klimaschutzgesetz (KSG)</p> <p>Federal Climate Protection Act (KSG)</p>		<p>GHG target for 2030 raised to minus 65 percent compared to 1990, Mandatory greenhouse gas neutrality by 2045, Tougher targets in the sectors, binding target for natural sinks</p>	
Strategy	National	<p>Klimaschutz-Sofortprogramm 2022</p> <p>Emergency Climate Protection Programme 2022</p>		<p>around 8 billion additional euros for climate protection measures in all sectors, with a particular focus on the industry, energy and buildings sectors, The measures in these sectors have a total volume of just under 6.5 billion euros. Additional funds are flowing into the Federal Promotion of Energy-Efficient Buildings (BEG), the Steel Industry Investment Programme and the Decarbonisation of Industry Programme, among others.</p>	
Policy		<p>nationales Emissionshandelssystem (nEHS)</p> <p>national Emissions Trading System (nEHS)</p>		<p>Reporting obligation for fuel emissions from waste becomes effective under SESTA on 01.01.2023</p>	
Policy/Strategy		<p>Klimaschutzprogramm 2030</p> <p>Climate Protection Programme 2030</p>		<p>A comprehensive package of measures to achieve the 2030 climate targets, the core components of which are the national emissions trading scheme introduced at the beginning of the year in the areas of heating and transport, a gradual phase-out of coal-fired power generation, relief for citizens and the economy as well as extensive support measures in the energy, industry, buildings, transport, agriculture and waste management sectors.</p> <p>With the Future Package as part of the Economic Stimulus Package 2020, the German government has launched further climate protection</p>	



				measures in the double-digit billion range, such as funding for the market ramp-up of hydrogen technologies for use in industry, among other things.	
Strategies	regional	<p>Regionales Energiekonzept Rhein-Neckar (2012) Einheitlicher Regionalplan Rhein-Neckar (2019) Wasserstoffresolution IHK' Rhein-Neckar und Pfalz (2019) Mobilitätspakt Rhein-Neckar (2021)</p> <p>Rhine-Neckar Regional Energy Concept (2012) Standardised Rhine-Neckar Regional Plan (2019) Hydrogen Resolution IHK' Rhine-Neckar and Palatinate (2019) Rhine-Neckar Mobility Pact (2021)</p>			
Policy	EU	EU-Klimaschutzpaket: Fit For 55	https://www.consilium.europa.eu/de/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/	<p>"Fit for 55" refers to the EU's target to reduce net greenhouse gas emissions by at least 55% by 2030.</p> <p>The EU's energy ministers, parliament and commission have taken important decisions for climate protection: Around three quarters of all European CO2 emissions will in future be included in emissions trading - from 2027 also those from heat and transport. The expansion of solar and wind energy is to be massively accelerated throughout the EU.</p>	
Strategy	EU	EU Green Deal		https://ec.europa.eu/commission/presscorner/detail/de/ip_21_3541	
Policy	EU	REPowerEU		<p>Adaptation to climate change in Mannheim" concept In addition to climate protection goals, the City of Mannheim also pursues adaptation to the unavoidable consequences of climate change. The Climate Protection Department has set out on the path to becoming a resilient city through the concept "Adapting to Climate Change in Mannheim" (V117/2019), the mission statement "Mannheim 2030" and the emergency plan. The concept "Adaptation to Climate Change in Mannheim", which was adopted by the city council in April 2019, was developed in a broad-based participation process with</p>	<p>European governments must implement the measures proposed by the Commission in the REPowerEU plan. Following the extraordinary European Council of 30 and 31 May 2022,</p>



				<p>stakeholders from within the city administration as well as with Mannheim's citizens and businesses.</p> <p>The consequences of climate change are already clearly noticeable in Mannheim today. The increase in extreme weather events such as heat waves, dry periods and heavy rainfall events pose major challenges for the city. The concept "Adaptation to Climate Change in Mannheim" serves as an important strategic decision-making basis and planning aid for climate protection and climate impact adaptation in Mannheim. The concept shows how Mannheim is affected by climate change, defines adaptation goals and identifies 71 measures in the relevant fields of action, such as health, green spaces and urban structure.</p> <p>Climate Impact Adaptation Management In order to implement the concept "Adaptation to Climate Change in Mannheim", a federally funded position for Climate Impact Adaptation Management was established in the Climate Protection Department in August 2020. This office is responsible for the coordination and partial initiation of adaptation measures. The following eight fields of action have been identified for climate impact adaptation in Mannheim:</p> <p>Overarching measures</p> <p>Public health and social infrastructure</p> <p>Urban society and urban structure</p> <p>Transport and air quality</p> <p>Urban water management</p> <p>Buildings and materials</p> <p>Industry, commerce and tourism</p> <p>Green spaces, agriculture and forestry, biodiversity</p> <p>Through the management, the topics of climate impact adaptation and climate protection are anchored across all departments and integrated into the procedures and processes of the city administration. In addition, the awareness of the Mannheim population for climate impacts is to be raised through citizen participation formats as well as educational and information offers.</p> <p>Current projects for the implementation of the concept</p>	<p>Member States have also stressed the urgency of quickly examining the Commission's proposals to achieve the REPowerEU targets.</p>
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				include the preparation of the Mannheim Heat Action Plan in cooperation with the Department of Youth Welfare and the Department of Health, funded by the federal project SMARTilience, the update of the City Climate Analysis 2020 by the Department of Geoinformation and Urban Planning, and the development of the Heavy Rain Risk Management by Stadtentwässerung Mannheim.	
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A-2.2: Description & assessment of policies

(describe and assess listed policies, strategies, regulations etc. to add detail)

CLIMATE POLICIES AND STRATEGIES MANNHEIM:

Climate Action Plan Mannheim (SECAP) 2030

NOTE: At this point, we would like to refrain from explaining all the contents of the KSAP again, as they are already described in detail in this document - CCC.

➔ **Climate Action Plan Mannheim 20230 – SECAP**

Adaptation to climate change in Mannheim concept

In addition to climate protection goals, the City of Mannheim also pursues adaptation to the unavoidable consequences of climate change. The Climate Protection Department has set out on the path to becoming a resilient city through the **concept "Adapting to Climate Change in Mannheim"** (V117/2019), the mission statement "Mannheim 2030" and the emergency plan. The concept "Adaptation to Climate Change in Mannheim", which was adopted by the city council in April 2019, was developed in a broad-based participation process with stakeholders from within the city administration as well as with Mannheim's citizens and businesses.

The consequences of climate change are already clearly noticeable in Mannheim today. The increase in extreme weather events such as heat waves, dry periods and heavy rainfall events pose major challenges for the city. The concept "Adaptation to Climate Change in Mannheim" serves as an important strategic decision-making basis and planning aid for climate protection and climate impact adaptation in Mannheim. **The concept shows how Mannheim is affected by climate change, defines adaptation goals and identifies 71 measures in the relevant fields of action, such as health, green spaces and urban structure.**

CLIMATE IMPACT ADAPTATION MANAGEMENT

In order to implement the concept "Adaptation to Climate Change in Mannheim", a federally funded position for Climate Impact Adaptation Management was established in the Climate Protection Department in August 2020. This office is responsible for the coordination and partial initiation of adaptation measures. The following eight fields of action have been identified for climate impact adaptation in Mannheim:

- Overarching measures
- Public health and social infrastructure
- Urban society and urban structure
- Transport and air quality
- Urban water management
- Buildings and materials
- Industry, commerce and tourism
- Green spaces, agriculture and forestry, biodiversity

Through the management, the topics of climate impact adaptation and climate protection are anchored across all departments and integrated into the procedures and processes of the city administration. In



In addition, the awareness of the Mannheim population for climate impacts is to be raised through citizen participation formats as well as educational and information offers.

Current projects for the implementation of the concept include the preparation of the Mannheim Heat Action Plan in cooperation with the Department of Youth Welfare and the Department of Health, funded by the federal project SMARTilience, the update of the City Climate Analysis 2020 by the Department of Geoinformation and Urban Planning, and the development of the Heavy Rain Risk Management by Stadtentwässerung Mannheim.

- See Climate Adaptation Plan Mannheim (2019)
- <https://mannheim-gemeinsam-gestalten.de/archiv/dialoge/klimaschutzaktionsplan.html#uip-1>

Energy Study MVV utility together with City of Mannheim to prepare the frameworks for the KSAP

- https://www.mvv.de/fileadmin/user_upload/Ueber_uns/de/Energierahmenstudie.pdf

HEAT ACTION PLAN MANNHEIM

On 26 October 2021, the city council adopted the Heat Action Plan. With this plan, the City of Mannheim meets the challenge of timely active and preventive adaptation to health impairments for Mannheim residents during hot spells. The aim of the heat action plan is to protect in particular those heat-vulnerable, helpless groups who are unable to protect themselves in hot weather.

In the long term, the heat action plan is to be constantly updated as a basis for decision-making and adapted to changing needs. A total of ten overarching measures and 21 group-specific measures were developed in a broad participation process with actors from administration, politics, science, the care and health sectors as well as citizens in order to address the needs of heat-vulnerable, helpless groups before and during hot spells. At its core, the Heat Action Plan is an alarm plan with a focus on sensitive measures that can be implemented quickly and easily. Among them, measures of a preventive nature as well as immediate relief measures were elaborated.

The City of Mannheim is one of the first municipalities in Germany to address this issue and to draw up a heat action plan. This was developed from the climate impact adaptation concept of the City of Mannheim. This underlines the long-term orientation of the City of Mannheim in climate impact adaptation.

The development of the heat action plan was fully funded by the Federal Ministry of Education and Research as part of the research project "SMARTilience" from the funding measure "Implementation of the flagship initiative Future City", thematic area "Climate resilience through action in the city and region".

- <https://mannheim-gemeinsam-gestalten.de/kuehle-orte-mannheim>
- https://buergerinfo.mannheim.de/buergerinfo/vo0050.asp?_kvonr=227283
- <https://mannheim-gemeinsam-gestalten.de/archiv/dialoge/hitzeaktionsplan.html>

The Model Spatial Order (MRO) - SUDP

The Model Spatial Order (MRO) is the integrated spatial urban development concept of the City of Mannheim. First developed in 1992 and updated in 1998, the MRO has since provided a stable framework to guide spatial developments in the city of Mannheim. Currently, the MSP is being updated in order to react to the challenges of spatial development in inner city development and climate change at the citywide level.

The 1992 MSP already identified the "dwindling reserves of buildable land" as the central challenge of spatial urban development. Unlike at that time, however, the military conversion areas are now largely developed and are no longer available as potential. However, the demand for land remains high.



The population of the city of Mannheim is expected to grow by 5.7% to a total of 338,000 inhabitants by 2040. The increasing number of inhabitants raises various questions. In particular, it will be necessary to consider how to deal with the unchanged high demand pressure in terms of housing but also commerce in the context of the shortage of land.

However, quality of living and quality of life are only achieved through a green environment. Urban greenery and high-quality open spaces promote recreation, the experience of nature and social participation. To preserve biodiversity, climate protection and climate adaptation, blue-green open space is becoming increasingly important and must be protected and developed accordingly.

These different demands on space generate land use conflicts that are represented and weighed up in the Spatial Order model. The MRO develops a spatial model for a sustainable further development and strategic positioning of Mannheim as a regional centre. Downstream, concrete urban development projects are derived from the MSP.

The two-stage update of the Model Spatial Order is divided into an analysis phase and a concept phase. The analysis phase ended with the analysis brochure of 2021 (see also draft resolutions V456/2019 and V028/2021). At the end of 2021, the Committee for Environment and Technology commissioned the administration to begin the concept phase in accordance with the process design (see also draft resolution V470/2021).

Together with the commissioned office partnership, development scenarios were drawn up in accordance with the process design as an initial basis for discussion and presented and discussed with urban development stakeholders on 20.07.2022 in the 1st City Talk (see also information document on dispatch V651/2022).

→ https://www.mannheim.de/sites/default/files/2022-06/MRO_Broschuere_Prozessdesign_210811.pdf

Masterplan Mobility 2035 Mannheim – SUMP

The transport development plan of the city of Mannheim is being updated. The aim is to define a framework for action and strategies for managing mobility behaviour and traffic in the city for the next 15 to 20 years. For this task, the engineering office IVAS was commissioned in August 2020 with the cooperation of orange edge GbR, VCDB VerkehrsConsult Dresden-Berlin GmbH and proloco Michael Glatthaar/ Franziska Lehmann GbR.

The last traffic development plan for Mannheim was drawn up in the early 1990s. A major challenge will be, in particular, to organise sustainable mobility for all citizens and the functioning of the overall transport system under the conditions of higher requirements from environmental and climate protection, intensive urban development including demographic changes as well as the further increasing regional interdependencies.

Since 2018, a set of specifications has therefore been developed as the terms of reference for the master plan. The "Mobility Round Table", consisting of around 30 representatives from politics, administration and associations as well as social groups, met as an advisory body. The Round Table continues to accompany the project. The developed specifications are divided into ten work packages, which also fulfil the requirements of the European Union for a "Sustainable Urban Mobility Plan".

The Mobility Master Plan 2035 is to contain analyses and forecasts of traffic development and traffic effects, the formulation of goals, the identification of deficiencies and problems, the development of scenarios and the elaboration of concepts for action and proposals for measures. All modes and means of transport are to be included, as well as the transport of people and goods. Innovative technological and organisational developments are to be taken into account and implementation possibilities for Mannheim are to be proposed. The inhabitants of Mannheim will be involved in the process through various participation formats. A total of three years are planned for the development of the master plan.



In September 2021, a first milestone of the Mobility 2035 Master Plan was reached: The cornerstones and goals for the further process were adopted by the Committee for Environment and Technology. They are based on the mission statement of the city of Mannheim and are intended to ensure its implementation. A total of 19 individual objectives were assigned to the five target fields (general, environmental qualities, urban space qualities, accessibility, and economic and freight transport).

The next round of participation in the Mobility Master Plan 2035 will take place in spring/summer 2022. All further information at: <https://www.mannheim-gemeinsam-gestalten.de/masterplan>

- ➔ <https://www.mannheim.de/de/stadt-gestalten/planungskonzepte/masterplan-mobilitaet-2035>
- ➔ <https://mannheim-gemeinsam-gestalten.de/masterplan>

LOCAL GREEN DEAL

Mannheims Local Green Deal initiiert, aktiviert und bündelt konkrete Beiträge der gesamten Stadtgesellschaft. Ziel: ein grünes, sauberes und gesundes Mannheim zu gestalten.

The City of Mannheim had taken on this assessment of its climate protection strategies and applied with the Local Green Deal approach, which not only looks at the climate protection action plan, but also brings together all the current planning for a green, clean and sustainable city and, through this, strives for targeted partnerships for success in the entire city society. The application included, among other things, an extensive catalogue of questions on strategies, risks and barriers on the way to climate neutrality. The concept of the City of Mannheim was successful and was rewarded by the EU Commission with the selection of Mannheim as one of the 100 cities in the mission.

The central element of the mission is the Climate City Contracts, which must be drawn up, signed and implemented by each participating city. They will contain plans for the city to become climate neutral by 2030. While these contracts are not legally binding, they represent a clear and visible political commitment to the EU, national and regional authorities and citizens. The Climate City Contracts are created together with local actors and citizens through a mission platform. The mission platform will provide cities with the necessary technical, regulatory and financial support.

Now it is up to Mannheim to transform the ambition into local actions and deals with the help of the mission platform and expert advice to get on the path to climate neutrality.

iDEAL for Mannheim is when we succeed in jointly shaping a liveable (ideal) city for everyone!

Mannheim's Local Green Deal initiates, activates and bundles concrete agreements. In this way, it is above all an offer to the urban society to shape a green, clean and healthy Mannheim together with citizens, politics, administration, business and research and thus to implement the Mannheim 2030 mission statement.

The Local Green Deal is not only about more ambitious climate protection goals and the supply of clean, affordable and safe energy. It is equally about a clean and circular economy, about fair, healthy and environmentally friendly food, and about energy and resource-efficient building and housing. It is about the sustainable and intelligent further development of our mobility. And it is not possible without strengthening ecosystems and biodiversity as well as the zero-pollutant goal for a clean environment.

- ➔ <https://mannheim-gemeinsam-gestalten.de/local-green-deal>

SMART CITY STRATEGY

The concept of the smart city aims to overcome urban challenges. For this purpose, digital data must be collected, processed and made available.

A broad participation process is taking place for the elaboration.

The City of Mannheim has successfully applied for federal funding for the development of a smart city strategy in the federal programme "Model Projects Smart Cities". The concept of the Smart City stands for



the management of urban challenges based on the collection, processing and provision of digital data. The goal is to improve the living conditions of urban society in a way that is oriented towards the common good by harnessing existing and newly collected digital data.

A first version of the smart city strategy is to be discussed by summer 2022 in a participatory process with the municipal administration, the city corporation, organised civil society, businesses and Mannheim's citizens.

After the strategy phase, the first implementation projects will be rolled out in 2023. Data provides valuable insights for optimal networking in the smart city. That is why the specially developed data platform is the heart of the project. Important recommendations for action and solutions for a resilient and liveable city can be derived from the climate, mobility and consumption data collected on it.

- ➔ www.smartmannheim.de/
- ➔ <https://mannheim-gemeinsam-gestalten.de/smart-city>

NOTE: In our EOI, we have already detailed all areas that address the current policies in the sectors.
➔ EOI Mannheim Survey

Current policies – energy

Which of the following areas does your city's current energy policy address?

- | | |
|---|---|
| <input checked="" type="checkbox"/> Nearly Zero Energy Buildings (NZEBS) (new buildings) | <input checked="" type="checkbox"/> Street lighting |
| <input type="checkbox"/> Positive Energy Buildings | <input checked="" type="checkbox"/> Citizen and renewable energy communities |
| <input checked="" type="checkbox"/> Nearly Zero Energy Buildings (NZEBS) (renovation of existing buildings) | <input checked="" type="checkbox"/> On-site and nearby renewable energy generation (electricity, heat/cold) |
| <input checked="" type="checkbox"/> Energy renovation/retrofit of existing buildings (below NZEB level) | <input checked="" type="checkbox"/> Local (off-site) renewable energy generation (electricity, heat/cold) |
| <input checked="" type="checkbox"/> Building electrification | <input checked="" type="checkbox"/> District heating/cooling |
| <input checked="" type="checkbox"/> Energy efficient electrical appliances | <input checked="" type="checkbox"/> Demand response |
| <input checked="" type="checkbox"/> Integrating RES systems into the building | <input checked="" type="checkbox"/> Virtual power plants |
| <input checked="" type="checkbox"/> Building Automation and Control Systems (BACS) /Building Energy Management Systems (BEMS) | <input checked="" type="checkbox"/> Urban heat island effect mitigation |
| <input checked="" type="checkbox"/> Nearly Zero / Positive Energy Districts | <input checked="" type="checkbox"/> Mixed-use development and sprawl containment |
| <input checked="" type="checkbox"/> Digitalisation and smart city solutions | <input checked="" type="checkbox"/> Urban regeneration |
| <input checked="" type="checkbox"/> Local heat/cold storage | <input checked="" type="checkbox"/> Behavioural changes |

Which type of energy policy measures does your city currently apply?

- | | |
|---|--|
| <input checked="" type="checkbox"/> Regulatory (e.g. building codes / standards, minimum energy performance standards, public procurement rules, energy supplier obligations) | <input checked="" type="checkbox"/> Infrastructure measures (e.g. upgrade of power plants, increase of RES capacity, smart grids) |
| <input checked="" type="checkbox"/> Financial incentives and fiscal instruments (e.g. grants, loans, soft loans, taxes, subsidies) | <input checked="" type="checkbox"/> Planning solutions (e.g. integrated land use and urban planning, integrated long-term strategies for sub-sectors, such as institutional buildings) |
| <input checked="" type="checkbox"/> Public Private Partnerships | <input checked="" type="checkbox"/> Voluntary measures (e.g. industry voluntary agreement programmes) |
| <input checked="" type="checkbox"/> Information/awareness raising (e.g. energy audits, certification and labelling of energy efficiency performance) | <input checked="" type="checkbox"/> Technical measures (e.g. smart metering, provision of energy efficient products and services) |
| <input checked="" type="checkbox"/> Education/capacity building (e.g. qualification programmes in the sector, trainings) | |

Which of the following building categories are targeted by your current energy policy measures?

- | | | |
|---|--|--|
| <input checked="" type="checkbox"/> Residential buildings | <input checked="" type="checkbox"/> Institutional buildings and facilities | <input checked="" type="checkbox"/> Social housing |
| <input checked="" type="checkbox"/> Commercial buildings and facilities | <input checked="" type="checkbox"/> Industrial buildings and facilities | <input checked="" type="checkbox"/> Historical buildings |



Current policies – Transport:

Which of the following areas does your city's current transport policy address?

- Cleaner/efficient vehicles
- Clean buses
- Electric vehicles (incl. infrastructure)
- Investment in metros and railways
- Accessibility of public transport
- Modal shift to walking & cycling, incl. infrastructure
- Car sharing
- Ride-sharing/car-pooling initiatives
- Park and ride facilities
- Multi-modal hubs/integration between transport modes
- Micromobility
- Mobility as a Service (MaaS)
- Improvement of logistics and urban freight transport
- Road network optimisation aiming at emission reduction
- Mixed use development and sprawl containment
- Digitalisation and smart city solutions
- Eco-driving (driving behaviour and style to reduce fuel consumption and emissions)

Which type of transport policy measures does your city apply?

- Technical measures (e.g. smart cards for public transport)
- Infrastructure measures (e.g. cycling lanes, recharging stations for electric cars)
- Regulation based measures (e.g. vehicle access regulations like Low or Zero Emission Zones)
- Planning solutions (e.g. SUMP or integrated land use and transport planning)
- Financial incentives and fiscal instruments (e.g. subsidies, taxes, congestion pricing schemes)
- Public Private Partnerships
- Voluntary measures with stakeholders
- Information/awareness raising (e.g. awareness campaigns)

Does the issuing of [new] building permits require the constructor/promoter to provide charging stations for electric vehicles / e-bikes etc?

- Yes, for office buildings and/or education buildings
- Yes, for residential buildings
- Yes, for commercial/ entertainment buildings
- No

Current policies – Waste/ Waste Water:

Which of the following areas does your city's current waste/wastewater management policy address?

- Use of recycled and recyclable, renewable and sustainable materials
- Management of biodegradable municipal waste
- Municipal waste prevention
- Food waste prevention
- Redirecting food surplus and food scraps
- Litter prevention in public spaces and/or marine litter prevention
- Industrial symbiosis between local businesses
- Sustainable buildings
- Circular economy business models, aimed at encouraging the reuse, repair and/or recycling of products
- Efficient thermal treatment/ landfill management
- Efficient waste /landfill gas to energy / fuel
- Wastewater reuse
- Stormwater management

Which type of waste/wastewater management policy measures does your city currently apply?

- Regulatory (e.g. bans or restrictions on single use or non-recyclable materials, regulations for durability, reparability and recycling in public procurement)
- Financial incentives and fiscal instruments (e.g. grants, loans, soft loans, taxes, subsidies, fees / incentives for volume based waste collection)

Which of the following fractions are collected and/or sorted separately in your city?

- Plastics
- Cardboard and paper
- Food waste
- Waste electrical and electronic equipment
- Glass
- Metal
- Garden/Yard waste
- Hazardous waste



Current policies – Digitalisation / Smart City

Which of the following elements does your city have in place to enable or incentivise digitalisation and smart city solutions intended to support the transition towards climate neutrality?

- Digitalisation or smart city strategies
- Innovation procurement strategies
- Use of Internet-of-Things technology
- Digitalisation or smart city policies
- Data governance strategy (national or local)
- Digital Twins
- ICT infrastructure to enable smart city solutions
- Use of open standards by preference

Has your city used any open innovation approaches and methods to enable testing, piloting or demonstration of integrated smart-city solutions?

- No
- Living labs
- Other
- Testbeds
- Regulatory sandboxes

IMPROVEMENTS

With the completion and resolution of the KSAP, the ambition for climate neutrality 2030 has been defined, the theoretical model for climate neutrality has been calculated, and the measures and responsibilities for TOP measures have been identified. The conception phase is immediately followed by the implementation phase, in which the **details of the content are further refined, concrete deals in the LGD** are negotiated with different actors, the **financing of the implementation of measures is concretised and impact monitoring is established.**



To implement the mission statement, further strategies and programmes have been and are being developed for the individual strategic goals and their thematic areas. They describe more concretely the path of implementation.



Through the Local Green Deal Mannheim, we **bring together all strategies and goals** in an integrated way. This is the Mannheim approach to **improving urban strategies**. We also want to further develop the **multi-level governance approach** and involve the regional and national level even more and better in order to improve the regulatory and financial framework conditions.

The 9 German EU Mission Cities work together on this and **strengthen relations with the national level** in a steering forum in which all federal ministries are involved. The German Mission Cities have prepared a working paper for this purpose (**CONFIDENTIAL – only for internal use**).

➔ Working Paper German EU Mission Cities - attached

NOTE table A-2.3: From **our point of view**, there is **no difference between the 3rd and the 4th column of table A-2.3**. Therefore, we also enter the **same values**. This then means: According to Pathway 2, our target is a reduction of 93% (column 3) and at the same time these are also our planned emission reductions (column 4). We thus say from **target = planned reductions**. However, this also means that the last column (Emission Gap) is 0, which then results from the footer⁴ we plan to fulfil our KSAP path. **Residuals are already given in column 2.**

In Germany, we reject the alternative interpretation that column 4 is the sum of the CO2 savings of all individual measures (bottom-up approach), because it is not target-oriented and takes into account the hard measures with direct emissions. Such a calculation leads to the fact that important enabling measures are not valued accordingly, especially since many measures cannot be directly assigned a measurable reduction potential.

A-2.3: Emissions gap										
	Baseline emissions (percentage)		Residual emissions offsetting ¹		Baseline emissions reduction target ²		Emissions reductions in existing strategies ³		Emissions gap (to be addressed by action plan) ⁴	
	(absolute t CO2)	(%)	(absolute t CO2)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)
							Path 2 Climate Action Plan Mannheim		= planned reduction by Climate Action Plan Mannheim	
Buildings	1,978,964	76	326,877	73	1,652,087	77	1,652,087	77	0	0
Transport	582,344	22,4	119.267	27	463,077	21	463,077	21	0	0
Waste	11,974	<1	unknown		11,974	<1	11,974	<1	0	0
Industrial Process and Product Use (IPPU)	25,728	1	unknown		25,728	1	25,728	1	0	0
Agricultural, Forestry and Land Use (AFOLU)	3,232	<1	unknown		3,232	<1	3,232	<1	0	0
Total	2,602,242	100	446.144 without CCS	100	2,156,098	100	2,156,098	100	0	0

¹ Residual emissions consist of those emissions which can't be reduced through climate action and are being offset. Residual emission may amount to a maximum of 20 % as stated by the Mission Info Kit.

² Baseline reduction target = Baseline emissions – residual emissions.

³ Emission reductions planned for in existing action planning and strategies should be quantified per sector.

⁴ Emissions gap = Baseline emission reduction target – Emissions reduction in existing strategies.



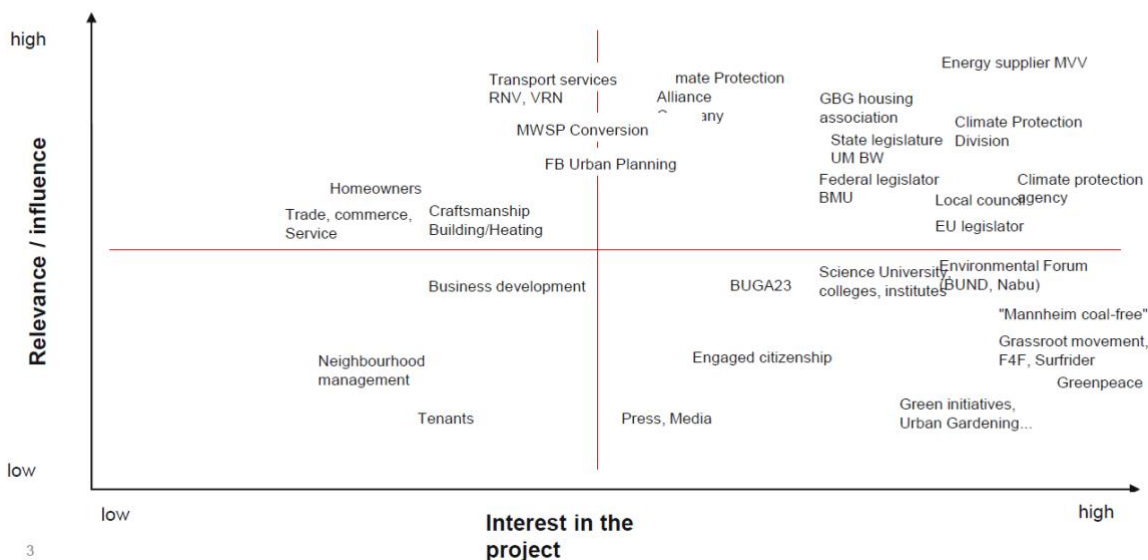
3.3 Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality

Before starting with the Climate Action Plan the City has conducted a SWOT Analyses and a Stakeholderanalysis in 2020. Here are the results.

"CLIMATE NEUTRAL CITY 2050 - CLIMATE PROTECTION ACTION PLAN". SWOT ANALYSIS

<p>Strengths</p> <ul style="list-style-type: none"> ▪ Mix of the team's professional competences: climate protection, construction, renewable energies, urban planning, environmental planning, climate change ▪ Communication skills Actions, campaigns, awareness raising ▪ Training in project management, facilitation, participation formats ▪ Strong knowledge of funding management and project funding ▪ Young team Future-oriented, experienced management Knowledge transfer ▪ Bundling activities with climate protection agency ▪ Well-developed climate protection budget ▪ Staffing expanded to team with 6 positions ▪ Proximity to science through research projects and CCME study programme ▪ Excellent network city/national/international 	<p>Weaknesses</p> <ul style="list-style-type: none"> ▪ Monitoring CO2 balances to be expanded ▪ PV systems not yet sufficiently developed ▪ Conflicts of interest within the city hamper ▪ No integrated planning across all departments as standard yet ▪ Expanding the role model effect of city-owned properties ▪ Climate impact assessment not yet on all processes ▪ Gravel gardens Problem: Nature conservation/building law unresolved ▪ Improve energy management ▪ Real estate City and companies not in one hand
<p>Opportunities</p> <ul style="list-style-type: none"> ▪ Cooperation with science and research ▪ Coal phase-out by 2034 in Mannheim ▪ Heat planning according to the Climate Protection Act BW ▪ Promotional obligations Climate protection in the KSG BW ▪ Great interest among citizens, associations and politicians ▪ Climate change is tangible for people ▪ Target discussion 2030 how quickly climate neutral? ▪ Transformation of society "Mannheim 2030" mission statement ▪ Climate emergency movement ▪ EU Green Deal, Mannheim Message for Local Green Deal, use of networks 	<p>Risks</p> <ul style="list-style-type: none"> ▪ Refurbishment rate too low ▪ Mobility MIV is a CO2 driver ▪ Financing of the projects not secured ▪ Inhibiting legal framework conditions ▪ Technologies not fully developed "CO2 storage ▪ Are there enough usable renewable energy sources? ▪ Can forests be used as CO2 sinks? ▪ Dense city, high degree of sealing

"CLIMATE NEUTRAL CITY 2050 - CLIMATE PROTECTION ACTION PLAN". ACTOR ANALYSIS



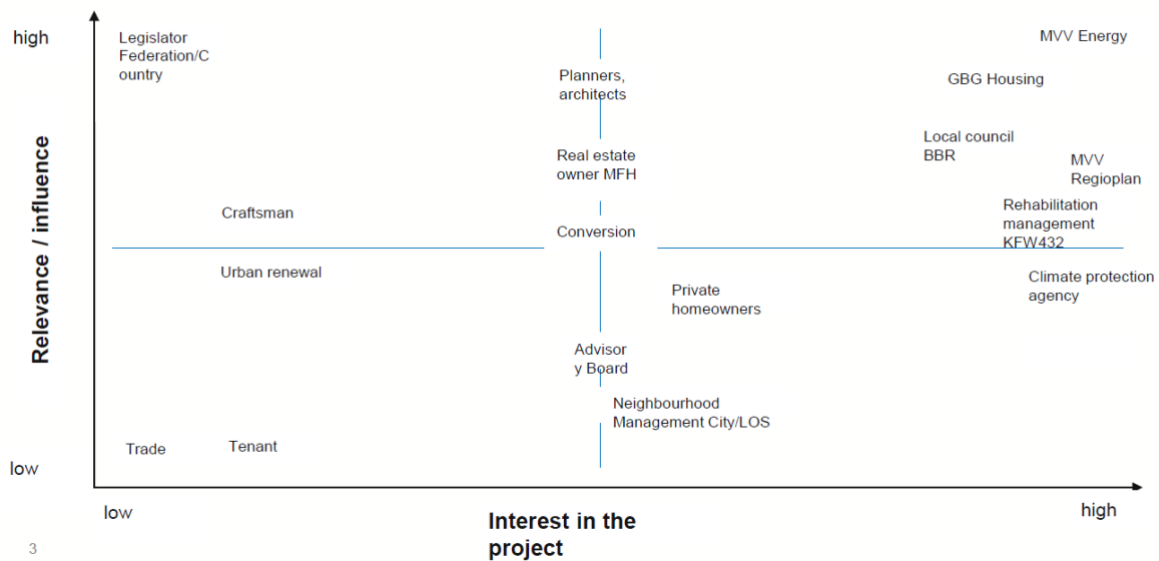
An additional SWOT Analysis and Stakeholder Analysis was carried out by the Climate Action Agency looking at the stakeholders for actions and campaigns in 2020.



"PROJECT: ENERGY-EFFICIENT NEIGHBOURHOOD REFURBISHMENT SWOT ANALYSIS

<p>Strengths</p> <ul style="list-style-type: none"> ▪ Close dovetailing with climate protection at the city (strategy, finance, personnel, expertise) ▪ 10 years of experience, expertise in the team, various disciplines, integrated thematic approach ▪ Linking advice and funding provision "from a single source" ▪ Neutrality creates acceptance (non-profit limited liability company) ▪ Unbureaucratic way of working (no authority), flexibility ▪ Competent, free and comprehensible advice ▪ On-site presence and advice ▪ Joint Redevelopment Team /City/Agency/MVV Regioplan 	<p>Weaknesses</p> <ul style="list-style-type: none"> ▪ Making better use of the link to urban regeneration issues ▪ Personnel capacities limited ▪ Contribution to the energy transition/heat transition sufficient? ▪ Financial resources, low own budget ▪ Not yet enough visibility in the neighbourhood ▪ Local funding programme "sold out" before the end of the year ▪ Too little budget to promote multi-family housing
<p>Opportunities</p> <ul style="list-style-type: none"> ▪ Policy support through district orientation (district advisory council BBR, neighbourhood management of the city) ▪ Shareholders City/MVV/GBG can support ▪ Use networking of actors, multipliers in the district ▪ Increased interest in renovation among homeowners ▪ Promotional legal measures (BEG, KSG BW) ▪ Coal phase-out 2034 in Mannheim ▪ Decarbonisation of district heating ▪ Consumption-dependent tariffs, CO2 budget as control 	<p>Risks</p> <ul style="list-style-type: none"> ▪ KfW programme material funds too low, no investments possible ▪ Funding not certain, changes all the time ▪ Legal framework conditions can change, EEG, GEG ▪ Tenant power model and communal PV use unsuitable ▪ Weakness of resolutions, disagreement in WEGs ▪ Addressing property owners MFH, mostly not on site ▪ Lack of information among craftsmen, planners ▪ Low renovation rate

"PROJECT: ENERGY-EFFICIENT NEIGHBOURHOOD REHABILITATION ACTOR ANALYSIS

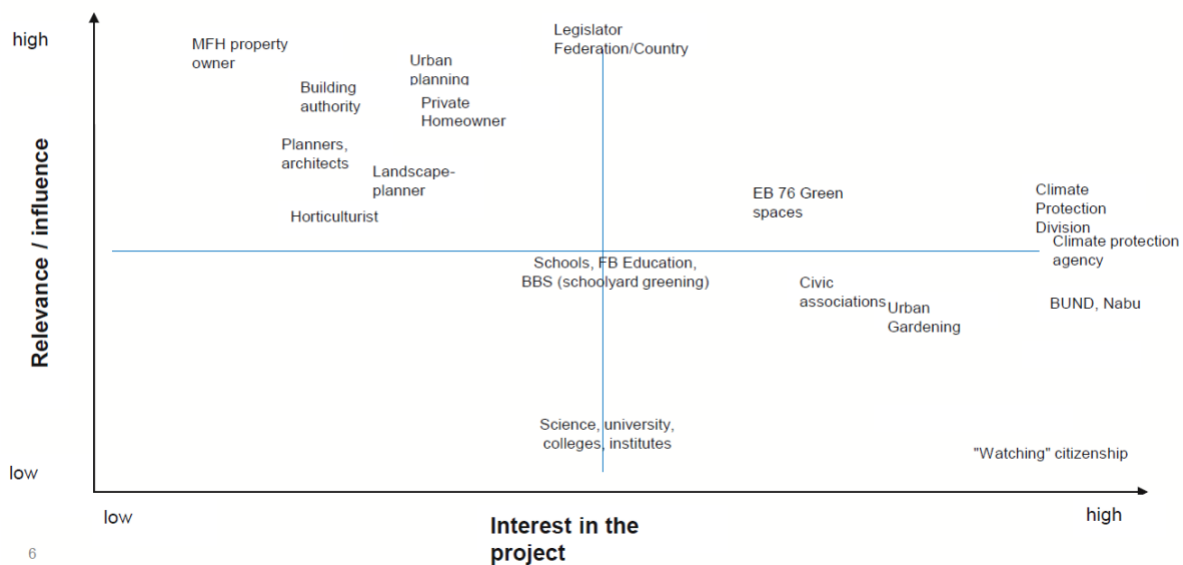




"PROJECT: MANNHEIM MAKES ROOM FOR GREEN!" SWOT ANALYSIS

<h3 style="margin: 0;">Strengths</h3> <ul style="list-style-type: none"> ▪ Anchoring in the concept "Adaptation to Climate Change in Mannheim" and in the "Mannheim 2030" mission statement ▪ Implementation of the Urgent Action Plan - Urban Green CO2 Sink ▪ Expanded communication strategy to raise awareness ▪ Competent, free advice from the climate protection agency team ▪ Joint thematic treatment in the neighbourhoods, redevelopment and greening in combination 	<h3 style="margin: 0;">Weaknesses</h3> <ul style="list-style-type: none"> ▪ Gravel gardens Problem: Nature conservation/building law unresolved ▪ Difficulty of implementation to check the ban on gravel gardens (lack of staff) ▪ Specification of greening in development plans (construction height for roof greening; façade greening) ▪ Lower potentials in the area of greening statutes ▪ Funding pots often exhausted quickly due to high demand ▪ Fixing green roofs and solar installations problematic
<h3 style="margin: 0;">Opportunities</h3> <ul style="list-style-type: none"> ▪ Potential analysis shows further areas for green roofs ▪ Increase of the budget by the city ▪ Great demand for the funding programme, trend topic ▪ Contribution to sustainable, resilient urban development ▪ Improvement of the microclimate in the urban area, city centre ▪ Precipitation retention, especially during heavy rainfall events ▪ Promoting biodiversity ▪ Contribution to air pollution control and noise reduction ▪ Increasing the attractiveness of public space ▪ Environmental education and raising awareness among the population ▪ Involvement of local initiatives 	<h3 style="margin: 0;">Risks</h3> <ul style="list-style-type: none"> ▪ Reservations among the population, e.g. damage to buildings, vermin, maintenance effort ▪ Horticulturists, planners and architects do not follow suit ▪ Competing requirements for buildings and areas ▪ Irrigation in dry periods and costs Maintenance ▪ Difficult conditions in existing buildings, static requirements ▪ High investments necessary, homeowners' own contribution ▪ Tenants usually have no influence on greening ▪ Professional planning required ▪ Safety aspects, e.g. escape routes

"PROJECT: MANNHEIM MAKES ROOM FOR GREEN!" ACTOR ANALYSIS

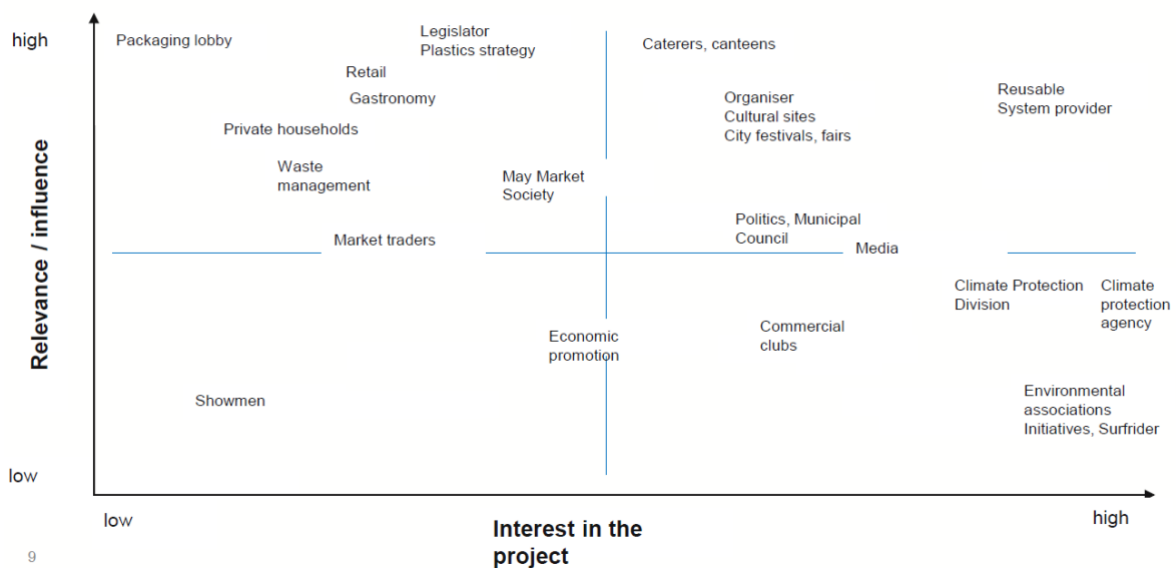




"PROJECT: BYE BYE DISPOSABLE. HELLO REUSABLE SWOT ANALYSIS

<p>Strengths</p> <ul style="list-style-type: none"> ▪ Own expertise sustainable living ▪ Campaign experience ▪ Cross-cutting issues and awareness raising ▪ Education for sustainable development, from young to older ▪ Good networking with the media ▪ Good presence in the media, own social media channels ▪ Network with retail, gastronomy, city marketing, business development ▪ Appealing, rousing address/communication ▪ Local connection, Mannheim agency ▪ Known for the topic in the city 	<p>Weaknesses</p> <ul style="list-style-type: none"> ▪ No structured plastic strategy in the city - no opportunity for participation ▪ No good link to the mission statement goal "Role model for sustainable living" - no holistic approach in the city ▪ Isolated actions and actors ▪ Storage facilities and logistics for material-intensive actions limited ▪ Transition from project initiation to self-perpetuation - stabilisation ▪ Financial advance at the start of the action is usually difficult ▪ Additional expenditure for bookkeeping (e.g. cup campaign)
<p>Opportunities</p> <ul style="list-style-type: none"> ▪ Ambitious plastics strategy EU - Confederation ▪ Increased demand for reusable solutions (Corona) ▪ High public interest/readiness/trend ▪ Great media interest ▪ Own behaviour has a quick effect - visibility ▪ High degree of innovation (start-ups) ▪ Increasing attractive public space ▪ Less litter - quality of stay ▪ Cost reduction in city cleaning ▪ Use citizen participation Plastic strategy 	<p>Risks</p> <ul style="list-style-type: none"> ▪ Listening to the packaging lobby ▪ Shifting costs to consumers ▪ Uncertainty about hygiene guidelines for reusable packaging ▪ Insufficient willingness to avoid, reduce waste ▪ Rigid attitude waste system, flat-rate billing instead of consumption ▪ Cooperation with one-way transport providers difficult, especially international and national chains ▪ Use of recyclates increasingly uneconomical ▪ Lack of willingness for innovative solutions (rinsing mobile..)

PROJECT: BYE BYE DISPOSABLE. HELLO REUSABLE ACTOR ANALYSIS





NOTE: The table A 3-1 was filled with information from the stakeholder mapping of the participation process for the development of the Climate Action Plan 2030 in 2021/2022.

A-3.1: Systems & stakeholder mapping				
(Fill out according to AP Guidance) – e.g.				
System description	Stakeholders involved	Network	Influence	Interest
Entire City (impact on many sectors)	Municipal departments	Municipality	High	The fulfilment of the interests of each of the departments. This stakeholder group is very diverse and represents very different, sometimes even opposing interests city-wide, which creates a field of tension. Interests range from urban planning, mobility, municipal building operation to budgetary matters.
	MVV Energie AG	Energy Utility /Steering group	High	Interest in particular in topics related to energy production, e.g. supply security in the future, renewable energy potentials, customer needs, grid expansion, etc. This stakeholder has a particularly large influence on city-wide emissions, as projects are realised on a large scale.
	Wuppertal institute, Fraunhofer institute, Ifeu, IVAS, MVV Energie AG, sMArt City GmbH, ZEW, dena, BUND	Research/Scientific advisory group	Medium	Comprehensive target definition on the basis of scientific findings and comprehensible strategy. These stakeholders reduce CO2 only indirectly through their actions, through a solid foundation and focused action.
	Political representatives	Politics, Steering group	High	The interests are multifaceted due to the broad political landscape and are oriented towards the individual political party programmes of the parliamentary groups. By voting and approving resolutions, projects, etc. in the municipal council, politicians have a high degree of influence on climate action-related goals.
	Environmental initiatives	Initiatives, associations Steering group, Scientific advisory group	Medium	Consideration of scientific evidence and methods as well as compliance with the 1.5 degree target. Process participation and project involvement.
	Citizenship	Steering group, Citizens Council	Medium	Individual and multifaceted interests, which, according to experience, are strongly focused on the two topics of housing and mobility. Citizens have a significant influence on the success of a climate action strategy through their behaviour and impact as multipliers.
	Local Green Deal	Municipality, Steering group	High	Cross-cutting interests in the sense of climate action to drive the implementation of measures and achieve public awareness.
	Power plant operator (GKM)	Strategy/Working group	Medium	Securing energy supply, future planning security, securing customers and staff
Residentials	Chamber of skilled crafts	Steering group	Medium	Underline the need for a qualified workforce and to meet the demand for skilled staff. Affects several sectors.
	Real estate related representations (e.g. Mieterverein, Haus & Grund)	Steering group	Low	Balancing climate action with housing needs and social aspects



	Climate Action Agency	Steering group	Medium	Awareness raising, support (also financial) and activation of citizens.
	Residential housing associations (GBG-Group)	Strategy/Working group	Medium	Economic and sustainable operation/maintenance of own building stock in the future.
Mobility	Regional transport operator (Rhein-Neckar-Verkehr GmbH)	Strategy/Working group	Medium	Further operation and development of mobility solutions. Planning security, expand customer base.
	Regional transport association (Verkehrsverbund Rhein-Neckar)	Strategy/Working group	Low	Regional development and integration of mobility solutions.
	Mannheimer municipal holdings (MKB)	Strategy/Working group	Medium	Control and financing of local public transport as well as coordination and control of transport activities in Mannheim
	Neighbouring municipalities	Multiple city networks and platforms	Low	Regional development and integration of mobility solutions.
Industry & Commerce	Chamber of commerce and industry	Steering group	High	Representing the interests of local businesses (can also be very different, as industry-specific). Ensuring a strong business location (competitive advantages, infrastructure, innovation, support, etc.).
	Local companies and especially largescale companies	Business networks (e.g. Climate Action Alliance or Initiative Industriestandort Mannheim)	High	Securing a powerful location and support in the transformation process. Since the municipality has no direct influence on company decisions and Mannheim is at the same time a successful business location, companies have an immense influence on the city's CO2 emissions and the achievement of targets.
	Union representatives	Strategy/Working group	Medium	Securing the interests of employees with regard to future developments
	Harbour (Rhein-Neckar-Hafengesellschaft Mannheim mbH)	Strategy/Working group	Medium	Ensuring the role of the city as an important transport hub and planning certainty for future directions

A-3.2: Description of systemic barriers – textual elements

NOTE : we would like to point out here again that the Climate Action Plan has already been developed along the requirements of the CCC. This means that in the description of the measures ALL necessary information on the implementation of the measure and its framework conditions, impacts, co-benefits and conflicting potentials and synergies have been assigned to the measures. Please refer to Table B 2.2.

We provide here from the Climate Action Plan an overview of the challenges, framework to reach climate neutrality by 2030. That is all already described in Table B 2.2. (Mannheim's measures for climate neutrality!



BASELINE ASSUMPTIONS TARGET VALUE 2030

Electricity

- New PV installation of around 300 MW by 2030 (corresponds to total PV expansion in Germany in 2021).
- Federal electricity mix drops linearly to 70gCO₂/kWh (2020: 366 gCO₂/kWh)
- GKM coal fired power plant shutdown completed by 2030

Buildings

- Refurbishment rate: 4% (previously approx. 1%)
- Intensification of refurbishment depth factor 4.5 (40Wh/m²*a instead of 180 kWh/m²*a in existing buildings; comparable to Kfw55-70New)
- Complete substitution of conventional individual heating systems (oil, coal, gas) by 2030 (lifetime and technology change rates cannot be taken into account => only conceivable with state subsidies)
- Increase renewable energies by a factor of 8 (PV, solar thermal, biomass)

Transport

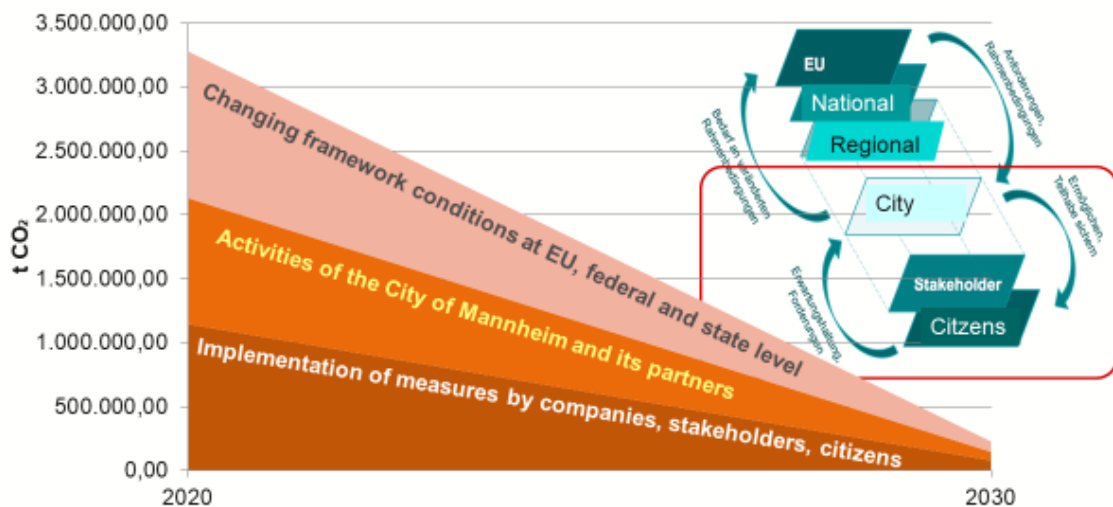
- Decrease in transport performance - Substantial conversion of the vehicle fleet (e-mobility, hydrogen - at least speed of the federal government's ramp-up forecast)

Energy

- CCUS applications for sinks

STADTMANNHEIM ²

COMPOSITION OF REDUCTION PATHWAYS THROUGH ACTIVITIES AT ALL LEVELS



STADTMANNHEIM ²

Another already **described systemic barrier** is, that only one third of the measures are under the influence of the City and the Mannheim Group. One third are influenced by the framework conditions at EU, National and State Level. And one third is dependent from the private capital, companies and citizens.

Source EOI Mannheim:

identified main barriers/gaps/assistance needs the city envisages in pursuing climate neutrality by 2030

Slow/disaggregated authorisation process and Slow/disaggregated financial process
 Regulatory red tape: the complexity of burdensome administrative rules and procedures that have negative effects on the organisation's performance, any bureaucratic obstacles to climate neutral action



Lack of circularity
Lack of industrial support in providing the necessary services
Lack of citizen participation and proactiveness
Lack of enabling policy at Member State level
Lack of enabling policy at EU level
Lack of enabling energy policy at Member State level
Difficulties in building collaborations between public and private sectors
Prohibitive investment costs

Climatic limitations/challenges: extreme heat and heavy rain falls, drought

Sector specific:

Energy: High initial capital costs, Unfavourable power pricing rules, Lack of enabling energy policy at Member State level, Restrictions on siting and construction,

Transport: High initial capital costs, People's time and economic constraints in the use of public transport, Infrastructural and planning barriers to active travel (lack of side walks, cycling lanes, etc.); Psychosocial barriers to public transport use (risk of transmission of infections, exposure to crime and verbal offense)

waste/wastewater management sector: Insufficient waste separation and quality of separated waste, Slow behavioural transformation, including cultural barriers; Ineffective waste prevention, Lack of infrastructure for circular economy measures

EOI Mannheim: Achieving climate neutrality depends not only on technical feasibility, but also on favorable external conditions. For example, in the case of new rail lines, lengthy and complicated planning approval procedures and procurement routes are an obstacle. Success also depends on industry support and the provision of the necessary services. The availability of construction materials and climate-neutral vehicles is limited. Bureaucratic internal administrative regulations need to be adapted to the accelerated target. More citizens need to actively participate in the climate goal and significantly reduce their own carbon footprint through energy conservation, home renovation, PV installations, and switching to zero-emission transportation to achieve a better quality of life. Unreasonably high investment costs for retrofits or public transportation and lack of or inappropriate funding and financing programs, as well as uncertain funding availability, make planning uncertain or even infeasible.

Pilot Cities Project CoLAB: CoLAB confronts the obstacles that prevent everyday citizens from making their own contribution to climate neutrality and impact the **interrelated emission areas of mobility, energy and buildings, food and consumption**. The city administration needs to address **these barriers** with systemic approaches and not just provide more information or more technical solutions. Overcoming the barriers to citizen-led climate action is of particular importance, as finding ways to overcome them increases the effectiveness and acceptance of these strategies. The lack of sufficient measurability of the effectiveness of enabling policies creates the risk that policies will not be adopted or financially supported. Data on the effectiveness, success factors and barriers to reducing consumption-related emissions in the emission areas of electricity and heat consumption, mobility, land use and waste/disposal should be identified in order to develop the right (effective) solutions to close the gap between knowledge and action. These emissions cannot be reduced directly through technical measures, but rely on the voluntary or possibly regulated behaviour of citizens. This means that the possibilities for intervention or the influence of the municipality on consumption behaviour and the resulting emissions and negative environmental impacts are limited. CoLAB therefore investigates the decision-making of private households for climate-friendly actions. The success of CoLAB activities depends on social approval and the assumption of actual ownership by citizens. CoLAB takes advantage of this by strengthening the sense of self-efficacy and encouraging action through a concrete action plan. CoLAB aims at more collective local action and for this it also needs to overcome psychological barriers that lead to a gap between knowledge and action. Climate communication must be based on a shared vision, on the appreciation of citizens and stakeholders, and on a target group-specific approach. CoLAB addresses the gap of developing concrete intentions and identifying opportunities to act in accordance with values or motivational complexes in the case of competing



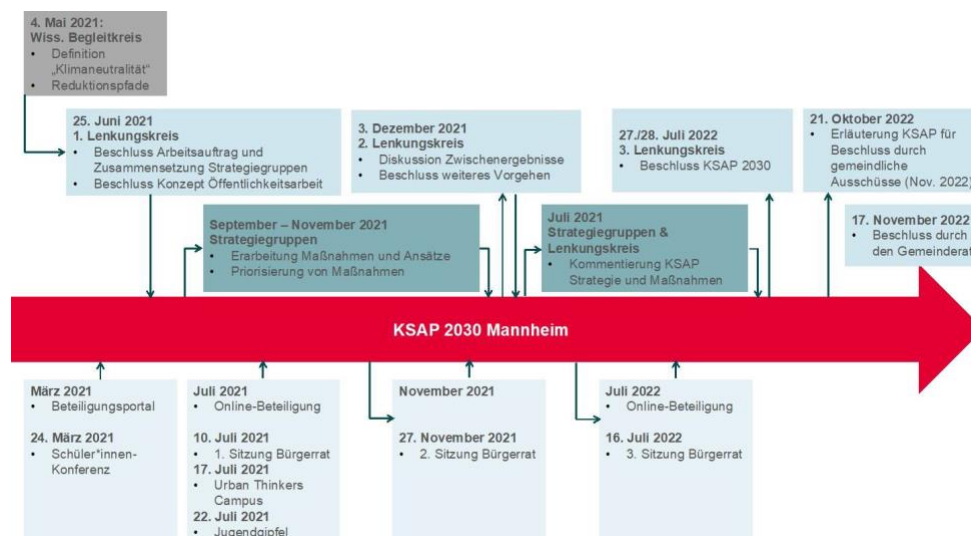
values. Barriers to carbon-saving consumer behaviour include lack of confidence in the efficacy of acting in accordance with values, or when counter-incentives are set that outweigh the values involved, lack of relevant options, or increased difficulty when no climate-friendly alternative is offered. CoLAB aims to guide citizens to get to a point where they take a particular action: First, people need to acquire the necessary knowledge about a particular issue. Then people have to process this knowledge to form relevant values. Then they have to translate these values into intentions for action. Finally, people have to translate these intentions into real actions and also to realise that there is an opportunity to act. This is the chain of barriers that CoLAB aims to overcome and link with solutions with "of I should, I would, I can, I do" to take ownership of the action for a 1.5 degree lifestyle. Other barriers to local action are uncertainty, scepticism about the issue and mistrust of the municipality, national government and organisations or even producers. Citizen decision-making processes are limited by inducing citizens to act against their values, for example through marketing that encourages people to buy a certain type of unhealthy food. For example, many people exhibit a values-action gap when it comes to environmental issues, because although they care about these issues, they are unwilling to take actions that contribute to their solution, such as giving up their car. CoLAB investigates the causes of the values-action gap in personal, social and structural barriers to action, such as individuality, responsibility and practicality. CoLAB cities have already listed the following barriers to pursuing carbon neutrality by 2030, here specifically related to local actions: bureaucratic barriers to carbon neutral action; lack of citizen participation and proactivity; lack of funding/funding programmes or uncertain availability; time and economic constraints for people to use public transport; lack of walking and cycling paths, etc. ; psychosocial barriers to using public transport; Insufficient waste separation and quality of separated waste; Slow behaviour change, including cultural barriers; Ineffective waste prevention; Availability of building materials and carbon neutral cars; Unreasonably high investment costs.

A-3.3: Description or visualisation of participatory model for the city climate neutrality – textual and visual elements

NOTE: participation model is also described in the Commitment Part of the CCC

CLIMATE ACTION PLAN 2030 - KSAP:

The Wuppertal Institute was commissioned to prepare and provide scientific support for the KSAP. The Wuppertal Institute had completed an important basis for the KSAP with the MVV Energy Framework Study³ in March 2021. The preparation and participation process was approved by the municipal council on 22.06.2021 with the submission of the "Climate Action Plan 2030: Structure, Process and Participation" (V332/2021) was adopted.



Process for developing the KSAP from spring 2021 to autumn 2022

Source: Wuppertal Institute



The **participation process** was designed in close coordination between the Climate Protection Department, the Citizen Participation Coordination Unit and the Wuppertal Institute. Various Convene project groups, such as the Scientific Monitoring Group, a Steering Group, the Citizens' Council "Climate Protection 2030" as well as topic-specific strategy groups. In addition, citizens were involved in the preparation of the KSAP in various formats, both online and on site. This ensured that the entire urban society from citizens, businesses, associations, initiatives, science, politics and city administration was involved in the process. In total, there were over 20 participation formats.

The action plan that is now available is the result of the interaction and feedback of the results from the individual project groups into the overall process.

The complexity of the fields of action in climate protection, the ambitious objectives and the range of actors involved have required process adjustments that have affected both the project duration and the sequence of the individual project groups.

The intensive cooperation at the KSAP ensures that the results are supported by all stakeholders and that there is interest in the joint, decisive implementation of measures to achieve the goals.

The **scientific support group** was the first project group to meet. It consisted of scientific and technical experts on the topics of climate protection, climate neutrality, heat, energy and transport transition (cf. Table 1). The consultation in the advisory group provided the content-related basis for the following participation process.

The group of participants consisting of recognised experts discussed the possibilities and potentials for achieving climate neutrality well before the year 2050 and discussed targets and reduction paths in various fields of action up to the year 2030.

In addition, a definition of the term "climate neutrality" was formulated in this circle, which formed the basis of the further process as a common understanding (cf. section 5.2).

As an important body that accompanies and steers the entire KSAP process, the steering committee was appointed by the municipal council (V332/2021). It met three times during the project. The members of the steering committee, consisting of representatives from politics, city administration, associations and civil society organisations, were made up of full members (with weighted voting rights) and associate advisory members (without voting rights) (cf. Table 2). Based on the scientific discussion, the steering committee legitimised the goal of climate neutrality 2030 and determined CO₂ reduction paths for the fields of action as a work assignment for the further process. Furthermore, it structured the fields of action thematically and in terms of personnel (strategy groups) and decided on the participation process. After the strategy group meetings, the steering committee reflected on the work from the workshops and the results of the citizens' council and public participation. It compared the measures developed with the goals set, checked their feasibility and prioritised the measures. It was possible to identify possible synergies and conflicts of objectives that could arise between individual fields of action or also with other topics and sustainability dimensions.

At the last meeting of the steering committee in July 2022, comments and suggestions were again taken on board and the draft of the KSAP was recommended for further political consultation.

Existing and new approaches in the fields of action as well as the synergies and conflicting goals to be taken into account served as a work assignment for the **eight strategy groups**:

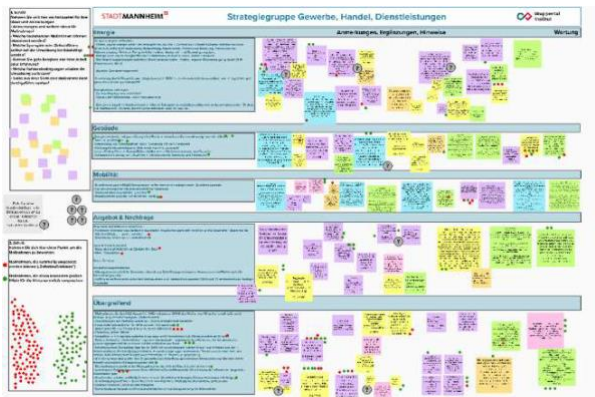
- Energy production
- Industry
- Trade, commerce, service
- Land use
- Green-blue infrastructures
- Mobility
- Private households
- Municipal administration

For the industrial sector, there is already an established structure in the form of the "Initiative Industriestandort Mannheim" (I2M) founded by the Economic Development Department (FB 80), which acted as a strategy group for the KSAP in view of significant thematic overlaps.

The strategy groups were made up of thematically relevant stakeholders in Mannheim, such as the city administration, politicians, companies, initiatives, associations, trade unions, interest groups and citizens. The task of the strategy groups was to deal with the development of



measures and activities in the respective fields of action in the further process and to contribute their own ideas that could contribute to achieving the goal of climate neutrality. A series of workshops was held with seven of the strategy groups in the summer / autumn of 2021. Due to the pandemic situation caused by COVID 19, the strategy group meetings took place online and the joint work on measures and activities took place on a digital whiteboard (cf. Figure 4).



Presentation of the work results on the whiteboard using the example of the strategy group "Trade, Commerce, Services" (Source: Own presentation, Wuppertal Institute).

The **industry strategy group** was an exception. The measures in the field of action Industry were determined by the Initiative Industriestandort Mannheim under the leadership of FB 80 via questionnaires and interviews with the 12 industrial companies with the highest employment at the location and the Port of Mannheim.

Within the framework of this interactive exchange of the Initiative Industriestandort Mannheim, eleven key topics were identified on the basis of which the location-related transformation and cooperation potentials were examined and are now being further concretised in technical and operational terms by the participating companies in eight consortia with the declared aim of joint collaborative projects:

- 1 | Digital process chains in industrial and service production
- 2 | Access to start-ups / disruptors
- 3 | Attracting skilled workers and future prospects for employees
- 4 | Collaborative projects with universities, talent acquisition and business-related research
- 5 | Circular economy
- 6 | Hydrogen: production, transport and industrial application spaces
- 7 | Energy supply security (local) / smart grids
- 8 | Smart building / building technology/refurbishment
- 9 | Mobility & logistics infrastructure / Rhine as a transport route
- 10 | Transformation of the automotive industry
- 11 | Industrial land availability

In addition, these results for the KSAP were reflected by the Wuppertal Institute in relation to the city's climate protection concerns and taken up in the measures of the "Industry" field of action.

Public participation

In parallel, the public participation process was designed, coordinated and implemented by the Climate Protection Department (FB 67) and the Citizen Participation Coordination Office (FB 15). In order to involve as many Mannheim residents as possible in the process, various participation formats were used: on-site events, online participation options and, for the first time in Mannheim, a citizens' council.

For the participation of children and young people, a number of projects were developed within the framework of the children's and youth office 68DEINS! (FB 58) and carried out in cooperation with the Climate Protection Department (FB 67) and the Climate Protection Agency, concrete concerns for the Climate Protection Action Plan 2030 were developed with young people at the "schools for future" conference (24.03.2021) and the Mannheim Youth Summit 2021 (22.07.2021). The most important concerns were: Mobility and infrastructure

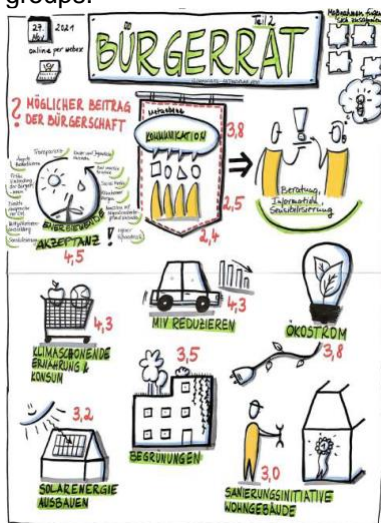


(especially bicycles and public transport, car-free zones), renovation and greening of buildings and schoolyards, waste separation, environmental education and sustainable consumption at schools.



Youth Summit on 22 July 2022. (Photo: City of Mannheim)

The **Citizens' Council "Climate Protection 2030"** was a committee of 24 randomly selected Mannheim residents. The group was composed in such a way that it represented as much of Mannheim's society as possible - in terms of age, gender and place of residence. The citizens' council discussed the results of the citizens' participation in three meetings, was able to contribute its own ideas to the process and discuss the proposals of the strategy groups. Members of the citizens' council were represented in the steering committee and in the strategy groups.

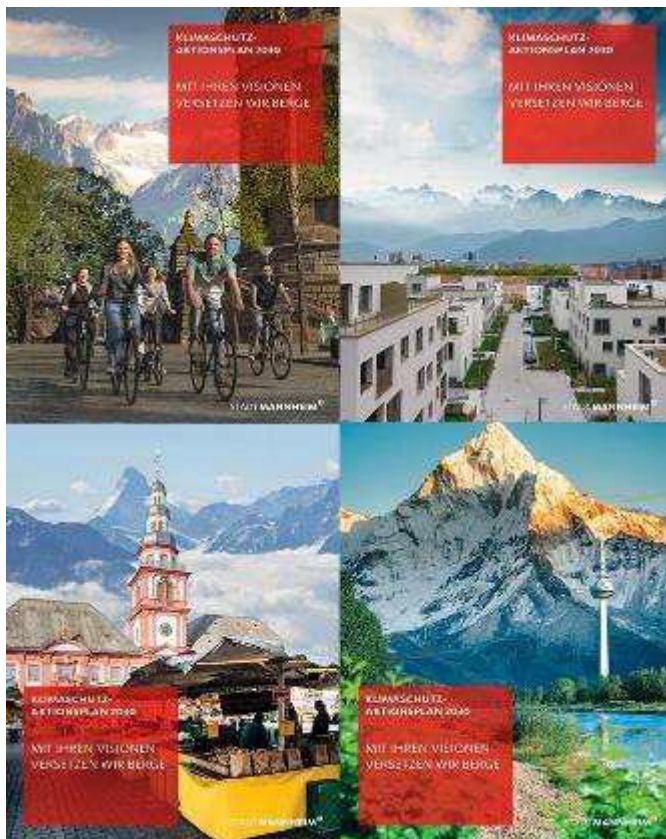


Graphic Recording as documentation of the Citizens' Council meeting on 27 November 2022. (Drawing: Katarina Ressel)

In addition, the city of Mannheim involved the **general public** both with outreach participation in a public square and at a workshop at the "Urban Thinkers Campus" event. In addition to an online survey at the beginning of the process, Mannheim residents were able to make suggestions online. Finally, citizens took the opportunity to comment on drafts of citizen-relevant action plans on the participation platform "Shaping Mannheim Together". In total, more than 400 people took part in the process.



Citizen participation within the framework of the "Mobile Green Room ®" on the market square. (Photo: City of Mannheim)



Campaign for the call for citizen participation "With your visions we move mountains". (Source: City of Mannheim)

The results from the **work of the citizens' council, the online participations and several public events** were processed in preparation for the meetings of the steering committee and the strategy groups and discussed within this framework.

This broad participation process aimed to generate the largest possible number of ideas worth pursuing and to ensure maximum acceptance of the process and measures, thus strengthening the democratic processes on the ground. In total, **more than 300 ideas were submitted**.

The results of the entire process were processed by the Wuppertal Institute and integrated into the strategy presented here. In a second round, the draft strategy was submitted to the participants of the process for comments and revised accordingly. The result is the now available KSAP 2030 with the strategy section, which is the process (cf. chapter 4), the structure of the strategy and recommendations for action (cf. chapter 6) with a detailed description of the measures developed (cf. Chapter 7) as well as the modelling of pathways towards climate neutrality (cf. Chapter 8 and 9 KSAP).

**Online Platform « Together shaping Mannheim – Mannheim gemeinsam gestalten »
Process and citizens participation (collection of ideas) :**

- <https://mannheim-gemeinsam-gestalten.de/archiv/dialoge/klimaschutzaktionsplan.html#uip-1>
- <https://mannheim-gemeinsam-gestalten.de/archiv/ksap.html>

Participatory Budget City of Mannheim : collection of ideas (2022 : IDEAL for Mannheim)

- <https://mannheim-gemeinsam-gestalten.de/beteiligungshaushalt2022>

EOI – Participation citywide:

Mannheim is the place **where people shape the city**. The **online participation platform citizens** offers to cocreate plans and actions for all important city plans, projects and strategies. Currently, the citizen participation for the SECAP2030 "With your visions we move mountains" is running and a voluntary citizens' council was established. In the participatory budget citizens can vote for their own ideas. Innovative participation is provided by the Urban Thinkers Campus, taken place 6 times in Mannheim. This year, citizens could create their own deals for a healthy, clean and green city for the Local Green Deal Mannheim. The Climate Action Agency Mannheim has received several awards for its creative informative practices and awareness-raising actions and campaigns, from "Spare your Car!", "Mannheim makes room for Green!" or "Stay true to your cup!" - there is first-hand information, action and competition to close the gap between knowledge and action. The agency provides advice and action on sustainable lifestyles, offers workshops under the "Climate Active School" program and at the adult education center the "klimafit" course is running. 3 local funding programs with a total volume of 700,000 € offer citizens an incentive for energy-efficient renovation, roof and facade greening, as well as for solar systems. The Climate Action Agency and the Climate Change Department publish their own annual climate magazine, MAX2, with all the latest projects and campaigns.

Private sector: see also Commitment Part CCC

The city is working closely with SMEs and industrial companies, trade and service institutions to develop the climate and mobility strategy. The established initiative of large industrial companies is collaborating on measures in the industrial sector, and the Business Climate Alliance (since 2015) has itself committed to the city's climate goals and recently presented its Big Deals on climate neutrality. The Chamber of Crafts and the Chamber of Industry and Commerce keep in touch with craftsmen and SMEs as members of the Climate Agency's advisory board. The Mannheim advertising association works with the city to implement the livable city. The energy and housing companies (MVV, GBG), as shareholders of the agency, implement local support programs for the success of the renovation wave.

Regional and National governments: see also Commitment Part CCC

With the climate protection pact of the state of Baden-Württemberg, Mannheim receives more funds for the implementation of its exemplary function. The state climate protection agency KEA supports Mannheim with access to tools and competencies such as the climate protection planner, offers training on energy management and CO2 reporting, and assists in recording energy consumption and creating a heat plan. In the network of municipal climate protection managers, the city receives technical and strategic support for SECAP. Mannheim receives state and federal funding for climate staff and projects. The national service and competence center SK:KK provides Mannheim with up-to-date information on financial advisory services and support for mobilizing resources in outreach, awareness raising, and effective communication about climate impacts. The new federal government is currently raising energy standards for climate-neutral buildings, and a new emergency climate protection program has been announced to provide cities with a framework for achieving climate neutrality. The state working group "Bicycle-Friendly Communities" supports its mobility strategy. Mannheim actively uses the federal research area's funding opportunities and regionally supported structural EU funds for its smart city strategy and climate resilience (see R&I projects). Annual state and national competitions such as (see Awards) provide Mannheim with the opportunity to compete and learn from each other.



4 Part B – Pathways towards Climate Neutrality by 2030

4.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

NOTE: The allocation in **the table B-1.1** is a very theoretical work, which has already been done in detail **for each measure in the Climate Action Plan Mannheim 2030**. In addition, the allocation of the Lever of Change and outcomes and impacts as well as co-benefits per top measure was listed for **the Pilot Cities project CoLAB. We have attached Table B-1.1. for the CoLAB activities**

➔ **Source: TOP Measures Climate Action Plan Mannheim 2030 (KSAP)**

The following **co-benefits are addressed by the emission domains** in the Climate Action Plan and the CoLAB project.

	Impacts (including co-benefits) and impact categories
Direct impacts	Climate-neutrality
	Climate Mitigation <ul style="list-style-type: none"> • Reduced GHG emissions • Increased energy efficiency or rate of retrofit (including district heating) • Reduced energy demand, needs, or consumption • Increased access to clean, stable, affordable energy • Reduced energy poverty • Increased modal shift to public transit, walking, cycling • Decreased modal share of private vehicles • Increased uptake of low-carbon technology vehicles for private, freight, public transport (EVs, e-bikes, hydrogen-fuelled etc.)
	Climate Adaptation <ul style="list-style-type: none"> • Increased carbon sequestration (for e.g., through NBS) • Enhanced stability of urban infrastructure • Reduced risk to natural/climate disasters or hazards • Increased preparedness to uncertainty of climate impacts

The following co-benefits are addressed by the emission domains in the Climate Action Plan, see also EOI Mannheim.

Co-Benefits/indirect impacts	
Economic	Job creation Business/technological innovation Natural resource depletion Revenue generation Labour productivity Congestion Costs Labour conditions Disruption of energy, transport, water and communications networks Energy security Economic production Economic impact of disasters
Social	Water security Energy poverty Transparency and accountability Food security Transport poverty Education and public awareness Mobility and access Security/protection for poor/vulnerable populations Number of households and businesses forced from homes/places of work



Public Health	Physical health Preparedness for health service delivery Premature deaths Mental wellbeing/quality of life Health impacts from extreme heat or cold weather Health costs Air quality Disaster/disease/contamination-related health impacts
Environmental	Resilience to climate change/adaptation Noise pollution Green space coverage and quality Water/soil quality Light pollution Biodiversity and ecosystem services

Social Co-Benefits in detail: It is part of Mannheim's transformation culture that climate neutrality in the city's life and economy is only conceivable in a social-ecological way. As a Local Green Deal pilot city, Mannheim evaluates all projects according to the impact of a just transformation. Climate-neutral building and living must also be affordable. That is why the city has launched a renovation offensive that offers citizens financial support for renovation, free energy checks with low investment measures for low-income households. The municipal GBG currently has a very large stock of such housing types, with around 3200 socially subsidised and almost 500 price linked flats. With the 12-point housing construction programme, the city is creating more housing in the lower price segment, as well as with the introduction of a social quota in new buildings of at least 30 % housing for low-income families. In addition to social housing, measures such as accessibility and subsidised public transport tickets for pupils, students and pensioners are also being implemented. Climate neutrality must also not lead to higher food prices and healthy food must be distributed fairly. Fairtrade shops, social department stores and food sharing initiatives are working towards this. To improve waste separation and convert organic waste back into energy, the organic waste bin has recently become free of charge. The city's heat warning plan ensures that vulnerable, helpless people receive medical care during heat waves.

CoLAB indirect impacts:

Indirect impacts	<u>Public Health & Environmental Impacts</u>
	<ul style="list-style-type: none"> • Improved air quality • Reduced noise pollution • Increased road safety • Reduced heat island effect • Enhanced physical & mental well-being
	<ul style="list-style-type: none"> • Enhanced liveability attractiveness/ aesthetics (align with New EU Bauhaus Goals) • Increased physical activity and active lifestyles • Equitable & affordable access to housing
	<u>Social Inclusion, Democracy & Cultural Impacts</u>
	<ul style="list-style-type: none"> • Enhanced citizen & communities' participation & social capacities for participation/engagement • Increased social justice • Improved social cohesion, gender equality, equity • improved functioning of democratic institutions • Increased awareness of social issues • Increased access to job/employment and skill development opportunities • Improved access to information, awareness & behaviour change
	<u>Economic Development Impacts</u>
	<ul style="list-style-type: none"> • Increased investments in R&I • Decreased future maintenance & capital costs • Increased number of skilled jobs & rate of employment • Increased economic thriving (quality of jobs, sustainable supply chains etc.) • Increased economic returns of natural capital • Increased technological readiness & rate of adoption • Local economic activity & global connectivity • Increased local entrepreneurship & local businesses/ventures • Increased visibility & knowledge/tech transfer for local businesses/ventures • Mainstreaming of new economic models like proximity & sharing economy



B-1.1: Impact Pathways – see CoLAB version of this table					
Fields of action	Systemic levers	Early changes (1-2 years)	Late outcomes (3-4 years)	Direct impacts (Emission reductions) t CO2	Indirect impacts (co-benefits)
Energy systems	Technology/Infrastructure	(Early change #1)	(Late outcome #1)		
	Government & Policy	(Early change #1)	(Late outcome #1)		
	Social Innovation	(Early change #2)	(Late Outcome #2)		
	Democracy/Participation	(Early change #1)	(Late outcome #1)		
	Finance & Funding	(Early change #2)	(Late Outcome #2)		
	Learning & Capabilities	(Early change #1)	(Late outcome #1)		
Built environment	Technology/Infrastructure	(Early change #1)	(Late outcome #1)	1,652,087 see A-2.3	
	Government & Policy	(Early change #1)	(Late outcome #1)		
	Social Innovation	(Early change #2)	(Late Outcome #2)		
	Democracy/Participation	(Early change #1)	(Late outcome #1)		
	Finance & Funding	(Early change #2)	(Late Outcome #2)		
	Learning & Capabilities	(Early change #1)	(Late outcome #1)		
Mobility & transport	Technology/Infrastructure	(Early change #1)	(Late outcome #1)	463,077 see A-2.3	
	Government & Policy	(Early change #1)	(Late outcome #1)		
	Social Innovation	(Early change #2)	(Late Outcome #2)		
	Democracy/Participation	(Early change #1)	(Late outcome #1)		
	Finance & Funding	(Early change #2)	(Late Outcome #2)		



	Learning & Capabilities	(Early change #1)	(Late outcome #1)		
Green infrastructure & nature based solutions	Technology/Infrastructure	(Early change #1)	(Late outcome #1)		
	Government & Policy	(Early change #1)	(Late outcome #1)		
	Social Innovation	(Early change #2)	(Late Outcome #2)		
	Democracy/Participation	(Early change #1)	(Late outcome #1)		
	Finance & Funding	(Early change #2)	(Late Outcome #2)		
	Learning & Capabilities	(Early change #1)	(Late outcome #1)		
Waste & circular economy	Technology/Infrastructure	(Early change #1)	(Late outcome #1)	11,974	see A-2.3
	Government & Policy	(Early change #1)	(Late outcome #1)		
	Social Innovation	(Early change #2)	(Late Outcome #2)		
	Democracy/Participation	(Early change #1)	(Late outcome #1)		
	Finance & Funding	(Early change #2)	(Late Outcome #2)		
	Learning & Capabilities	(Early change #1)	(Late outcome #1)		
Land use	Technology/Infrastructure	(Early change #1)	(Late outcome #1)		
	Government & Policy	(Early change #1)	(Late outcome #1)		
	Social Innovation	(Early change #2)	(Late Outcome #2)		
	Democracy/Participation	(Early change #1)	(Late outcome #1)		
	Finance & Funding	(Early change #2)	(Late Outcome #2)		



Project/Measure/Action	Impact	Description	Indicator/Target	Lead	Proposed Indicator Definition	How will you measure progress	Expected Bln of project target	Start/End	Intervention
GAAR - Commission PO 0078	Transition Team Establishment	Transition Team Establishment	Transition Team Establishment	GAAR - Commission PO 0078	Transition Team Establishment	Transition Team Establishment	Transition Team Establishment	PO 0078	Transition Team Establishment
GAAR - Commission PO 0080	Citizen Engagement	Citizen Engagement	Citizen Engagement	GAAR - Commission PO 0080	Citizen Engagement	Citizen Engagement	Citizen Engagement	PO 0080	Citizen Engagement
GAAR - Commission PO 0081	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0081	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0081	Co-production of innovative CoAR solutions
GAAR - Commission PO 0082	Peer Learning Programme	Peer Learning Programme	Peer Learning Programme	GAAR - Commission PO 0082	Peer Learning Programme	Peer Learning Programme	Peer Learning Programme	PO 0082	Peer Learning Programme
GAAR - Commission PO 0083	Stakeholder involvement	Stakeholder involvement	Stakeholder involvement	GAAR - Commission PO 0083	Stakeholder involvement	Stakeholder involvement	Stakeholder involvement	PO 0083	Stakeholder involvement
GAAR - Commission PO 0084	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0084	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0084	Co-production of innovative CoAR solutions
GAAR - Commission PO 0085	Citizen Engagement	Citizen Engagement	Citizen Engagement	GAAR - Commission PO 0085	Citizen Engagement	Citizen Engagement	Citizen Engagement	PO 0085	Citizen Engagement
GAAR - Commission PO 0086	Stakeholder involvement	Stakeholder involvement	Stakeholder involvement	GAAR - Commission PO 0086	Stakeholder involvement	Stakeholder involvement	Stakeholder involvement	PO 0086	Stakeholder involvement
GAAR - Commission PO 0087	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0087	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0087	Co-production of innovative CoAR solutions
GAAR - Commission PO 0088	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0088	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0088	Co-production of innovative CoAR solutions
GAAR - Commission PO 0089	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0089	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0089	Co-production of innovative CoAR solutions
GAAR - Commission PO 0090	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0090	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0090	Co-production of innovative CoAR solutions
GAAR - Commission PO 0091	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0091	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0091	Co-production of innovative CoAR solutions
GAAR - Commission PO 0092	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0092	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0092	Co-production of innovative CoAR solutions
GAAR - Commission PO 0093	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0093	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0093	Co-production of innovative CoAR solutions
GAAR - Commission PO 0094	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0094	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0094	Co-production of innovative CoAR solutions
GAAR - Commission PO 0095	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0095	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0095	Co-production of innovative CoAR solutions
GAAR - Commission PO 0096	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0096	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0096	Co-production of innovative CoAR solutions
GAAR - Commission PO 0097	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0097	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0097	Co-production of innovative CoAR solutions
GAAR - Commission PO 0098	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0098	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0098	Co-production of innovative CoAR solutions
GAAR - Commission PO 0099	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0099	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0099	Co-production of innovative CoAR solutions
GAAR - Commission PO 0100	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	GAAR - Commission PO 0100	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	Co-production of innovative CoAR solutions	PO 0100	Co-production of innovative CoAR solutions

B-1.2: Description of impact pathways – textual and visual elements

(Describe, visualise and contextualise pathways listed above)

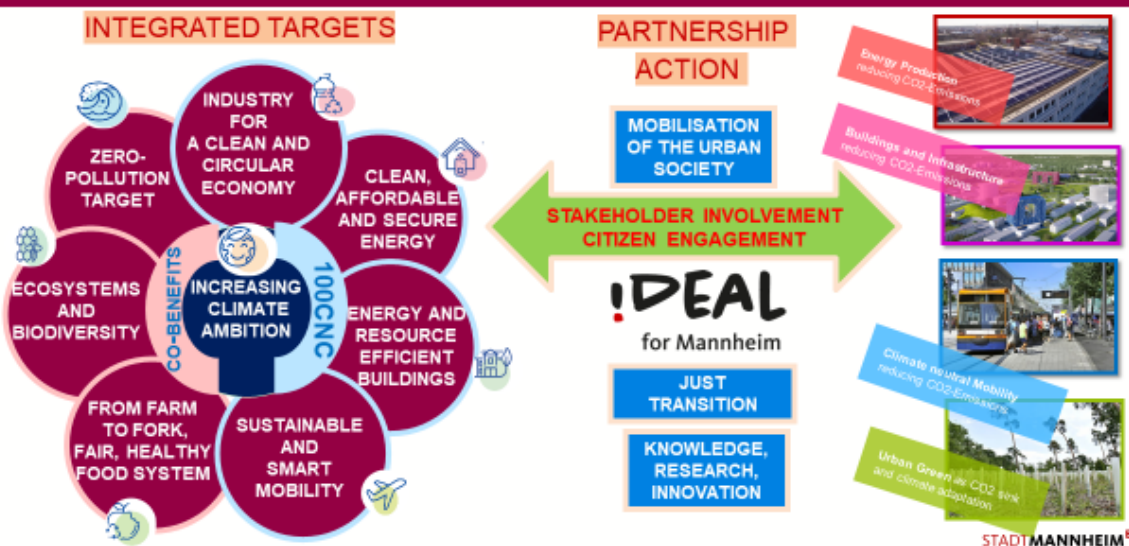
IMPACT PATHWAYS FOR THE LOCAL GREEN DEAL MANNHEIM

(Mannheim’s approach to climate neutrality with contributions from all action fields – direct and indirect impacts)

First, we are taking stock of what is being done in our city – both by our city administration and also others in civil society and the private sector. We identifying gaps in our efforts, and building bridges between the efforts that are already in motion. Although this may not sound innovative at first, our structured and methodical approach is enabling us to unlock real potential in our own administration and across the entire city. This approach is new, and it is effective.



THE LOCAL GREEN DEAL CHALLENGE



Some of our deals are broader and more strategic, like our commitment to accelerate our efforts to reach the goal of climate neutrality. Other deals connect with broader initiatives like the Edinburgh Declaration and Trees in Cities Challenge. We have used the EU Mission to define the co-benefits within/between the action fields. At the moment all LGD Managers fill the potential analysis for their action field and define hereby the connections of deals to other actionsfields.

This is how we proceeded with **our potential analysis: In each of the 8 fields of action, we identified over 150 local Green Deal potentials in strategies, plans and projects, starting from the objectives based on the EU Green Deal targets in the field of action and the framework from the EU level to the implementation at the national level via the state level to the local level.**

IDENTIFIED CONCRETE POTENTIALS IN ALL LOCAL GREEN DEAL ACTION FIELDS

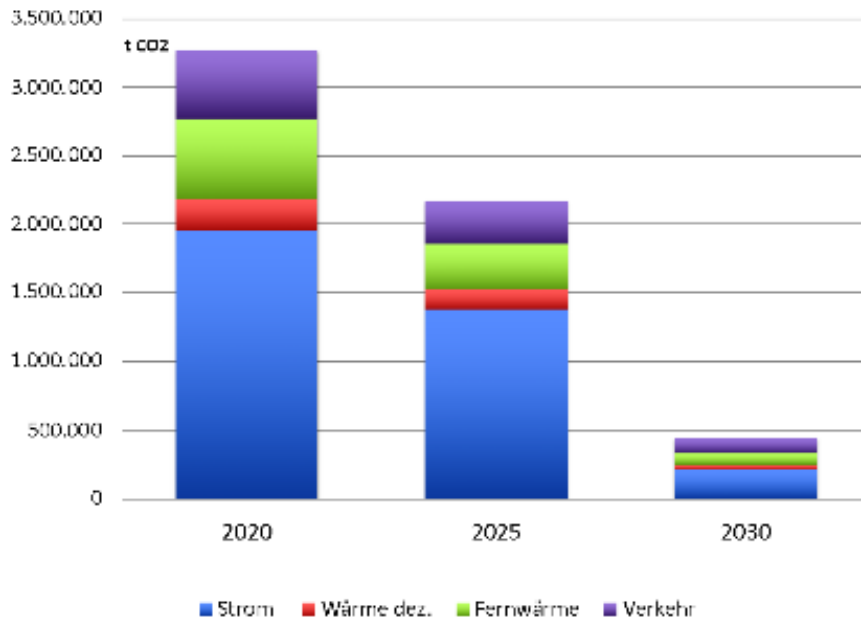




IMPACT PATHWAYS CLIMATE ACTION PLAN MANNHEIM

→ **Source: Brochure Climate Action Plan Chapter 9.2.**

The development of Pathway 1 towards climate neutrality is detailed across all consumption sectors in the following sections.

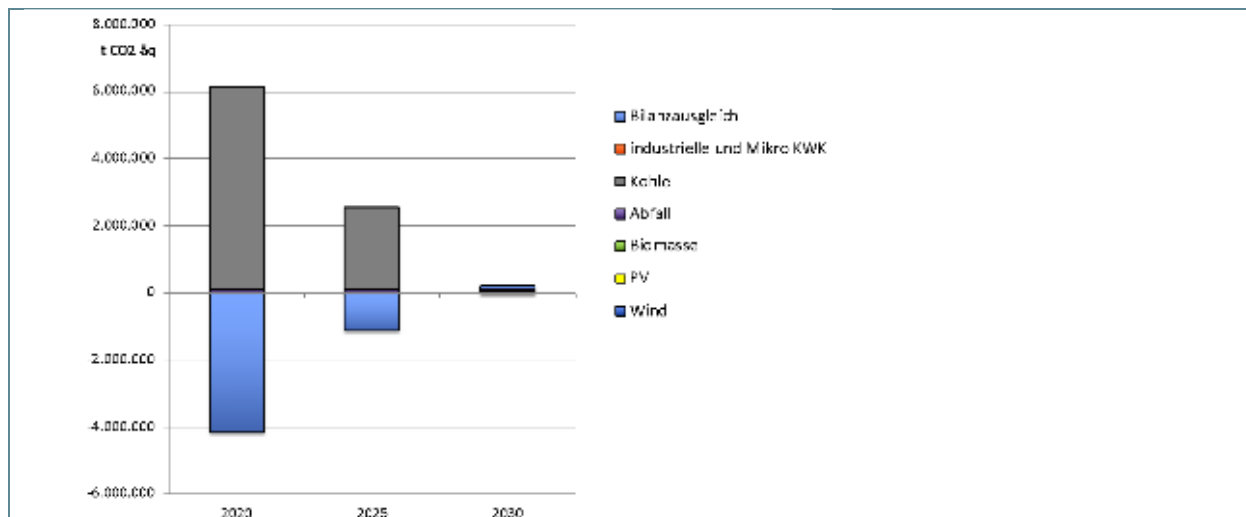


Emissions by consumption sector in pathway 1. (Source: Own calculation and presentation, Wuppertal Institute)

Path 1: Power sector

Due to the importance of the power plant GKM beyond the city limits, it is relevant for the balance and its interpretation to consider the electricity production divided according to consumption. A total of around 6 million tonnes of CO2 were emitted in the electricity sector in 2018. Of these, 32 % (corresponding to 1.9 million tonnes of CO2) are attributable to the consumption of electricity within the Mannheim territory; around 4.1 million tonnes of CO2 are additionally generated by electricity production for consumers outside Mannheim.

When the GKM is switched off, this relationship is reversed and Mannheim becomes an "importer" of electricity from the surrounding area or from the German grid. This electricity purchase is charged in each case with the emissions that were determined after the adjustment of the dena lead study to the advanced schedule (referred to as "balance adjustment" in the figure).



Emissions from electricity generation in Mannheim in path 1. (Source: Own calculation and presentation, Wuppertal Institute)

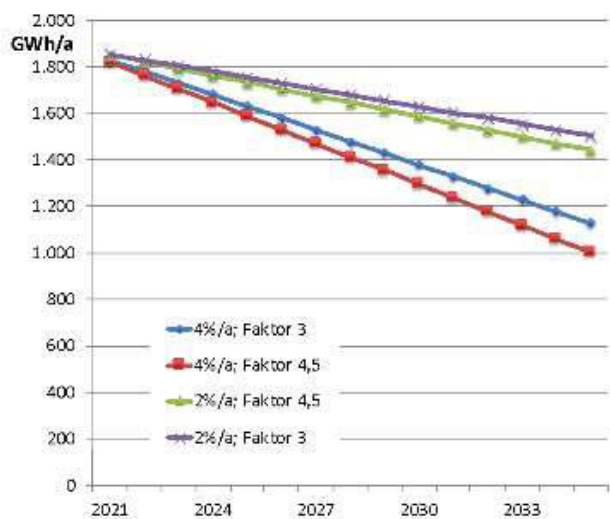
Renewable energies for electricity production on Mannheim city territory are photovoltaics, wind, and to a limited extent biomass (in the form of wood in the CHP plant). The main contribution is made by PV, whereby in addition to the roof area, additional potential is being tapped on open spaces, but also on façades.

The maximum potentials used as a basis here correspond to those determined in the Energy Framework Study in the "KliMa" scenario and also applied there - again with the decisive difference that there is twenty years less time for the complete development of these potentials, i.e. only until 2030 instead of 2050. In the case of photovoltaics in particular, this requires a significantly increased speed of expansion. An ambitious pace of expansion has already been set in the Energy Framework Study, but it is still within the experience horizon of other large cities⁴⁰. In order to achieve the expansion target by 2030, around 300 MW would have to be newly installed in Mannheim per year. This challenge is hardly conceivable without significant political intervention.

Path 1: Heat sector

In the area of building heat, the main influencing factor is renovation and the resulting reduction in energy demand. The following assumptions are taken from the national average (Kobiela et al., 2020). According to this, about 60 % of the building stock has not yet been renovated in terms of energy efficiency. In order to refurbish this proportion by the target year 2030, 6 % of the building stock (here reference: energy demand) would have to be refurbished per year by 2030. This value again exceeds the value of 4 %/a, which is the highest rate that has been mentioned in the literature so far (Kobiela et al., 2020). For this reason, 4 %/a was initially assumed here as well. For the energy demand, an average value of around 180 kWh/m² *a has been assumed, which is to be reduced to 40 kWh/m² *a, i.e. corresponding to a factor of 4.5. Figure 17 illustrates the influence of renovation rate and renovation depth by showing the resulting energy demand in each case. The higher effect is thus achieved by the number of renovated buildings (renovation rate) than by the improvement per building (renovation depth).

However, it is also clear that energy savings due to renovation are not sufficient to make the building stock climate neutral, as there is still a considerable energy demand to be met. In addition to the necessary renovation, a technology change away from conventional heat generation methods must also be implemented.

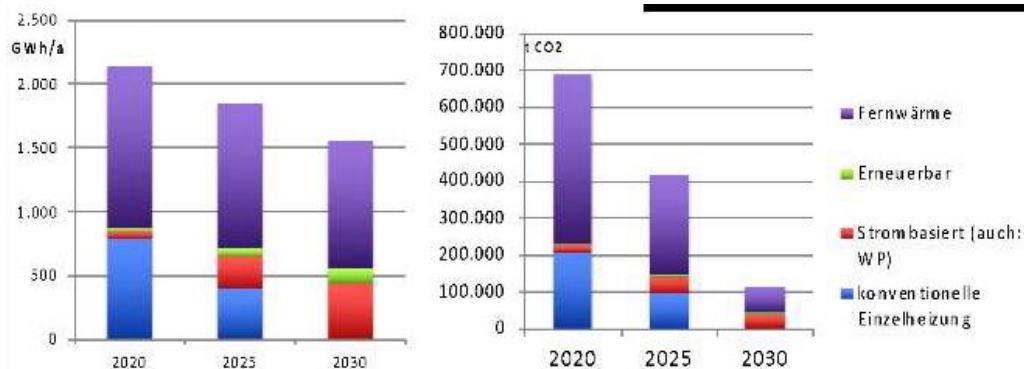


Influence of renovation rate and renovation depth on resulting energy demand. (Source: Own calculation and presentation, Wuppertal Institute).

The time span for implementing the climate neutrality targets by 2030 is extremely short. Therefore, in the transformation of technologies for building heat, the usual lifetimes or depreciation periods and technology change rates can no longer be maintained in this model. There would have to be a forced replacement. This is a methodological difference to the ERS energy framework study, in which the technology change was assumed to be similar, but significantly slower in the period up to 2050.

In order to achieve emissions as close to zero as possible, Pathway 1 relies primarily on electricity-based heating (largely heat pumps) and renewable heat. The share of electricity-based individual heating is increased by a factor of 4; solar thermal (starting from a relatively low level) by a factor of 10 and biomass (pellets) by a factor of 2-3. In this way, it is possible to remove conventional individual heating from the system by 2030. As shown above, this is a system upheaval, as these heaters will not all have reached the end of their service life by 2030 and would therefore have to be replaced prematurely. Political intervention ("promotion and coercion") will most likely be necessary here.

Even despite this far-reaching conversion, a residual emissions base of around 100,000 t CO₂ remains in 2030.



Energy demand and resulting emissions in the building sector in path 1. (Source: Own calculation and presentation, Wuppertal Institute)

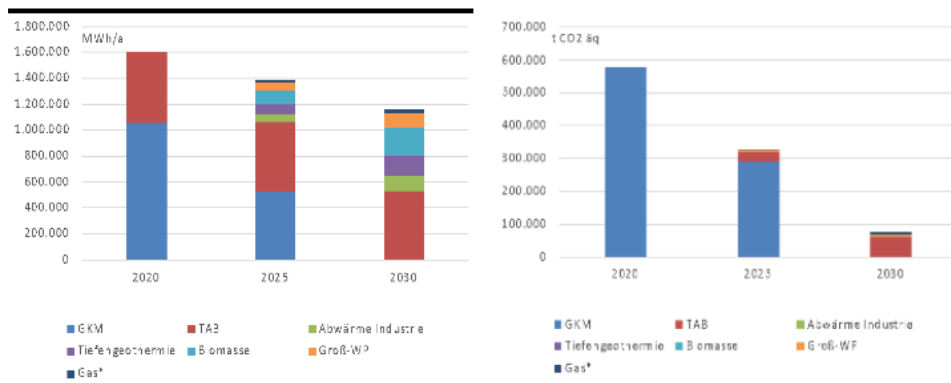
The figure also shows the great importance of district heating in Mannheim. The large share has grown historically and will also remain very relevant in the future, so that this area is shown separately again. District heating supplies large parts of the residential building stock



as well as the "trade, commerce, services" sector and industry. Until 2019 / 2020, district heating in Mannheim was fed from the heat extraction of the large power plant in Mannheim (GKM) and is therefore based exclusively on the combustion of coal. At the time of the preparation of the ERS, the connection of the heat extraction from the thermal waste treatment (TAB) was to be created, which is to provide significant parts of the district heating in the outlook.

Further options have been investigated in detail in the energy framework study by (Arnold et al., 2021). Due to its favourable geographical location, Mannheim has relevant geothermal potentials for heat supply, which can be used via deep geothermal energy as well as via river heat pumps. In addition, biomass (in the form of wood via an already installed wood-fired CHP plant and possible further expansions) and, at the peak, gas are used. Decoupled waste heat from industrial settlements in the city needs to be investigated in more detail, but could also make a smaller contribution.

A possible development for path 1 is shown in Figure 19 is shown. Emissions are dominated by the GKM until it is shut down; emissions from the TAB are accounted for as half "biogenic in origin and thus climate neutral" according to common assumptions.



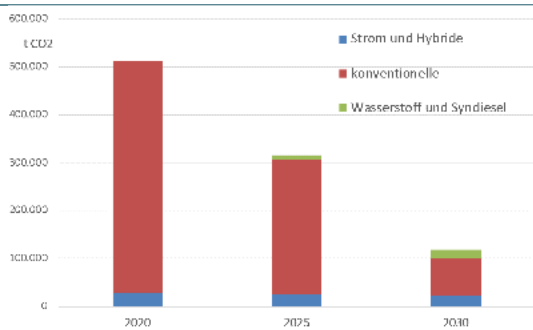
District heating generation in path 1; useful energy and emissions by feed-in category (Source: Own calculation and presentation, Wuppertal Institute).

From district heating alone, a base of emissions of around 76,000 t CO2 remains in 2030 if path 1 is applied. Since district heating and the previously shown building heat supply form an intersection, the residual emissions from the entire heating sector in path 1 are around 110,000 t CO2 .

Path 1: Transport sector

The transport sector has been divided into three areas: motorised private transport (MIV), freight transport (GV) and public passenger transport (ÖPNV). All three known instruments - avoid, shift, improve - have been applied. In the case of private transport, a decrease in transport performance has been assumed in order to take into account the high ambition of climate neutrality by 2030. For detailed information on the transport sector, please refer to the Energy Framework Study; as described above, the development there has been adjusted to the target year 2030.

In Figure 20 summarises the emissions from all three sectors by energy source. As not all conventional fuels have been replaced by 2030 despite ambitious changes in the fleet composition, they account for the largest share of the remaining emissions of around 120,000 t CO2 .

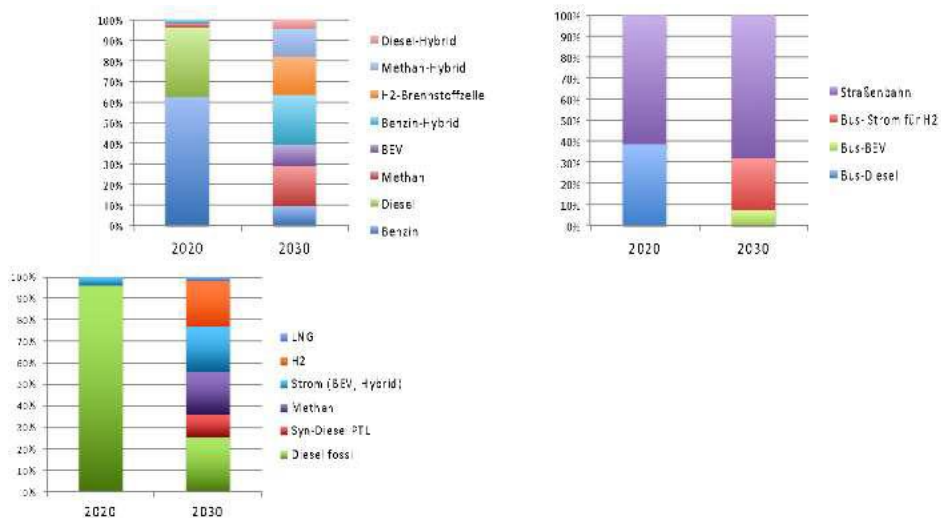


Resulting emissions across all transport sectors by energy source in path 1. (Source: Own calculation and presentation, Wuppertal Institute)

Figure 21 shows how the fleet composition must change in each of the three transport sectors in order to achieve the targets set. These are adapted and adopted in the familiar procedure from the dena lead study (Bründlinger et al., 2018).

Particularly in the MIV and GV sectors, the far greater number of options for propulsion and fuel systems makes it clear that here, as in the building sector, a system change is imminent that must be implemented within a short period of time.

The number of options is expanded by using hybrid vehicle concepts, as also envisaged in (Bründlinger et al., 2018). In the modified path 2 of this present work, the hybrids are replaced by other solutions and the emissions are reduced even further in this way (see section 9.2.3).



Change in fleet composition in path 1 - breakdown of propulsion systems by energy use. (Source: Own calculation and presentation, Wuppertal Institute)

Public transport in Mannheim benefits from the high relevance of the tram, which, by the way, is already operated with green electricity according to the operator, Rhein-Neckar-Verkehrs GmbH. Thus, only the bus operation in this area needs to be converted from diesel to electric drive, which seems quite feasible within the set time frame.

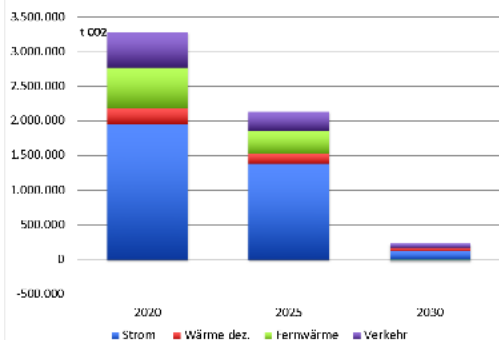
Path 2: increased level of ambition

As described in section 8.2.2 pathways 1 and 2 differ mainly in the application of CCUS and a bundle of measures in the transport sector. Due to these, the residual emissions in path 2 are almost halved to around 224,700 t CO2 compared to path 1, which corresponds to a reduction

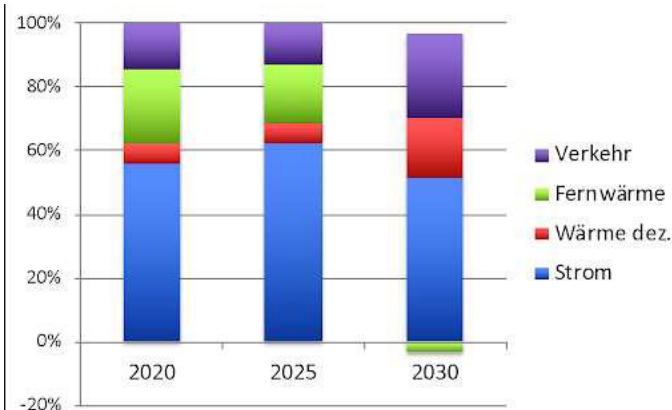


of around 93 % compared to 2020. Lower emissions are emitted in path 2, especially in the target year 2030, which is why the difference is reflected in the budget calculation (cf. section 8.3) is much less noticeable.

Due to the sink achieved by CCUS at the waste treatment site (see explanations in section 9.2.2), there are no more residual emissions in the heat supply, as also shown in Figure 22 illustrates. Accordingly, transport continues to be a major emitter, although most emissions are still caused in the electricity sector.



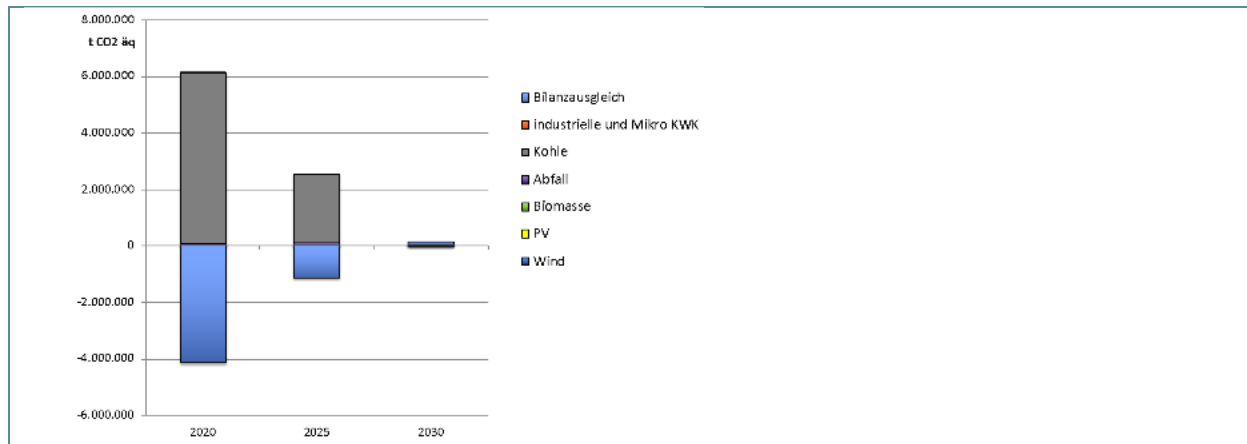
Emissions by consumption sector in pathway 2. (Source: Own calculation and presentation, Wuppertal Institute)



Shares of emissions by consumption sector in path 2. (Source: Own calculation and presentation, Wuppertal Institute)

Path 2: Power sector

The generation and consumption structure of path 2 does not differ from that in path 1. Lower emissions in the target year are only due to the fact that a sink of around 13,000 t CO2 is achieved due to CO2 capture at the thermal waste treatment plant (TAB). However, this is overcompensated by the other electricity producers, so that in the electricity sector a total of 123,000 t CO2 (instead of around 206,000 t) are emitted in the target year. The difference is shown in Figure 24 in contrast to Figure 16 hardly visible.

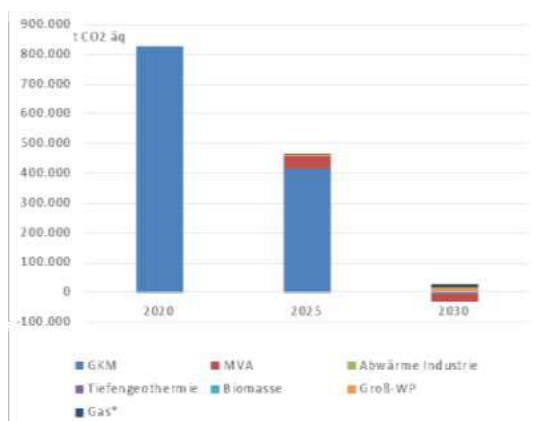
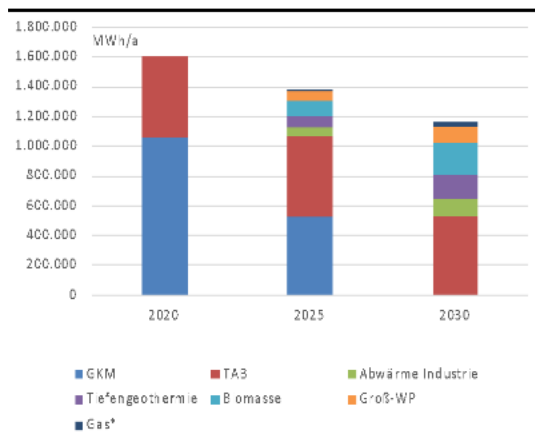


Emissions from electricity generation in Mannheim in path 2. (Source: Own calculation and presentation, Wuppertal Institute)

Path 2: Heat sector

Compared to path 1, the decentralised heat sector in path 2 is unchanged. In the author's opinion, a very high level of ambition has already been set in path 1, which is justified by the target of "climate neutral in 2030". Therefore, there are no additional measures that could reduce emissions even further.

In district heating, on the other hand, a relevant lever for emission reduction is available with the option of capturing the emissions generated at the waste treatment plant (for an explanation of the framework data, see Section 8.2.2). From the same supply structure, this results in a sink in emissions that has a general effect on district heating: with -23,000 t CO2 from TAB, district heating achieves a total of around -5,400 t CO2 in 2030.

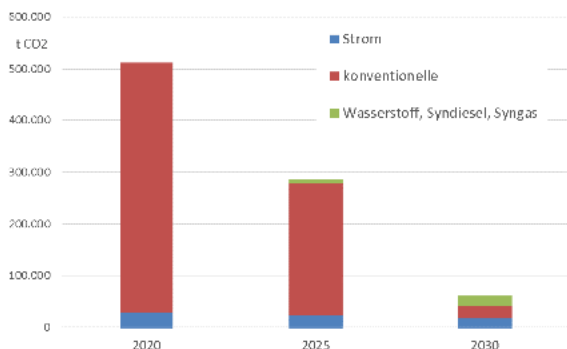




*District heating generation in path 2; useful energy and emissions by feed-in category.
(Source: Own calculation and presentation, Wuppertal Institute)*

Pathway 2: Transport sector

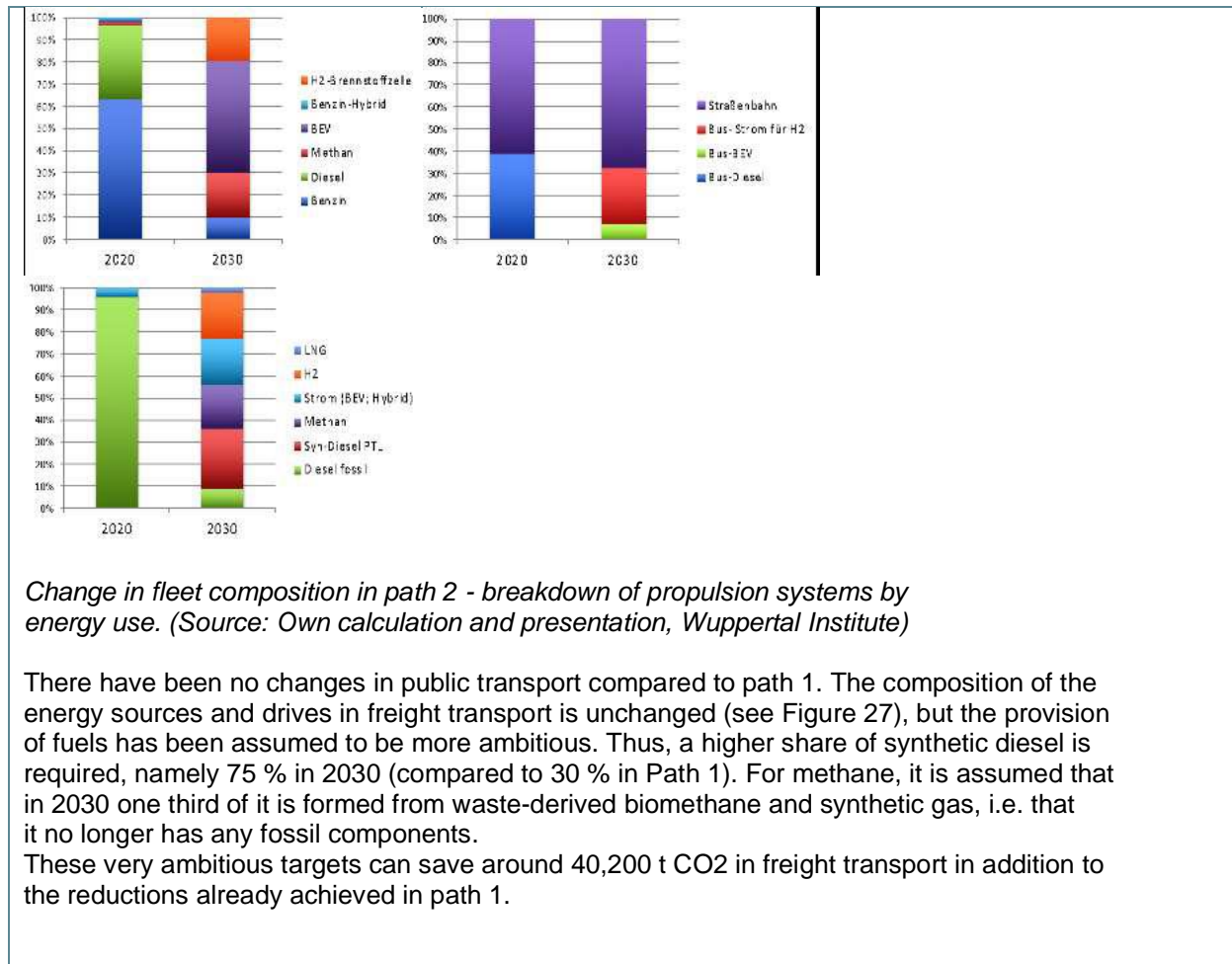
In pathway 2, the residual emissions in the transport sector fall to around 62,500 t CO₂ in 2030, corresponding to about half of those in pathway 1. In 2030, about one third of these come from residual conventional fuels (such as LNG in shipping), from the provision of electricity for propulsion systems, and from the provision of hydrogen or other synthetic fuels (syndiesel and syngas).



*Resulting emissions across all transport sectors by energy source in path 2.
(Source: Own calculation and presentation, Wuppertal Institute)*

In section 8.2.2 the additional measures in transport are described in contrast to path 1. On the one hand, there is an adjustment in the fleet composition, which deviates at this point from the templates from (Bründlinger et al., 2018). In contrast to these, the focus is now no longer on hybrid vehicles in MIV (petrol, diesel and methane hybrid), as they are used in the lead study to a high share of around 40 % in the target year (adjusted here: 2030). Instead, this share is now switched to battery-electric vehicles and assessed on the emissions side with the emission factor for electricity in 2030 (adjusted: 2040 value). This already achieves a reduction of 16,500 t CO₂ compared to path 1.

Another effect of this measure is that the fleet composition in MIV becomes less diverse than is the case in path 1 - as Figure 27 in contrast to Figure 21 shows. In 2020, there is already a small share of petrol-hybrid vehicles in the fleet; however, this will not be expanded but, on the contrary, decommissioned. For consumers, this means that in the target year 2030 there will also be more options than is the case today, but the majority of vehicles will have a battery-electric drive. In addition, there are still natural gas vehicles and hydrogen fuel cell vehicles in the fleet, whereby the natural gas vehicles in path 2 are fuelled with a mixture of synthetic gas and biomethane from waste.



4.2 Module B-2 Climate Neutrality Portfolio Design

➔ Source: KSAP Chapter 6.3 Measures & Activities

CLIMATE NEUTRALITY PORTFOLIO DESIGN

CLIMATE ACTION PLAN MANNHEIM



DESIGN FOR CCC BROSCHURE

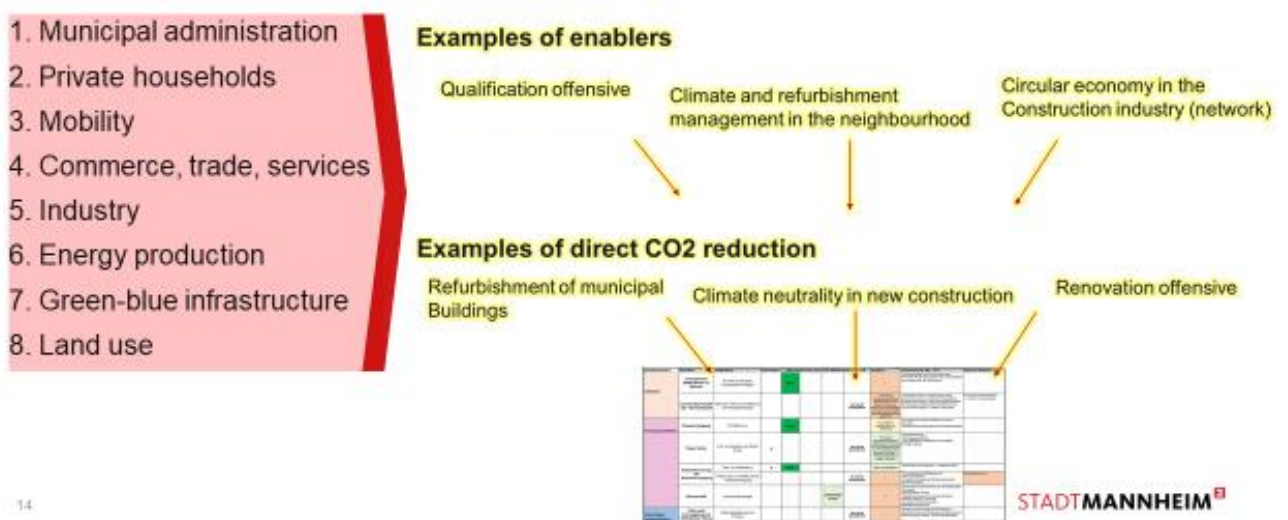


For each building block in a field of action, there are several measures, which in turn consist of several activities. The level of activities ultimately describes the contributions to be made by the City of Mannheim and/or partners within the framework of a measure. (See also Table B-2.2)

From the total of 81 measures, a total of 34 urgent measures (TOP measures) were selected in all fields of action, which are marked separately and described in more detail. In addition, a superordinate TOP measure on energy saving was added against the background of the Ukraine conflict and the resulting uncertainty of the energy supply. These are of central importance for Mannheim on the way to climate neutrality. They were selected according to the following criteria:


- CO2 saving potentials
- Important preparatory, supporting measures for acceleration ("enablers")
- **All ten core measures = interventions from the application as one of the "100 climate neutral cities".**
- At least one measure per field of action
- Measures for all groups of actors in urban society (municipal administration, citizens, companies)
- Assessment of the services for relevance, chances of implementation and speed





ACTION FIELDS SECAP 2030 – TOP MEASURES (INTERVENTIONS 100CNC) - IMPACT CASCADE CO2 REDUCTION





The following table shows all **34 TOP measures** and assigns them to their corresponding fields of action and building blocks:

Quelle KSAP Table 4: Overview of the TOP measures and their classification in fields of action and building blocks with reference to the measures of the application for "100 climate neutral cities". These TOP measures (**interventions**) are prepared and symbolically netted as follows marked 

Mannheim	B-2.1: Description of action portfolios - textual or visual		
Action Field SECAP	Fields of action	Portfolio description	
		List of actions	Descriptions
Overarching	<i>Energy saving</i>	Offensive for energy saving in the city of Mannheim	Energy Saving measures in municipal buildings and infrastructure
Energy production	Energy systems	Power generation	PV Offensive
Energy production	Energy systems	Smart grids	Development and expansion of intelligent energy control and smart grids 
Energy production	Energy systems	Decarbonisation of the heat supply	District and local heating  Geothermal energy Promotion for the conversion of the heat supply
Energy production	Energy systems	Hydrogen	Hydrogen strategy
Energy production	Energy systems	Concrete and overarching measures	Energy self-sufficient sewage treatment plant 
Industry	Energy systems	Energy measures in the company	Use and expansion of renewable energies
Industry	Waste & circular economy	Establish and expand the circular economy in industry	Network "Resource Efficiency & Circular Economy »
Trade, commerce, services	Waste & circular economy	Establish and expand the circular economy in the tertiary sector	Circular economy in the construction industry
Trade, commerce, services	Others	Overarching measures	Economic and structural development Qualification offensive
Mobility	Mobility & transport	Avoid motorised traffic	Reduction of the privileges of motorised individual transport (MIV) Reduce the need to be (car)mobile
Mobility	Mobility & transport	Shift motorised traffic	Shift MIV to public transport 



			Shift MIV to cycling and walking  Car-poor inner city Mannheim (Liveable inner city Mannheim) 
Mobility	Mobility & transport	Making motorised transport more efficient	Promoting new drive concepts
Land use	Green infrastructure & nature based solutions	Reduce land consumption	Safeguarding and developing open space (planning principle) Land-saving urban development (planning principle)
Land use	Green infrastructure & nature based solutions	Green, forest and agricultural land	Forest areas
Green-blue infrastructures	Green infrastructure & nature based solutions	Green and unsealing in public space	Unsealing of surfaces
Green-blue infrastructures	Green infrastructure & nature based solutions	Water in the city	Sponge City Mannheim
Private Households	Built environment	Residential building	Optimised use of living space and areas Renovation offensive 
Private Households	Others	Climate-friendly nutrition and consumption	Avoid waste, improve recycling
Municipal administration	Built environment	Climate-neutral properties	Rehabilitation of municipal buildings  Climate neutrality in new construction  Optimised use of buildings
Municipal administration	Built environment	Climate protection in public spaces	Corporate mobility management in the administration Reduction of energy consumption in public spaces 



Municipal administration	others	Administrative structures and -processes	Strengthening integrated administrative action
Municipal administration	Built environment	Overarching measures	Climate protection management in the neighbourhood

INTERVENTIONS FOR CLIMATE NEUTRALITY BY 2030

Here we provide a **description of all interventions, which are crucial for reaching climate neutrality** by 2030. All of these interventions are **flow into the Climate Action plan**, see table above. In the middle you can see the Local Green Deal action field (campaign IDEAL for Mannheim), which is mainly influenced by the interventions.

100CNC Interventions Stationary Energy

!IDEAL for Mannheim

Building for the future

Municipal refurbishment road map: Energy retrofits, green district heating, renewable energy expansion saving by 17kg CO₂/m²/a. CO₂ minus 80% within 20 years

Green roofs and facades

Municipal refurbishment road map: all buildings powered by PV electricity by 2027

Local renovation wave: 4.000 flats refurbished by 2030; 1.000 flats connected to district net by 2025
heat minus 40%
CO₂ minus 55%

Smart Quarter Spinelli: Lighthouse project on conversion area with energy self-sufficient heating concept - groundwater energy, heat pumps, PV electricity on all roofs and facades.

STADTMANNHEIM²



100CNC Interventions
Renewable Energy



Street Lighting:
Energy-efficient and insect friendly; 14,600 poles replaced in 2028 (LED-quote 40%); 1,000 t CO2 reduction per year; counteracting light pollution

Solar Initiative Mannheim: sMArt City company 40 MWp PV for all municipal buildings (incl. schools); support of private homeowners with solar bonus for PV; cost-free solar checks

Decarbonisation district heating:
100% climate-neutral by 2030 through mix of thermal waste treatment, renewable sources as biomass, biomethane, river heat, geothermal energy, sewage sludge incineration and industrial waste heat

Renewable heat transition:
Geothermal energy from Rhine Valley (150-200 GWh); River Heat pump into operation 2023 (20MWth, heat generation 80 GWh)

100CNC Interventions
Mobility



Livable, emission-free city centre: by reallocating public space 64% of CO2 emissions significantly reduced; cycle paths expanded;

Reduce cars: streets converted into pedestrian zones; parking spaces reduced; increasing parking fees; reduce parking search traffic

Comfortable Cycling: high-speed cycle lanes - 2 routes begin 2022; new Rhine bridge connection; bicycle route network optimised; cycle gap closure; inner city ring, 50% now completed

Attractive green public transport: 100% climate-neutral by 2030, including street cars, e-buses, H2-buses; extension light railway network of 11km by 2027; more frequent service; digital on-demand transport; intermodal hubs



100CNC Interventions
WASTE

Biowaste becomes energy: production of climate neutral methane for heat generation in the planned joint anaerobic bio-digestion plant; CO2 savings 7,400 t/year Mannheim+Heidelberg



Piloting carbon capture from waste heat: Thermal waste treatment plant; pilot carbon capture in mid terms of 2020s

Innovation meets waste water treatment plant: energy self sufficient waste water treatment plant

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STADTMANNHEIM ²

100CNC Interventions
Other Areas

Sustainable lifestyle: Reusable's campaign; climate-friendly food

Green Innovation Ecosystem: largest industries and research; just transition

IDEAL GREEN for Mannheim: forestation 23,000 forest trees in 2 years; 2,300 city trees by 2023



Reducing carbon footprint: transform into handprint thinking

National Garden show BUGA23: 2,300 city trees by 2023; climate-neutral event





All interventions belong together to make the IDEAL for Mannheim picture complete. They have overlapping direct and indirect impacts.

ESTIMATION OF THE SAVINGS POTENTIAL

A transformation of this magnitude is only feasible with a variety of different hard and soft measures. Hard measures are usually infrastructural as well as legally binding measures. Hard measures are, for example, concrete regulations or the construction of a district heating pipeline. These measures have a direct impact on CO₂ emissions. In contrast, advisory or communicative measures are classified as soft. Overall, a good mix of hard and soft measures is important. The better soft measures work, the more effective and better hard measures unfold. The various measures interact with each other, which does not always allow for an exact delineation of the individual contributions to reducing the emission level. In addition, for example, the effect of an advisory offer for the expansion of photovoltaics on roof surfaces depends on how well it is actually accepted or how many people advised actually decide to install a PV system in the end.

These uncertainties can only be partially reflected by assumptions, whereby care must be taken to avoid double counting: For example, a scheme to install PV can be supported by advice and financial support. The emission reduction of the installed systems must then be "distributed" among the individual measures. Consequently, the KSAP is made up of a large number of measures, only some of which can be quantified well, but which ultimately combine to produce the "good mix" of hard and soft measures mentioned above. It should be noted that the quantified CO₂ savings do not take into account any interactions among the measures, but each measure is considered in isolation. Accordingly, the measures may not be added up among themselves. **Measures with interactions are explicitly mentioned in the text. For the majority of the quantified measures, the CO₂ savings potential was determined on the basis of the UBA Umweltbundesamt (2022a).** This study provides Germany-wide municipal savings potentials for climate protection measures in million tonnes of CO₂ equivalents, which were adjusted for application to Mannheim. Some measures are based on own calculations. For example, all impact assessments for the field of action mobility are based on preliminary work from the **Mannheim Energy Framework Study (ERS)** and in coordination and harmonisation with the Mobility Master Plan 2035. This procedure was chosen because the ERS



provided extensive Mannheim-specific mobility indicators. In addition, the Wuppertal Institute had already developed a methodology and a tool for the ERS to estimate the mitigation effect of transport-related climate protection measures.

The field of action "energy production" is not considered separately according to the present municipal accounting methodology. Likewise, neither emissions from land use change nor natural emission sinks, such as afforestation, are accounted for, which would affect the fields of action "land use" and "green-blue infrastructure". **The contributions to climate neutrality, which are nevertheless relevant but not always quantifiable, are therefore presented separately in the descriptions of the fields of action.**

NOTE: Instead of Table B - 2.2. we can offer for each of the 34 top measures an overview with a description of the measure, savings potential, co-benefits and costs if available. These are also listed again in the text of the Climate Action Plan 2030.

★ **TOP priority Measure: Offensive for energy saving in the City of Mannheim**

Due to the war in Ukraine and the associated reduction in gas supplies from Russia, it is currently a very realistic scenario that energy supply bottlenecks may occur in winter. Political activities currently focus on the question of where alternative energy supplies can come from. In addition, there are calls for energy-saving behaviour. With the Federal Energy Saving Ordinance, a bundle of measures was passed to save 20 % of the energy demand in Germany in the short term.

Energy savings can be achieved through different measures and by different actors. Due to these various possibilities to achieve the savings target, there are many links to the other measures described in the KSAP. In particular, the renovation offensives in the building sector and measures to increase energy efficiency and sufficiency should be mentioned here, such as, for example:

- In the field of action Industry: Measure 1: Exploit energy efficiency potentials
- in the field of action trade, commerce, services: Module 1: Energy and resource efficiency in companies
- in the field of action Private Households: Measure 2: Renovation offensive
- in the field of action of local administration: Module 1: Climate-neutral properties and Module 3: Climate protection in public spaces

- In addition, a broad-based energy-saving campaign is to be launched, which will highlight behaviour-related ways of saving energy through proper heating and ventilation, electricity-saving measures and energy-saving mobility.

The aim of the measure is to support, educate and motivate the population of Mannheim in energy-saving behaviour.

The activities of the City of Mannheim and its stakeholders in this regard are:

- Intensification of existing advisory activities by the climate protection agency
- Temporary massive campaign with broad publicity
- Support measures to increase energy savings
- Cushioning of social hardship (e.g. adjustment of payment terms for energy costs)
- Implementation of the Energy Saving Ordinance (EnEV) and Short-Term Energy Supply Assurance Measures Ordinance (EnSikuMaV) for all parts of the urban community, taking into account occupational health and safety requirements, this includes, among other things:
 - Heating public buildings to a maximum of 19 degrees
 - Stop lighting public buildings and monuments

Time horizon

The measure should be implemented immediately and be limited in time.

Contribution to climate neutrality

The CO₂ savings potential is shown here as 0.486 million tonnes. A saving of 20 % is to be achieved in all sectors except transport.

Responsibility

- Energy saving: the whole of Mannheim's urban society
- Advisory services: Climate Protection Agency Mannheim gGmbH
- Compensation for social hardship: Energy supplier, City of Mannheim
- Support programmes: City of Mannheim

Financial expenditure

Personnel capacities must be made available in the short term to intensify the advisory activities. Material resources must also be made available for public relations work.

Monitoring / Indicators

The success of the measure can be measured by the reduction in energy consumption on Mannheim city territory.

Conflicting goals and synergies

The measure has a direct link to social aspects in that it can help particularly affected low-income households to keep rising energy prices as low as possible through savings. It thus has high synergies for combating energy poverty.

Good practice examples

- Municipal savings measures in response to the declaration of the "gas_" emergency plan alert level: <https://www.mannheim.de/de/presse/stadt-mannheim-verfolgt-schnell-umsetzbare-energiesparmassnahmen>
- City of Neustadt: Establishment of various information services on the energy crisis <https://www.neustadt.eu/BN/CN/BCrger-Leben/Energiekrise/>
- MIV "Moinem saves energy" / gas bonus <https://www.miv.de/moinemspartenergie/carbonix>

Example measures in text form KSAP (only to show, how it looks in the Original Climate Action Plan)

B-2.2: Individual action outlines		
Original Template information		Mannheim Climate Action Plan
Action outline	Action name	yes
	Action type	yes
	Action description	yes
Reference to impact pathway	Field of action	yes
	Systemic lever	partly described
	Outcome (according to module B-1.1)	yes activities/results
Implementation	Responsible bodies/person for implementation	yes
	Action scale & addressed entities	yes
	Involved stakeholders	yes
	Comments on implementation	yes
Impact & cost	Generated renewable energy (if applicable)	yes partly, if already possible/quantified
	Removed/substituted energy, volume or fuel type	yes partly, if already possible/quantified
	GHG emissions reduction estimate (total) per emission source sector	yes partly, if already possible/quantified
	Total costs and costs by CO ₂ e unit	Yes partly for seed financing – see investmentplan



All **measures have already been transferred to Climate View** and are controlled via the conversion levers there. We **do not consider an additional different presentation** as required here to be expedient. However, **all information on the measures is named in the KSAP and is listed in the text section below.**

MANNHEIM TABLE B-2.2.

MAIN TABLE FOR THE CCC WITH ALL INFORMATION INCLUDED

<p>TOP priority Overarching Measure: OFFENSIVE FOR ENERGY SAVING IN THE CITY OF MANNHEIM</p>
<p>Framework conditions : Due to the war in Ukraine and the associated reduction in gas supplies from Russia, it is currently a very realistic scenario that energy supply bottlenecks may occur in winter. Political activities currently focus on the question of where alternative energy supplies can come from. In addition, there are calls for energy-saving behaviour. With the Federal Energy Saving Ordinance, a bundle of measures was passed to save 20 % of the energy demand in Germany in the short term. Energy savings can be achieved through different measures and by different actors. Due to these various possibilities to achieve the savings target, there are many links to the other measures described in the KSAP. In particular, the renovation offensives in the building sector and measures to increase energy efficiency and sufficiency should be mentioned here, such</p> <ul style="list-style-type: none"> ▪ as, for example: In the field of action Industry: Measure 1: Exploit energy efficiency potentials ▪ in the field of action trade, commerce, services: Module 1: Energy and resource efficiency in companies ▪ in the field of action Private Households: Measure 2: Renovation offensive ▪ in the field of action of local administration Module 1: Climate-neutral properties and Module 3: Climate protection in public spaces ▪ In addition, a broad-based energy-saving campaign is to be launched, which will highlight behaviour-related ways of saving energy through proper heating and ventilation, electricity-saving measures and energy-saving mobility
<p>The aim of the measure is to support, educate and motivate the population of Mannheim in energy-saving behaviour</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> ▪ Intensification of existing advisory activities by the climate protection agency ▪ Temporary massive campaign with broad publicity ▪ Support measures to increase energy savings ▪ Cushioning of social hardship (e.g. adjustment of payment terms for energy costs) ▪ Implementation of the Energy Saving Ordinance (EnEV) and Short-Term Energy Supply Assurance Measures Ordinance (EnSikuMaV) for all parts of the urban community, taking into account occupational health and safety requirements, this includes, among other things <ul style="list-style-type: none"> ○ Heating public buildings to a maximum of 19 degrees ○ Stop lighting public buildings and monuments
<p>Time horizon The measure should be implemented immediately and be limited in time.</p>
<p>Contribution to climate neutrality The CO2 savings potential is shown here as 0.486 million tonnes. A saving of 20 % is to be achieved in all sectors except transport.</p>
<p>Responsibility</p> <ul style="list-style-type: none"> ▪ Energy saving: the whole of Mannheim's urban society ▪ Advisory services: Climate Protection Agency Mannheim gGmbH ▪ Compensation for social hardship: Energy supplier, City of Mannheim ▪ Support programmes: City of Mannheim

**Financial expenditure**

Personnel capacities must be made available in the short term to intensify the advisory activities. Material resources must also be made available for public relations work.

Monitoring / Indicators

The success of the measure can be measured by the reduction in energy consumption on Mannheim city territory.

Conflicting goals and synergies

The measure has a direct link to social aspects in that it can help particularly affected low-income households to keep rising energy prices as low as possible through savings. It thus has high synergies for combating energy poverty.

Good practice examples

- Municipal savings measures in response to the declaration of the "gas" emergency plan
- alert level: <https://www.mannheim.de/de/presse/stadt-mannheim-verfolgt-schnell-umsetzbare-energiesparmassnahmen>
- City of Neustadt: Establishment of various information services on the energy crisis
- MVV "Monnem saves energy"/gas bonus
- <https://www.mvv.de/monnemspartenergie/gasbonus>

FIELD OF ACTION ENERGY PRODUCTION



Energy production poses a challenge, especially in urban areas, where land for the construction of larger plants is limited compared to rural areas. **Nevertheless, in MVV Energie AG, the city of Mannheim has a local energy supplier that is already actively addressing this challenge. This applies to both renewable electricity and heat supply. The decarbonisation of district heating is a key challenge in Mannheim.**

While today up to 30% of district heating is generated by climate-friendly energies, decarbonisation is being pushed further and further. In April 2022, for example, construction began on an innovative river heat pump on the Rhine, which will enable river water to be used as a climate-neutral heat source from 2023. In addition, site analyses for the use of deep geothermal energy, among other things, for heat generation in the city area are currently pending. If the study is successful, this could be another building block with great potential for decarbonised district heating in Mannheim. For a timely conversion to a renewable energy supply, regional cooperations are just as sensible as investments and participations in plants outside the Mannheim city area, even if these are not included in the territorial balance. Due to the insufficient expansion potential in Mannheim itself, there is the possibility of supplying the entire Mannheim city area with green electricity, at least in mathematical terms. Ultimately, the calculations show that decarbonisation in the electricity sector alone is only possible if the German electricity mix as a whole is fed by renewables.

**Framework conditions at EU, federal and state level**

Russia's attack on Ukraine has put the issue of energy import dependency and security of supply at the top of the agenda. With the decisions of the federal government, the so-called "Easter Package", a clear course has already been set towards simplified and accelerated **regulations and procedures for the expansion of renewable energies**. With the offensive in the building sector and the amendment of the GEG, there has also been a requirement since summer 2022 that **65 % of the heat in new heating systems in buildings must come from renewable energy sources from 2024**.

The calculations (cf. chapter 9) show in particular the great influence that a timely shutdown of the large power plant in Mannheim would have on the cumulative emissions. However, the decision to bring forward the planned shutdown to 2033 is not (solely) in Mannheim's hands, but rather in the hands of the owners and, if applicable, the effects of federal policy requirements. Accordingly, an earlier coal phase-out must also be decided at the federal level. However, the aforementioned Ukraine conflict and the desire for independence from oil and gas imports from Russia represent a conflict of goals here.

BUILDING BLOCK1: POWER GENERATION (7.2.1)**TOP MEASURE 1: PV OFFENSIVE**

Framework conditions : Photovoltaics (PV) as a renewable energy source usually has a special potential in densely populated urban areas, and this is also the case in Mannheim. The reason for this is that there are many unused roof and other areas (e.g. car parks, multi-storey car parks, garages) in existing buildings that lend themselves to expansion. At the same time, however, many different individual owners must be activated in order to use this potential, similar to the energy-efficient refurbishment of buildings. Against this backdrop, activation should also be considered in principle for corresponding measures and facilities (cf. Measure 7.8.1.2, 7.4.1.1 and 7.3.1.2). In this measure, the city of Mannheim itself also has corresponding land potential that it should consistently exploit in the future in order to live up to its role as a role model. In the new construction segment, it is expected that good utilisation of roof space can be achieved through the obligation to install photovoltaic systems, which has been in force in Baden-Württemberg since 2022. However, advisory and funding instruments should also be applied in this segment in order to optimise the PV offensive.

The **aim of the measure** is to address the existing potential in existing buildings, complementing the PV obligation.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Exploiting the PV potential on municipal properties by 2030
- Use of open space potential for solar energy (agri-PV, contaminated sites and along transport infrastructures) and other areas (e.g. sports facilities, car parking areas, squares, airport, charging infrastructure for e-mobility...), taking into account the concerns of nature conservation and species protection, the landscape and the recreational function.
- Intensify solar advice within the framework of the climate protection agency's renovation advice
- Support and expand tenant electricity models
- Offers for condominium communities
- Potential analysis for façade PV
- Support the establishment of a citizen's energy cooperative
- Promotion of full-surface rooftop PV systems (beyond the legal obligation of 60 %)
- Resolution of the conflict of objectives between the protection of historical monuments and PV expansion (development of solar registers for areas with a high number of protected buildings).

Time horizon

The measure can be started immediately. The full exploitation of the potential will probably not be completed by 2030.



<p>Contribution to climate neutrality The CO2 savings potential amounts to approx. 196,300 t CO2 /a in 2030 (incl. the identified potentials from the measures 7.4.2.1, 7.8.1.2, 7.8.1.3, 7.9.1.1 and 7.9.1.2).</p>
<p>Responsibility</p> <ul style="list-style-type: none"> ▪ PV potential on municipal properties and open spaces: FB 25, Dec. V, sMArt City Mannheim GmbH, GBG Group of companies (BBS, GBG), FB 61, EB 76, EB 69, FB 40, FB 75 ▪ Solar advice: Klimaschutzagentur Mannheim gGmbH ▪ Solar energy in new buildings: FB 67, FB 61, Klimaschutzagentur Mannheim gGmbH ▪ Tenant electricity models: Klimaschutzagentur Mannheim gGmbH and FB 67
<p>Financial expenditure The Climate Protection Agency already offers highly qualified advice. However, the number of advisors is far from sufficient and needs to be increased. It is therefore more a matter of intensification, which can be implemented with a small additional personnel effort in terms of achievable CO2 reduction effects. Costs arise for the City of Mannheim for the examination of the suitability of available roofs of municipal buildings and areas. This is then associated with investment costs for the installation of the systems and necessary work on the roof.</p>
<p>Monitoring / Indicators The success of the measure can be illustrated by the PV electricity fed into the grid, which is recorded when the energy and CO2 balance sheet is updated. The installation for self-consumption can also be recorded via consulting cases and funded projects by the City of Mannheim or the Climate Protection Agency. A possible indicator is also the increase in installed capacity in Mannheim (the data from the market master data register is publicly available).</p>
<p>Conflicting goals and synergies The measure is directly related to the action 7.7.3.1 "Promote new drive concepts" with regard to the conversion to e-mobility and the necessary expansion of the charging infrastructure. A frequently mentioned conflict of objectives is between the use of areas for greening versus PV use. However, there are not only conflicts here, but also synergies: for example, green roofs can increase the performance of PV systems through their cooling effect in summer. The shading effect can also have synergies in hot periods on public squares, car parks or green spaces. Especially for open spaces, a conflict of goals can develop, as these offer great potential not only for PV systems, but also for nature conservation and species protection.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> ▪ Foundation of sMArt City Mannheim GmbH https://www.smartmannheim.de/themen/dekarbonisierung/ ▪ City of Gütersloh: Photovoltaics funding programme https://www.guetersloh.de/de/rathaus/presseportal/news/meldungen/archiv/2021/foerderprogramm-photovoltaik.php ▪ As of December 2022: A total of around 3200 registered PV systems on Mannheim city territory, with a gross capacity of 65,180 kWp

<p>MEASURE 2: WIND POWER</p>
<p>Framework conditions : According to the current status, areas in the north of Mannheim and on Friesenheim Island are among the possible locations for wind energy in Mannheim. In addition to large turbines, small wind turbines can also make a contribution to decarbonisation in the electricity sector. The aim of the measure is therefore to identify and exploit the potential for wind power in a more targeted manner. The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> ▪ Explore suitable areas in the north of Mannheim and on Friesenheim Island ▪ Potential study on small wind turbines (e.g. on sports fields, high-rise building roofs) ▪ Raising awareness and reducing barriers: educational seminars and excursions to wind farms for residents of potential sites.
<p>Contribution to climate neutrality: The CO2 savings potential amounts to 34,400 t CO2 /a in 2030.</p>



BUILDING BLOCK 2: SMART GRIDS (7.2.2)

In addition to electricity generation, storage and load management are important variables to balance the fluctuating generation that energy from the sun and wind brings. In combination, this results in smart grids that enable better use of renewable electricity.

MEASURE 1: ESTABLISHMENT AND EXPANSION OF INTELLIGENT ENERGY CONTROL AND SMART GRIDS

Framework conditions: Smart grids digitally control electricity generation and demand and can thus better balance grid loads, especially against the background of fluctuating renewable electricity generation from sun and wind. Smart grids can be developed successively and initially on a small scale by first creating them for specific areas. This can be interesting both in industrial areas (cf. Measure 7.3.3.1) as well as in mixed areas, or across different neighbourhoods, so that generation, storage and utilisation capacities can be considered and used in an integrated manner. The city of Mannheim has already gained experience in this area with the conversion area Benjamin Franklin Village.

The **aim of** the measure is to identify suitable areas and build smart grids.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Identify and implement use cases (e.g. industrial area, neighbourhood)
- Develop a long-term strategy for expansion
- Site analysis for electricity storage and implementation of pilot projects
- Decentralised cellular energy management for raising flexibility potentials and peak load management (C-Sells)
- Accelerate smart meter rollout

Time horizon

The measure can be started immediately. For this purpose, a potential and feasibility study should be prepared as a first step, on the basis of which a first pilot project will be implemented. A more extensive expansion of smart grids is unlikely to be completed by 2030.

Contribution to climate neutrality

Smart grids themselves do not have any direct CO2 saving potential, but through the intelligent control of grid loads they are a building block for the optimised use of renewable energies and their expansion.

Responsibility

Construction and operation of smart grids: energy companies, owners of large real estate portfolios, companies in commercial areas (see also section 7.3).

Financial expenditure

In a first step, a preliminary study would have to be carried out at a comparatively low financial cost. The costs for implementing a pilot project depend very much on the identified area and the installations and construction measures required here, which is why a cost estimate is not possible at this point. It should be part of a corresponding feasibility study.

Monitoring / Indicators

A first milestone would be the identification of a neighbourhood or an area that can be developed as a pilot project, a second the implementation of the project. Subsequently, the further expansion can provide information about the amount of energy controlled via smart grids or the connected plants and energy consumption points as an indicator of success.

Conflicting goals and synergies

Synergies arise in the development of smart grids, especially with regard to the expansion of renewable energy plants such as PV and wind. The fluctuating amount of electricity can be used more optimally through intelligent load management. Smart grids can also contribute to the decarbonisation of industrial and other energy-intensive companies.

Good practice examples

- Mannheim district of Franklin: C-sells project <https://www.mvv.de/smart-cities/quartiersentwickler/>
- loesungen#c19846 <https://www.csells.net/de/>
- Stuttgart Airport: <https://www.flughafen-stuttgart.de/fairport-str/klimaschutz-ressourcen/im-fokus-intelligente-energiesysteme/>



BUILDING BLOCK 3: DECARBONISATION OF THE HEAT SUPPLY

In addition to the need to accelerate the **expansion of renewable energies for electricity supply**, there is a much greater need to **decarbonise the heat supply** in Mannheim than in other cities, as the grid is very well developed. In addition to the urgently needed **savings through efficiency and sufficiency in the building sector**, different energy sources also offer themselves here. With the construction of a river heat pump on the Rhine, another cornerstone has been laid for the decarbonisation of Mannheim's district heating. **From 2023, it will provide a thermal output of around 20 megawatts, with a consumption of 7 megawatts of electricity, and will thus be one of the largest heat pumps in Europe. However, the technical potential of both rivers, the Rhine and the Neckar, is much higher and is estimated at 500 megawatts of thermal capacity.** Together with the potential for **deep geothermal energy**, river heat is an important building block for decarbonising the heat supply in Mannheim. The basis for a strategic development is the municipal heat planning (§7 c KSG BW), which is currently being developed in Mannheim.

MEASURE 1: MUNICIPAL HEAT PLANNING AS A BASIS FOR STRATEGIC PROMOTION AND ADVICE

Framework conditions: With the preparation of the municipal heating plan, Mannheim is currently developing an important basis for the strategic and neighbourhood-specific adaptation of future advisory and support services. The central steps for the preparation of the municipal heating plan are regulated in §7c paragraph 2 Climate Law state Baden-Wuerttemberg KSG BW.

The **aim of the measure** is to use municipal heat planning as a strategic tool for decarbonisation in the heat sector.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Completion of municipal heat planning (in progress) by the City of Mannheim by the end of 2023 (this heat planning contains district-specific specifications for district heating priority areas or hydrogen priority areas). Alignment of funding and advisory services with the strategic implementation of the heat transition.
- Identification of settlement areas where a substitution of the gas grid by hydrogen grids or a switch to district heating or other decentralised alternatives (heat pumps) is possible
- Ensure intensive citizen participation
- The measure itself has no direct **CO₂ saving potential**, but serves as a basis for raising the identified potential of the following measures in this module.

The measure itself has no direct **CO₂ saving potential**, but serves as a basis for raising the identified potential of the following measures in this module.

MEASURE 2: DISTRICT AND LOCAL HEATING

Framework conditions : Around 19,200 buildings in Mannheim are currently supplied with district heating (around 1,500 GWh per year). Their decarbonisation thus represents a major lever for a more climatefriendly heat supply. Even with a further expansion of district heating, not all areas can be developed. In some of these neighbourhoods, a local heating network can therefore be a climate-friendly option for heat supply. With the energy framework study for MVV (Arnold et.al., 2021) and the analysis on the "decarbonisation of district heating" by 2030 commissioned by Mannheim kohlefrei (2021), it has become clear that there is sufficient potential for a low-emission district heating supply (including biomass, river heat pumps, deep geothermal energy and industrial waste heat) to meet demand. So far, the potentials of industrial waste heat and solar thermal feed-in have not been analysed in more detail. With these (additional) potentials, it may be possible to meet a higher demand in the future through more district heating connections or through the development of local heating networks in areas without district heating connections. These expansion strategies should be based on the municipal heating planning currently being developed in order to avoid misdirected investments.

The **aim of the measure** is thus threefold: the decarbonisation of district heating, the expansion of district heating supply in the Mannheim urban area and the identification of areas with local heating potential.



<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> ▪ Potential analysis of industrial and commercial waste heat and its use ▪ Substitution of non-renewable energy sources through river heat pumps, deep geothermal energy, etc. ▪ Using solar thermal energy to feed into the district heating system ▪ District heating expansion strategy based on municipal heating planning ▪ Identification of areas for the development of local heating networks (for example, in peripheral areas of the city that are far away from the district heating network).
<p>Time horizon The decarbonisation of district heating is already underway. Implementation by 2030 is ambitious, but possible. Important components of the strategy are included in the Energy Framework Study 2045 and are continuously supplemented, for example by deep geothermal projects.</p>
<p>Contribution to climate neutrality The CO2 savings potential of this measure can be estimated at around 503,900t CO2 /a in 2030, taking into account a lower district heating demand in 2030 due to energy-optimised buildings. Without efficiency measures in the building stock, the CO2 savings potential through decarbonisation can be estimated at 475,200 t CO2 /a if the district heating demand remains the same.</p>
<p>Responsibility Heat Supply: MVV and other companies</p>
<p>Financial expenditure MVV is investing a low three-digit million sum in the expansion of district heating</p>
<p>Monitoring / Indicators The current emission factor of local district heating is already regularly collected. In addition, the sales figures for district heating represent a relevant indicator. https://www.mvv-netze.de/fileadmin/user_upload_mvv-netze/Dokumente/partner/installateure/Zertifikate_PEF_CO2_2020.pdf</p>
<p>Conflicting goals and synergies On the basis of municipal heat planning, advice and financial support should be used strategically. For example, the conversion of the heat supply should, if possible, take place by connecting to district heating if it is already "on the doorstep".</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> ▪ District heating network MVV https://www.mvv.de/waerme/fernwaerme ▪ Local heating network Hüfingen https://www.huefingen.de/de/Nahwaermeverbund-Huefingen
<p>MEASURE 3: GEOTHERMAL ENERGY</p>
<p>Framework conditions : Geothermal energy has a relevant potential for decarbonising district heating in Mannheim (cf. TOP measure 2: District and local heating) as well as for use in individual buildings. This is especially true for deep geothermal energy, as the use of near-surface geothermal energy in Mannheim often conflicts with groundwater protection. Geothermal energy represents a significant contribution to an overall low-emission heat supply in Mannheim, with the aim of identifying and exploiting all potential in a targeted manner. Concrete projects have already been initiated in this regard, such as a geothermal heating plant that Vulcan Energie Ressourcen GmbH and GeoHardt GmbH plan to build nearby.</p>
<p>The aim of the measure is to develop the geothermal potential in Mannheim.</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> ▪ Implementation for the utilisation of geothermal potential by companies with exploration permits ▪ Analyse potentials and implement pilot projects for near-surface geothermal energy, e.g. after refurbishment or in the new construction of a municipal property ▪ Construction of heat storage facilities for buffering peaks in the various city districts
<p>Time horizon The measure can be considered as already started. Further activities to analyse additional potentials should be initiated promptly. The full utilisation of the potentials is expected to extend beyond 2030.</p>



<p>Contribution to climate neutrality The CO₂ savings potential of this measure amounts to 25,800 t CO₂ /a in 2030. This potential has already been included in measure 7.2.3.2 integrated.</p>
<p>Responsibility</p> <ul style="list-style-type: none"> Expansion and operation: Vulcan Energy GmbH, GeoHardt GmbH, MVV Support/environmental issues: FB 67
<p>Financial expenditure Depending on the ongoing explorations and the potentials identified, valid cost estimates will only be possible at a later date.</p>
<p>Monitoring / Indicators The annual geothermal output can be determined from the installed systems. In addition, monitoring is carried out by regularly updating the energy and CO₂ balance sheet.</p>
<p>Conflicting goals and synergies The decision to use geothermal potential should be made on the basis of municipal heat planning. As with the measure 7.2.3.2 on district heating, a targeted city-wide strategy for decarbonising all heat should be pursued. Geothermal plants can also be used to extract lithium, which is used in batteries, for example. This results in synergies with storage technologies, which are needed as a building block of the energy and transport transition. Conflicts of interest may arise with groundwater protection. This must be examined in each individual case.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> Munich Freiham district heating network using geothermal energy https://www.swm.de/dam/doc/geschaeftskunden/fernwaerme/niedertemperaturnetzfreiham-nord.pdf Geothermal energy Insheim: https://natuerlich-insheim.eu/

<p>MEASURE 4: SUPPORT FOR THE CONVERSION OF THE HEAT SUPPLY SYSTEM</p>
<p>Framework conditions : Based on the municipal heat planning, a supply strategy for buildings and neighbourhoods can be developed that makes optimal and efficient use of the existing infrastructures (e.g. district heating) and potentials (e.g. geothermal energy or solar thermal energy). In accordance with this strategy, targeted consultation should also take place, which, in addition to the previous measures 7.2.3.2 and 7.2.3.3 is seen as complementary to these activities:</p> <ul style="list-style-type: none"> Renovation offensive in the private households field of action Consultancy and networking in the field of action GHD Use and expansion of renewable energies in the field of action industry <p>The mere existence of a strategic heat plan does not guarantee its implementation.</p>
<p>The aim of the measure is to strategically approach the conversion of the heat supply on the basis of municipal heat planning</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> Intensify advisory services for citizens and businesses Intensify promotion for renovation and heating conversion Neighbourhood- and building-specific targeted promotion of suitable heating solutions based on municipal heating planning
<p>Time horizon The municipal heat planning as a basis for this measure is currently being developed and will be completed by the end of 2023 at the latest. This can be followed up immediately with advice and funding.</p>
<p>Contribution to climate neutrality The CO₂ savings potential of this measure can be estimated at 11,000 t CO₂ after full implementation.</p>
<p>Responsibility</p> <ul style="list-style-type: none"> Consultancy services: Klimaschutzagentur Mannheim gGmbH, sMArt City Mannheim GmbH, MVV, municipal heating planning: FB 67

**Financial expenditure**

An overview of existing funding programmes in the building sector - including conversion of the heat energy supply - is available from the Ministry of the Environment of the State of Baden-Württemberg: <https://um.baden-wuerttemberg.de/de/energie/informieren-beratenfoerdern/foerderprogramme/energetische-foerderprogramme-fuer-gebaeude/>

A supplementary funding programme on the part of the city should examine these existing offers and, based on this, design a supporting or supplementary funding. For a significant intensification of the implementation of measures in the building sector, a considerable increase of the current budget of the climate protection agency is necessary. The share of funding for the conversion of the heat supply should then be estimated more concretely on the basis of the results of the municipal heat planning.

Monitoring / Indicators

Monitoring can be done on the number of consultations carried out as well as on the subsidies used.

Conflicting goals and synergies

The change in the funding logic, which promotes different systems and technologies at the small-scale level on the basis of municipal heating planning, is intended to lead to a more efficient use of existing potentials and thus to a more targeted use of funding. Nevertheless, it is possible that this new approach will cause problems of acceptance among the population and businesses. The measure should therefore be prepared and accompanied with information and communication.

Good practice examples

- City of Constance: Municipal heating planning <https://www.kea-bw.de/kommunaler-klimaschutz/wissensportal/best-practice/konstanz>
- Climate Protection Agency Mannheim: <https://klima-ma.de/>

BUILDING BLOCK 4: HYDROGEN

In various studies, green hydrogen promises to make a significant contribution to climate neutrality, but at the same time the production quantities have been far too small so far to be able to cover the diverse demand in various sectors. It therefore currently seems sensible to use hydrogen, which is foreseeably available in limited quantities, in those sectors and fields of action in which there are no sufficient alternatives, such as in certain industrial processes or in heavy goods transport. With the hydrogen strategy, the building block thus encompasses production, application and infrastructures to be developed.

MEASURE 1: HYDROGEN STRATEGY

Framework conditions: The topic of hydrogen is a highly topical one and is being promoted at various levels and programme strands. The areas of application for "green" hydrogen are diverse: in industry, aviation, in cars, for heat supply. Accordingly, energy and climate scenarios for Germany see competing uses and, in some cases, high import requirements. However, it is unclear whether the corresponding capacities can be created abroad to the extent estimated. It is therefore also important to further develop Germany as a production location and to test corresponding application possibilities.

Due to the diverse areas of application, a hydrogen strategy is currently being developed for the Rhine-Neckar metropolitan region, in which specific fields of application will also be identified for Mannheim. Particularly in the industrial sector, in processes or logistics, there are suitable fields of application for Mannheim. Accordingly, a strategy should also include relevant fields of application and the development of the necessary infrastructure in addition to measures for production.

The **aim of** the measure is to increase and strategically expand the production and application of hydrogen in Mannheim.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Sector coupling & power generation (mobility, storage and transport)
- Support regional hydrogen network (Rhine-Neckar metropolitan region) and jointly initiate innovation and application projects as well as funding advice and support for consortia formation (cf. measure 7.3.1.2). 7.3.1.2)



<p>Time horizon The development and expansion of production and infrastructure is a long-term process. Accordingly, the development of a strategy, the identification of potentials, the establishment of the network and the acquisition of funding should be started immediately.</p>
<p>Contribution to climate neutrality Green hydrogen has a high environmental relief potential. The contribution it can make to reducing emissions in Mannheim depends strongly on the local potential, availability and applications. Taking transport as an example, the expected hydrogen potential can lead to a saving of approx. 43,000 t CO2 .</p>
<p>Responsibility Development of strategy: MRN, companies, Dec. I, EB 76, IHK, HWK</p>
<p>Financial expenditure In the short term, there will be costs for potential analysis and strategy development. For initial pilot projects, efforts should be made to obtain funding so that the investment costs can be (partially) covered.</p>
<p>Monitoring / Indicators The first milestones in this context would be the preparation of a strategy and potential analysis. In the further course, the use of hydrogen as an energy carrier can be mapped within the framework of the energy and CO2 balance sheet.</p>
<p>Conflicting goals and synergies Not all hydrogen is climate-neutral. Accordingly, the strategy should clearly focus on green or possibly turquoise hydrogen.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> ▪ H2 Rivers Rhine-Neckar Metropolitan Region (project partner EB76): https://www.m-rn.com/was-wir-tun/themen-und-projekte/projekte/h2rivers ▪ Use of H2 vehicles in the EB 76 fleet ▪ Mannheim: Ensuring a refuelling infrastructure for hydrogen in Mannheim

<p>BUILDING BLOCK 5: CONCRETE AND OVERARCHING MEASURES</p>
<p>In addition to the concrete facilities and construction projects, a fundamental "desire for the energy transition" is needed for the field of action of energy production. This can be promoted through opportunities for financial and active participation. Concerns about the expansion can also be countered with appropriate public relations and educational work. In addition, the expansion of renewable energies is not limited to the Mannheim city area: in cooperation with the region, potentials can be used in a much more targeted and comprehensive way. And finally, ambitious showcase projects in the city can serve as a model and thus promote the commitment, or at least the acceptance, of ambitious climate protection.</p>
<p>MEASURE 1: ENERGY SELF-SUFFICIENT SEWAGE TREATMENT PLANT</p>
<p>Framework conditions : The large sewage treatment plant of the municipal sewage works is to become energy self-sufficient in the medium term. This means that it will be able to supply itself with electricity and heat. To achieve this, energy saving and energy generation measures were implemented.</p> <p>In addition to the energy renovation of the digester building shell, the heat distribution was optimised, a heat storage tank was built and the sludge drying system was replaced. Most of the required energy is generated by means of an innovative CHP plant, which uses the generated sewage gas to produce electricity and heat. The amount of sewage gas is significantly increased by accepting co-substrates (liquid waste materials containing carbon). In addition, a photovoltaic system was built over water surfaces and the plant's own water wheel.</p>
<p>The aim of the measure is to make the sewage treatment plant self-sufficient in terms of energy.</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> ▪ Renovation of the digester building envelope ▪ Construction of a heat accumulator ▪ Replacing the sludge drying



<ul style="list-style-type: none"> Construction of a reception point for co-substrates Construction of a combined heat and power plant powered by sewage gas Construction of PV systems on open spaces as well as over water surfaces Construction of a hydropower plant
<p>Time horizon The measure is already underway and electricity and heat have been generated on the grounds of the sewage treatment plant for its own use for almost 50 years (City of Mannheim, 2010). By 2023, it is planned that so much energy can be generated on the grounds of the sewage treatment plant that it can be operated largely self-sufficiently in terms of energy.</p>
<p>Contribution to climate neutrality The measures already implemented can save 35,000 t CO2 per year.</p>
<p>Responsibility <ul style="list-style-type: none"> Operator sewage treatment plant: EB 69 </p>
<p>Financial expenditure 26.7 million have already been approved for the energy measures via business plans. A large part of this has already been implemented or is in the process of being implemented. In addition, subsidies are being applied for for the heat storage facility, which will subsidise 30 % of the established costs. Further investments depend on the development regarding the taxation of electricity feedin. As soon as it is legally and contractually permitted to feed self-generated green energy into the higher-level grid, further energy measures (wind turbine, additional PV systems over water surfaces) are to be included in the business plan. For this further development, the staff position of an energy management will be created.</p>
<p>Monitoring / Indicators The share of self-generated electricity in the electricity consumption of the sewage treatment plant is already regularly recorded. In addition, the associated avoidance of CO2 emissions can be calculated for the entire city.</p>
<p>Conflicting goals and synergies In the routine replacement of company vehicles, there will be a switch to electric vehicles in the future where it makes sense to do so, which can be charged via self-generated electricity.</p>
<p>Good practice examples <ul style="list-style-type: none"> Sewage treatment plant City of Mannheim: https://www.mannheim.de/sites/default/files/2020-03/EBS_Imagebroschuere_2020_Web.pdf Dresden: Energy 21 programme: https://www.stadtentwaesserung-dresden.de/ueberuns/umwelt-zukunft/ </p>

<p>MEASURE 2: INNOVATIVE FINANCING / PARTICIPATION OPPORTUNITIES FOR LOCAL BUSINESSES AND CIVIL SOCIETY</p>
<p>Framework conditions: Getting businesses and civil society involved in the development of a sustainable city involves more than public relations or participation processes. Financial participation in concrete projects on the ground not only promotes acceptance, but also enables participation for people who are not able to engage actively, discursively, voluntarily or otherwise in a time-intensive way.</p>
<p>The aim of the measure is to develop offers for the financial participation of companies and civilians in local climate protection projects</p>
<ul style="list-style-type: none"> The activities of the City of Mannheim and its stakeholders in this regard are: Development of platforms for the expansion of renewable energies (e.g. solar exchange) Exploit economic potentials in energy management (virtual power plant) (e.g. electricity bank project) Support citizen cooperatives Certification of a green electricity offer from MVV with the "green electricity" label so that 1 cent per kWh sold can flow into a fund for the expansion of renewable energies in Mannheim Opportunity to participate in municipal climate protection projects in the form of donations
<p>The CO2 savings potential of this measure can be estimated at approx. 26,000 t CO2 /a for the year 2030.</p>



MEASURE 3: ACCEPTANCE FOR THE ENERGY TRANSITION

Framework conditions: Climate protection measures repeatedly encounter headwinds in various areas. This can be just as true for a change in traffic policy due to the reduction of parking spaces or the conversion of roads into cycle paths as it is for the installation of a wind turbine. However, the climate protection goals in Mannheim can only be achieved if all actors, from companies to organisations, initiatives and the civil population, actively participate or at least tolerate the necessary transformation.

The **aim of** the measure is to use various measures to give actors in Mannheim the opportunity to help shape and participate in climate protection measures and to promote acceptance.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Implementation through integration into appropriate counselling and support services
- Create investment opportunities (see also measure 7.2.5.2)
- Communication, public relations, events

The **CO2 savings potential of** this measure can be estimated at **26,000 t CO2 /a** for the year 2030.

MEASURE 4: REGIONAL NETWORKING / COOPERATION FOR THE ENERGY TRANSITION

Framework conditions: Networking beyond the Mannheim city area is an added value for various fields of action, measures and stakeholders. This applies, for example, to companies for the exchange regarding an efficiency and resource strategy or also for the development and expansion of a hydrogen strategy. A climate-neutral energy supply can only succeed through functioning urbanrural cooperation.

Against this background, the **aim of** the measure is to actively expand existing regional networks and build new ones.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Expand existing approaches, e.g. Cluster Network Energy and Environment of the MRN, Competence Centre Energy Efficiency (KEFF)
- Regional objectives / voluntary commitments, e.g. regional energy concept MRN

The **CO2 savings potential of** this measure can be estimated at **26,000 t CO2 /a** for the year 2030.

ACTION FIELD INDUSTRY



According to Mannheim's energy and CO2 balance with data from 2018, the industry sector is responsible for slightly more than half of the local emissions (V136/2021). Energy-intensive companies are obliged to participate in the European Emissions Trading Scheme (EU-ETS)⁹, which provides economic incentives to invest in emission-reducing measures.

The decisive fields of action with regard to the transformation paths in the industrial sector are found in the restructuring of the energy system and in the role of sector coupling.



Nevertheless, the principles of the energy transition - reducing energy demand, using renewable energy as directly as possible and using electricity from renewable energy sources - should be given equal priority.

The key challenge for climate protection in industry is to achieve economic growth that is independent of greenhouse gas emissions, which is associated with a significant increase in research and innovation activities. In this context, the use of innovative low CO2 processes must be examined on the basis of technical availability as well as economic aspects. Overall, the structural development of a competitive business location should be designed in a sustainable and future-oriented manner so that a shift of greenhouse gas emissions (carbon leakage problem) can be prevented (cf. BMUV 2021).

FRAME WORK CONDITIONS AT EU, FEDERAL AND STATE LEVEL

For an economically viable conversion of production processes, the framework set by the federal government and not least by the EU plays a decisive role in terms of competitiveness.

On the one hand, there are **financial and legal instruments** such as CO2 pricing, carbon contracts for difference¹⁰, CO2 carbon border price adjustment¹¹ and other forms of protection against carbon leakage¹². **On the other hand, subsidy programmes** play an important role in providing incentives for forced climate protection in industry: from the development and market introduction of innovative technologies to the expansion and use of renewable energies to the development and use of sustainable materials and products.

BUILDING BLOCK 1: ENERGY MEASURES IN THE COMPANY

The measures described here are intended to help reduce energy in industrial production processes, use it more efficiently and accelerate the shift in energy sources towards low-carbon and carbon-free energy sources.

MEASURE 1: EXPLOIT ENERGY EFFICIENCY POTENTIALS

Framework conditions: This measure is intended to enable industrial companies located in Mannheim to identify and exploit the energy efficiency potential associated with their production processes. The design should address not only industrial but also other energy-intensive companies

The **aim of** the measure is to reduce the energy consumption associated with industrial production processes and the associated CO2 emissions.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Advice on subsidies for conversion to energy-efficient processes and energy-efficient building refurbishment
- Targeted support services for change management in SMEs in their own companies, e.g. sustainability officers in companies
- Initiation and monitoring of energy-saving measures in companies
- Initiate and consolidate competence networks (Climate Protection Alliance, Initiative Industriestandort Mannheim)

The **CO2 savings potential** amounts to approx. **52,700 t CO2** after full implementation.

MEASURE 2: USE AND EXPANSION OF RENEWABLE ENERGIES

Framework conditions: Industry, as a special field of action that is particularly challenging in the development towards climate neutrality, will continue to have high energy consumption for the foreseeable future. All the more relevant here is the question of how the remaining energy demand can be covered by renewable energies. In addition to energy consumption for electricity and space heating, there are also energy requirements for cooling and processes, for example in the manufacture of materials and products. A distinction must also be made between the development of renewable energies on the company's premises for its own needs, the supply of energy to other energy consumers through feed-in and the purchase of renewable energy for its own needs. Various potential energy sources are available here.

The **aim of** the measure is to substitute fossil-generated electricity or fossil fuels with renewable-generated electricity and other renewable energy sources in Mannheim's industrial



companies.
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Investigate potentials: Use waste heat internally and / or feed it into heat grids; set up cooling grids • Support PV expansion on industrial (roof) surfaces through advisory services (e.g. in cooperation with Klimaschutzagentur Mannheim gGmbH or sMArt City Mannheim GmbH). <p>Support regional hydrogen network (Rhine-Neckar metropolitan region) and jointly initiate innovation and application projects as well as funding advice and support for consortium formation (cf. also Measure 7.2.4.1: Hydrogen Strategy).</p> <ul style="list-style-type: none"> • Mutual use of land potential: Exchange market for suitable areas or leasing opportunities for large-scale measures, e.g. solar exchange. • Support implementation projects for energy storage, identify land potentials • Joint pilot projects on hydrogen production, storage and use • Expansion and intensification of the training offer for companies around energy saving and sustainability at the workplace
<p>Time horizon</p> <p>The measure should be tackled in the short term and then implemented in the long term. In the field of PV, successes are likely to be achieved more quickly than in less established technologies and applications such as hydrogen.</p>
<p>Contribution to climate neutrality</p> <p>The CO₂ savings potential for the year 2030 is estimated at approx. 319,900 t CO₂ /a.2</p>
<p>Responsibility</p> <ul style="list-style-type: none"> • Advisory services: Klimaschutzagentur Mannheim gGmbH, sMArt City Mannheim GmbH • Climate Protection Alliance Network: FB 67 • Structural and Economic Development: FB 80 • Companies of the Initiative Industriestandort Mannheim, FB 80 (as a first approach)
<p>Financial expenditure</p> <p>For the city of Mannheim, costs arise for personnel capacities that can offer potential analyses and advisory services. Investment costs can also arise for the expansion of infrastructures, for example in the area of hydrogen. In this area in particular, however, there are currently and foreseeably funding programmes from the European Union and the Federal Ministry of Economics that can be used for the expansion of renewable energies in general and hydrogen in particular. Because the concrete potentials have not yet been determined, the costs in this context cannot be quantified in more detail.</p> <p>For the industrial companies, there are also investment costs that can also be financed proportionally through funding programmes.</p>
<p>Monitoring / Indicators</p> <p>The production and use of renewable energies on site can best be mapped in the context of updating the energy and CO₂ balance (energy consumption and use of energy sources).</p>
<p>Conflicting goals and synergies</p> <p>The expansion of renewable energies and their use are not necessarily core businesses of local companies. At the same time, however, the current Ukraine conflict demonstrates the sensitivity that arises for local companies due to their dependence on energy imports. Against this background, both climate protection and the security of energy supply for businesses can be addressed with this measure (see section 7.1).</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> • Roche https://www.energie.de/euroheatpower/news-detailansicht/nsctrl/detail/News/mvv-liefert-kompletten-bedarf-an-prozessdampf-fuer-rochewerk-aus-thermischer-abfallverwertung • John Deere Mannheim Biodiversity Roof https://taz.de/Abwasserreinigung-auf-dem-Dach!/5127447/ • Olam Covering heating needs by burning cocoa shells https://www.mvv.de/journalisten/pressemitteilungen/detail/mvv-errichtet-ressourcenschonende-und-nachhaltigedampferzeugungsanlage-in-mannheim • Friatec fuel cell power plant https://www.erneuerbareenergien.de/energiewende-



20/speicher/erstes-projekt-mannheim-brennstoffzellenkraftwerk-mit-14-megawattgeht-betrieb

BUILDING BLOCK 2: ESTABLISHING AND EXPANDING THE CIRCULAR ECONOMY IN INDUSTRY

The construction industry, food, clothing or electronic devices are just a few examples of the diverse areas in which circular economy needs very different approaches. Accordingly, the measures are to be understood comprehensively: from specific measures regarding technological applications to possibilities of material substitution to product and process design. The associated advantages in terms of savings potential and added value for companies – from energy and raw material import security to competitive advantages - should be systematically compiled and made available to Mannheim companies in information materials and advisory services. The establishment and expansion of digital process chains can provide support in this regard.

MEASURE 1: NETWORK "RESOURCE EFFICIENCY & CIRCULAR ECONOMY"

Framework conditions: The interrupted supply chains due to the restrictions in the context of the Corona pandemic, shortly afterwards in spring 2021 due to a container ship stuck in the Suez Canal and now currently the supply crisis due to the war in Ukraine, have shown that the security of supply of local companies with necessary raw materials is very sensitive. The promotion of resource efficiency and the development and expansion of the circular economy can therefore not only save emissions in the area of extraction and transport of raw materials, products and materials for companies. At the same time, they can make industrial companies based in Mannheim more independent of imports and thus more resilient to such events. In this context, the starting situations and possibilities for increasing resource efficiency in companies are very different, as are the possibilities for using renewable or recycled materials for one's own production or for improving the reparability or recyclability of one's own products. Accordingly, an approach should be pursued that takes this diversity in the companies into account

The aim of the measure is to support appropriate networking in different areas of the industrial companies located in Mannheim and to implement pilot projects.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Establishment of a network to support innovative cooperation projects (e.g. Climate Protection Alliance, Initiative Industriestandort Mannheim)
- Establishment of a platform for the exchange of "leftover products" between regional companies
- Prepare and disseminate sector-specific information material for industry sectors

Time horizon

The preparation and dissemination of information material can take place in the short term. Likewise, networking can begin promptly on the basis of the existing structures in Mannheim.

Contribution to climate neutrality

The reduced use of materials through the increase in resource efficiency and circular economy results in CO2 savings, especially in the area of the extraction of raw materials, the (pre-)production and the transport of goods outside the Mannheim city area. The amount of savings depends to a large extent on potentials in Mannheim companies that have not yet been identified and can therefore not be quantified in more detail here. On the Mannheim city area itself, the reduction of emissions is to be classified as rather low, possibly even increasing, if the treatment processes in the context of the circular economy mean additional energy consumption. In total (inside and outside the city area), however, a clear reduction potential can be assumed.

Responsibility

- Climate Protection Alliance: FB 67
- Companies of the Initiative Industriestandort Mannheim, FB 80, IHK
- Structural and Economic Development: FB 80

Financial expenditure

The financial expenditure should be planned in particular for network management. The network work should be considered together with other entrepreneurial network work (e.g. the network work on the topic of hydrogen in Measure 7.2.4.1 or the qualification offensive in Measure 7.4.4.3).



Monitoring / Indicators

The implementation of the measure can best be monitored through milestones set in advance, such as the holding of network meetings, the completion of information materials or initiated projects. Furthermore, concrete implemented projects can be mapped via the tonnages of imported materials saved.

Conflicting goals and synergies

Synergies can be identified with regard to the reduced dependence on imports of raw materials and materials for Mannheim companies and the associated increased resilience to supply bottlenecks. This measure can strengthen regional links and cooperation beyond the Mannheim city area. Companies in the region can benefit from each other's knowledge of products and residual materials and also achieve financial advantages.

Good practice examples

- IHK network
- Greentec Cluster Styria: <https://www.greentech.at/>
- KEFF+: <https://keff-bw.de/de/kompetenzstelle/rhein-neckar>

BUILDING BLOCK 3: SMART SUSTAINABLE INDUSTRY

With a "smart sustainable industry strategy", the aspects of digitalisation and sustainability are combined in order to raise efficiency potentials in industry, conserve resources and optimise the use of renewable energies.

MEASURE 1: SMART GRIDS

Framework conditions: Through intelligent systems such as smart grids, data on electricity generation, storage and consumption can be combined and important grid information can be transmitted. Sector coupling between electricity and heat as well as mobility also plays an important role here.

The aim of the measure is the efficient use of renewable energies generated in Mannheim and the optimisation of grid utilisation. A cost-intensive expansion of the electricity distribution grid to cope with the fluctuating generation and demand of renewably generated electricity can thus be avoided.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Concepts and feasibility studies for near-site climate-neutral energy supply of commercial and industrial areas, incl. energy generation, storage, load management, mobility

The **CO2** savings potential depends on the opportunities identified on site. Therefore, it cannot be estimated at this point in time.

MEASURE 2: DIGITAL PROCESSES AND APPLICATIONS

Framework conditions: Digital applications and processes, for example in the monitoring of machines or workflows, can improve production processes and thus conserve the necessary resources. Furthermore, they can be used in the introduction of a lifecycle management of products or the company.

The **aim of** this measure is to reduce the energy consumption resulting from industrial production processes and the associated CO2 emissions.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Support for the establishment and expansion of digital processes and services for the analysis of climate protection potentials of digital process chains
- Advice on the development and introduction of accounting tools for companies in general (corporate carbon footprint) and/or products (product carbon footprints) and lifecycle management
- Introduce management systems for sustainable business practices in companies (e.g. WIN Charter of the State of Baden-Württemberg).
- Promotion of innovation labs in the city

The **CO2** savings potential cannot be estimated at this point.



BUILDING BLOCK 4: OVERARCHING MEASURES

Analogous to the other fields of action, an "overarching measures" module is also planned for industry. This supports the targeted approach of industrial companies on the topic of climate protection as well as the communication of measures from industry to the population. As in the field of action for trade, commerce and services, the development of appropriate framework conditions and strategies for the entire economy in Mannheim is also supported.

MEASURE 1: ATTRACTING INNOVATIVE AND SUSTAINABLE INDUSTRY

Framework conditions: The focus of the measures presented so far has been particularly on companies already located in Mannheim. However, in order to have the necessary knowledge and solution providers on site so that industry can succeed in the transformation, an innovation component is to be added by intensifying both the efforts to attract new (green industry) companies and the promotion of start-ups, including spin-offs from the universities.

The aim of the measure is a proactive settlement policy of sustainable industries and companies and start-up promotion.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Announcement via networks, possibly competitions, etc.
- Addressing this corporate target group through public relations work
- Special consideration of GreenIndustry and Smart Economy companies in the allocation of space

The **CO₂** savings potential cannot be quantified in advance, or depends on the type of new settlement (or type of business) and whether the new settlement is additional. In this case, a one-time increase in emissions can be assumed, but it is still worth pursuing in order to support the intraregional dynamics in favour of a climate-neutral economy.

MEASURE 2: COMMUNICATION

Framework conditions: The measure includes all areas of advertising and public relations, from information material to events and campaigns to motivate companies to implement climate protection measures in their businesses. This also includes activities for the targeted settlement policy of sustainably operating companies (cf. measure 7.3.4.1).

The aim of the measure is to communicate climate protection measures in the industrial context (e.g. building modifications, CO₂ capture, etc.) to the population on the one hand, and on the other hand to permanently establish KSAP in the industrial sector.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Intensification of the activities of the Climate Protection Alliance
- Increased communication of industry best practices to the public through advertising, public relations

The **CO₂** savings potential cannot be quantified.

ACTION FIELD COMMERCE, TRADE, SERVICES



The share of the trade, commerce and services sector in final energy consumption is approx. 4.3 % and in emissions 5.3 % in Mannheim (398 GWh, 166,049 t CO₂). The field of action trade, commerce and services is characterised by the fact that it is made up of very different sectors, types of companies and actors, which means that it has a high level of diversity. Here, too, there are companies for which energy consumption represents a high cost factor in relation to turnover. Accordingly, the proposals made for the measures in the field of action "Industry" should be selected with care.

In addition, there are many small and medium-sized enterprises that - unlike large companies - often have not set up their own office for a corporate sustainability strategy because they lack the capacities for this or would have to "buy in" competences. This makes it clear that in the field of tertiary sector action, companies sometimes need more support than large corporations in order to tap into the basically economic energy saving potentials that they have.

Measures with this target group are therefore always part of sensible business promotion, because support for cost savings is a locational advantage. This becomes clear when looking at the share of energy costs in the turnover of different sectors. For example, the Austrian Energy Agency has determined that energy costs in the personnel-intensive hotel and restaurant sector account for about 5 %, and for laundries and dry cleaners even 8 to 10 % (<https://www.energieeffizienz-im-betrieb.net/energiekosten-unternehmen.html>).

FRAMEWORK CONDITIONS AT EU, FEDERAL AND STATE LEVEL

The further expansion of support services is necessary, especially for small and medium-sized enterprises. This includes **support programmes for energy management, energy consulting and investments** as well as clear, transparently communicated guidelines for action that open up long-term planning perspectives. If, in addition, **lending is** linked to appropriate framework conditions in order to align **investment decisions with the goal of climate neutrality**, it becomes clear that a corporate climate protection strategy can be tackled promptly and implemented in a sustainable manner.

The bureaucratic hurdles to obtaining funding are particularly high for tertiary enterprises. For example, the requirements of the de minimis aid regulation create barriers for a company to receive funding from an EU member state. In addition, the bureaucratic effort is often too high, especially for smaller companies, to successfully apply for funding or to apply for subsidies.

BUILDING BLOCK 1: ENERGY AND RESOURCE EFFICIENCY IN COMPANIES

Tapping energy and resource efficiency potentials in the tertiary sector leads to multiple benefits. Municipal strategies to increase energy and material efficiency have the effect of both reducing regional economic costs and developing sustainable business areas and jobs in the local economy (cf. Henniscke et al., 2022). In energy and climate change scenarios (cf. Kopernikus project Ariadne 2021) it was shown that a strategy focussing primarily on energy efficiency is associated with economic benefits, i.e. that the necessary investments are matched by similarly high or even higher savings. In this respect, measures that address the principle of "Energy Efficiency First" are of particular relevance. Another central argument in favour is that the more unnecessary energy consumption can be avoided through energy saving and efficient use, the higher the share of renewable energies. The expansion is thus more costeffective, more resource-



efficient and associated with less land and landscape consumption, and can be increased more quickly.
 The average share of material costs in the gross production value in the manufacturing sector in Germany rose from about 38 % (1993) to about 47 % (2008) and then fell again to about 43 % by 2017. In absolute terms, the cost of materials thus amounted to about 917 billion euros in 2017. The energy cost share of the total gross production value was on average about 1.6 % in 2017, i.e. in absolute terms about 34 billion euros, which are included in the above-mentioned material costs. This makes it clear that a joint consideration of energy and resource saving potentials in the tertiary sector makes a lot of sense. As a result, a joint energy and resource turnaround means not only a mutually reinforcing contribution to climate and resource protection, but also a significant reduction in material and energy costs, which increase the socio-ecological scope for innovation and investment. If the regional economic effects are included, the picture that emerges, put simply, is of a circular economy that is less dependent on external imports and thus less vulnerable to sudden price increases or supply difficulties.

MEASURE 1: COUNSELLING AND NETWORKING

Framework conditions: The development of knowledge and the networking of actors is an important key to success.
 Sector-specific networks and advisory services can address efficiency potential in a targeted manner. In this context, SMEs should also be addressed, which often do not have the possibilities to deal with these topics on their own due to their lower personnel capacities.

The **aim of** the measure is to reach, inform and support companies on the path to emission reduction.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Establish counselling centre and expand counselling services
- Support and advisory services for energy and resource efficiency, e.g. through the Competence Centre for Energy Efficiency (KEFF), the Smart Production network, technology scouts.
- Prepare / provide sector-specific information material for the tertiary sector, especially SMEs.
- Targeted support services for change management in SMEs in their own companies, e.g. sustainability officers in the companies
- Intensify corporate network (GreenTech cluster, climate protection alliance)
 - Continuation of ECOfit or KLIMAfit

The **CO2** savings potential of this measure cannot be quantified exactly. The amount of the savings potential depends very much on sector-specific aspects. However, as a preparatory, accompanying and thus "soft" measure, it is very relevant for achieving the savings potential in the tertiary sector.

MEASURE 2: SUPPORT PROGRAMME FOR ENERGY AND RESOURCE EFFICIENCY

Framework conditions: Sector-specific support programmes for tertiary enterprises can address energy saving potentials in a targeted manner and ideally respond to sector-specific characteristics.

The **aim of** the measure is to tap the rich potential for saving energy and resources in tertiary enterprises and thus to improve the competitiveness of the enterprises and at the same time to give positive impulses to the regional economy.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Set up municipal funding programmes to complement existing state and federal funding and close gaps where necessary.

The **CO2** savings potential of this measure cannot be quantified exactly. The amount of savings potential depends very much on sector-specific aspects, e.g. internet trade and laundry (digital business areas vs. manufacturing business areas).

Building Block 2: Using climate-neutral energy in trade and industry



The expansion of renewable energies in the tertiary sector can - similar to the field of action private households - be addressed at the building level as well as at the neighbourhood level. In the heating sector, this means that heating systems in individual buildings can be converted to renewable energies, but it may also be more advantageous to connect to district or local heating networks. On the other hand, there are also companies with similarities to the field of action of industry, in which waste heat accumulates that can be used both internally for the company's own heating needs or for a climate-friendly expansion or conversion of district heating. In the area of electricity, there is also still some potential for expanding photovoltaics on buildings and land. And finally, this also includes the use of renewables in the area of mobility, so that there is an interface with the mobility field of action.

MEASURE 1: WHOLE DISTRICT APPROACH

Framework conditions: In the districts, district solutions for the expansion of renewable energies and for the use of waste heat or climate-friendly heat supply are developed. Existing potentials are better exploited by taking into account site-specific characteristics.

The **aim of** the measure is to initiate concrete measures for the expansion of renewable energies in the neighbourhoods. The neighbourhood approach is intended to tap into possible synergies.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Municipal heat planning (in progress)
- Examine the potential of commercial waste heat and build up or feed it into corresponding heating/cooling networks.
- Check requirements for connection to appropriate heating networks (incl. advice and funding)
- Linking neighbourhood-based and operational mobility concepts

The **CO₂** savings potential of a compulsory connection and use of decarbonised district heating can be estimated at **approx. 7,000 t CO₂** for existing buildings and new buildings. The state of Baden-Württemberg is currently working on the legal basis for this.

MEASURE 2: SECTOR-SPECIFIC CONTRACTING OFFERS

Framework conditions: Contracting is a financing option in which an external provider makes energy-related investments that are refinanced via the cost savings achieved (e.g. through a more efficient plant). Sector-specific contracting offers, which are developed and offered both by MVV and by private contracting providers, can relieve companies in Mannheim of the burden of making corresponding investments. Conceivable offers are those that are specifically tailored to the hotel and catering industry, for example, where they in turn offer typical savings potential in special areas of application (such as food refrigeration, air conditioning or lighting) in the form of package solutions.

The **aim of** the measure is to overcome investment barriers among companies and to bind companies as customers in the long term through an economical offer. The decisive factor here is that the focus is not on the costs of the individual kilowatt hour, but on the costs of the total bill. Industry-specific contracting offers are energy services that correspond to quality competition in a special way.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Develop specific energy (savings) contracting offers that support the implementation of measures in this field of action (e.g. by energy service providers).

The **CO₂** savings potential of this measure cannot be quantified exactly. The amount of savings potential depends very much on sector-specific aspects for which contracting offers are being developed.

BUILDING BLOCK 3: ESTABLISH AND EXPAND THE CIRCULAR ECONOMY IN THE TERTIARY SECTOR

The development of a tertiary circular economy opens up many opportunities to make better use of valuable resources. Separating residual materials leads to a significant increase in reuse options. According to the principle that what is not used does not have to be disposed of,



companies can check the service life of operating materials. Here, too, the industry-specific aspects are central and very different. For example, in metalworking companies, switching to a cooling lubricant with a longer service life can lead to savings in cooling lubricants that need to be disposed of. In offices, paper consumption can be reduced through digitalisation, printer settings and awareness-raising measures. The introduction of deposit systems can go hand in hand with the reduction of disposable systems. A fundamental aspect of the circular economy in the tertiary sector is the networking of companies for the exchange of information on the reuse of existing resources and residual materials directly on site.

MEASURE 1: SECOND LIFE & SECOND USE

Framework conditions: The aim of a "Second Life & Second Use" measure is to develop circular markets in Mannheim and the region. By reusing and recycling substances and materials locally, the extraction and transport of raw materials can be avoided and reduced. The measure thus supports the longterm safeguarding of the regional economy and value creation. For the companies based in Mannheim and involved in the tertiary sector and industry, the production or use of circular materials and products can have the advantage of making them less dependent on global supply chains, more flexible in the use of materials for their own products and thus more resilient to possible raw material shortages.

The **objective of** the measure is to develop a local and regional market for recycled products and materials. In this way, products and materials are to be used more efficiently and for longer, and their reuse and recycling are to be promoted.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Exploratory study on fields of application of Second Life & Second Use of products and materials (supply and demand side)
- Information offers on the topic of "Service as a product": design and business models according to the principles of "reduce, reuse, recycle - repair, remanufacture, restore".
- Funding advice for pilot projects
- Establish a cooperation network for the circular economy

The **CO2** savings potential of this measure lies in the avoided production and transport of goods and products through their prolonged use and thus primarily outside the Mannheim city area. The savings depend on the question of which products and cycles are established locally and cannot be estimated.

MEASURE 2: CIRCULAR ECONOMY IN THE CONSTRUCTION SECTOR

Framework conditions: The construction industry is largely responsible for the domestic, mineral raw material extraction and causes about half of the German waste generation. Although about 90 % of mineral construction waste can be recovered through recycling and downcycling measures, the procurement of construction materials is nevertheless also linked to the international raw materials market and problems in the supply chains lead to severe delays and cost increases in the construction process and even to the rescheduling of buildings. To counteract this, the existing building stock can serve as an additional urban raw material store if deconstruction concepts are designed in such a way that components and also building materials can be reused and a market for the procurement of second-hand building materials is established. In order to be able to use the existing building stock even better as a raw material store in the future, new building projects should be planned according to the principles of the circular economy or following Cradle to Cradle, and deconstruction concepts should be consistently provided for and implemented. This not only leads to better availability of products, but also saves CO2 by reducing the need for new building materials.

The **aim of** the measure is to use and reuse components, products and materials for longer.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Promotion of "urban mining" projects to reuse and secure raw materials that have already been built up (city as raw material storehouse)
- Requirements of the City of Mannheim for construction measures for the recycling or reuse of excavated soil by earth levelling on the construction site
- Cradle to Cradle pilot projects (C2C) Buildings, e.g. planning for new city library
- Establishment of a building materials exchange



Time horizon

This is a long-term measure. Although the implementation of high-quality deconstruction concepts must take place in the short term, due to the large time gap between the production and deconstruction of a building, comprehensive recycling of buildings can only take place in the future. Nevertheless, the structures needed for this must already be established now, because the current building stock offers great potential as a raw material store.

Contribution to climate neutrality

The CO2 savings potential is mainly in the future and is therefore not accounted for. However, high-quality demolition of existing buildings and recycling of building materials can save CO2 emissions that are generated, for example, by landfilling or thermal recycling. An estimate of these savings is hardly possible due to the uncertainties of the building stock.

Responsibility

- Involvement of companies: FB 80, chambers
- Standards on soil excavation and earth levelling: EB 76, FB 67
- Municipal implementation: FB 60, departments with their own properties (GBG Group of Companies (BBS, GBG)FB 25, FB 40, FB 52, FB 80, NextMannheim, EB 16, EB 42, EB 46, EB 47, EB 76, EB 69, EB 75, Alte Feuerwache, Mannheim old people's homes, Mannheim wholesale market, Central Institute for Mental Health, Mannheim University Medical Centre).

Financial expenditure

Due to the many uncertainties associated with this measure, it is not possible to estimate the costs. Concepts of the circular economy, such as the Cradle to Cradle principle, are decisive for the production of sustainable and efficient buildings, with which high energy and thus cost savings are possible over the period of use. Due to the resulting high quality of materials, buildings with a high residual value are created, especially since such buildings are easier to deconstruct and building materials are easier to reuse (C2C Venlo, n.d.).

Monitoring / Indicators

Direct control of the measure is not possible at this point, as it is not possible to predict when and whether structures will be deconstructed. For future deconstruction, it is therefore necessary to create a detailed building material and component catalogue with a deconstruction and recycling concept for new buildings. Cooperation with the relevant professional chambers (Chamber of Trade, Chamber of Industry and Commerce) can be helpful here. In addition, concepts such as Cradle to Cradle can be verified through a variety of indicators in use. The focus here should be on climate-relevant indicators (electricity, heating, cooling).

Conflicting goals and synergies

Changes in the building sector in relation to a sustainable circular economy can be associated with many synergies. For example, a responsible use of resources would have an impact on the need for new resources and thus on the extraction of raw materials, which would be associated with less environmental intervention. New possibilities in reuse can open up new economic sectors and thus create jobs and support the structural change towards a climate-neutral society.

Good practice examples

- Mannheim City Library cradle to cradle
- TBS use of coal slag for cement production: https://www.mannheimer-morgen.de/wirtschaft/firmen_artikel,-gkm-ein-besonders-leiser-laster-_arid,1331401.html
- ETH Zurich Umar Urban Mining: <https://www.architektur-aktuell.at/projekte/umar-urban-mining-und-recycling-unit-duebendorf-schweiz>
- C2C Venlo City Hall: <https://c2cvenlo.nl/de/stadtverwaltung-venlo/>
- RAG headquarters, Zeche Zollverein in Essen: <https://www.dabonline.de/2020/04/28/cradle-to-cradle-ist-machbar-beispiele-architektur-baustoffe-c2c-infos/>

BUILDING BLOCK 4: OVERARCHING MEASURES

The targeted approach and support of companies from the tertiary sector on the topic of climate protection should be supplemented by the design of corresponding framework conditions and strategies for the entire economy in Mannheim.

MEASURE 1: ECONOMIC AND STRUCTURAL PROMOTION



Framework conditions: The task spectrum of municipal economic development has traditionally been primarily the development of industrial estates and the settlement of (larger) companies. As a hard location factor, however, the possibility of locating a company is not the only decisive factor for an attractive business location. Rather, the soft location factors that influence the quality of life of employees also play an important role in binding skilled workers, students and trainees to the region. Especially against the background of the necessary transformations in companies for a climate-friendly economy, there is a need for innovative start-ups, creative minds and cooperative economic forms that contribute to quality of life, climate protection, preservation and promotion of biodiversity and resilience through social impact orientation in the business model and sustainability. The systematic promotion of regional value creation and cooperative, social economy business models thus not only strengthens the local economic structure, but also supports the goals of climate and resource protection. The corresponding funding and advisory instruments that have proven themselves in the long term are to be maintained.

The **aim of** the measure is to support innovative forms of business in Mannheim to strengthen resilience and the regional economy.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Promote regional economy
- Raising efficiency potential through digitalisation (Smart Production network)
- Raising savings potentials at neighbourhood or commercial area level
- Testing decentralised cooling and heating networks
- Promotion of the innovation ecosystem through cluster initiatives (Cluster GreenIndustry)
- Systematic matchmaking between start-ups and corporates to identify suitable, innovative ideas from young start-ups for established companies, and vice versa for opportunities to professionalise and serially support established companies for young start-ups.
 - Support the establishment of social economy enterprises through activities of the Social Economy Competence Field
 - Networking for sustainable production and services
 - Development and use of existing (also regional) concrete advisory and support approaches for local enterprises

Time horizon

The measure can be implemented in the short term and should be continued permanently.

Contribution to climate neutrality

The measure itself has no direct CO2 saving potential. Rather, it aims to support a more environmentally and socially sustainable local and regional economy in order to promote the implementation of measures in local businesses.

Responsibility

- Economic and structural development: FB 80

Financial expenditure

The costs are estimated to be relatively high. In particular, it is a question of personnel resources to establish the approach at the Mannheim Economic Development Agency.

Monitoring / Indicators

The success of the measure can be mapped through concretely defined milestones, such as the establishment of regional and sustainable products and offers locally through events, networking and "pop-up stores", etc.

Conflicting goals and synergies

A local labour market cannot be boosted only by attracting companies. The decision for or against a job coincides with other factors, such as the accessibility of the job, the quality of life locally and the existing infrastructures. Economic and structural development thus contributes to a more sustainable and liveable city and thus also to the city's strategic goal of promoting and attracting talent.

Resource scarcity and energy dependence pose major challenges for many companies. On the one hand, they see the pressure to adapt, for example by switching to alternative, renewable or recycled raw materials and products or digitising processes. On the other hand, there is often a lack of skilled workers for these conversions. Through the network work of economic and structural development, companies can be strengthened in their sustainable development



and at the same time support regional value creation.

Good practice examples

- Mannheim Economic policy strategy <https://www.mannheim.de/de/presse/wirtschaftsfoerderung-ueberarbeitet-strategie>; https://buengerinfo.mannheim.de/buengerinfo/vo0050.asp?__kvonr=225833
- Bottrop Innovationcity <https://www.bottrop.de/innovationcity/index.php>

MEASURE 2: AWARDING AND LEVIES

Framework conditions: Incentives for climate protection can also be set through award criteria and financial instruments. For example, the sale of municipal land to newly established companies or the awarding of public contracts can be linked to aspects relevant to climate protection (cf. also measure 7.9.2.1) in order to create financial incentives on the one hand and to steer local companies towards climate neutrality on the other.

The **aim** of the measure is to develop municipal framework conditions for a climate-friendly economy.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Examination of the integration of climate protection-relevant aspects in award procedures
- Revision of model sales contracts

The **CO₂** savings potential of this measure cannot be quantified.

MEASURE 3: QUALIFICATION OFFENSIVE

Framework conditions: The lack of skilled workers is cited as a major obstacle in many areas and sectors when it comes to implementing climate protection or adaptation measures. This includes (technical) planning and the trades in the field of energy retrofitting as well as personnel capacities in municipal administration or engineers in industrial companies. This measure aims to strengthen the local labour market and thus implement climate protection measures locally through innovative approaches in education and training (especially further qualification of employees in companies) and in the area of recruitment (even greater exploitation of domestic potential and recruitment of international skilled workers). In combination with economic and structural promotion (see Measure 7.4.4.1), this measure addresses a more sustainable economy overall. As this is a very central obstacle to the development of climate protection activities, it is essential to have as broad an alliance as possible between business development, the employment agency, the job centre and chambers of commerce.

The **aim** is to ensure that sufficient human resources are available on a permanent basis to guarantee ambitious climate protection work.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Survey of local companies to identify qualification needs in local companies for the implementation of measures for energy saving, expansion and use of renewable energies and resources, sustainable development
- Use of the Rhine-Neckar Regional Skilled Workers Alliance or the Mannheim Industrial Location Initiative with regard to innovative approaches in education and training and in the area of recruitment from the Employment Agency, Chamber of Industry and Commerce, Chamber of Trade and Crafts, trade unions, employers' associations and the City of Mannheim, possibly expanded by the Mannheim University of Applied Sciences, the "Welcome Centre Rhine-Neckar" and companies for targeted education and training and recruitment of employees
 - Establishment of a qualification network of IHK, HWK, trade unions, Mannheim University of Applied Sciences and companies for targeted training and further education of employees
 - Implement innovative, experimental education and recruitment concepts, such as:
 - Establishment of a "Heat Pump Academy" training centre
 - Cooperation projects between students in planning and architecture and trainees in the skilled trades for the energy-efficient refurbishment of existing buildings and thus promotion of dual training
 - Project developed from the Social Economy Network and supervised by the NGO Starkmacher, in which young people are interested in and qualified for "green" professions in workshops.



- Introduction of a "voluntary practical year", comparable to a voluntary ecological or social year as an orientation phase for school leavers in the (building) trades
- Recruitment of skilled workers in relevant skilled crafts sectors in cooperation with the HWK, the Employment Agency, the Economic Development Agency and the Welcome Centre Rhine-Neckar

Time horizon

The conception of the qualification offensive should be tackled immediately, as qualified personnel is very relevant for the implementation of the measures described in the KSAP. The measure should then be designed to be permanent.

Contribution to climate neutrality

The measure does not contribute to CO2 savings, but addresses a major obstacle with the shortage of skilled workers, which can jeopardise the reduction potential of other measures.

Responsibility

- Network: Mannheim Employment Agency, Chamber of Industry and Commerce, Trade Unions, Employers' Association, Mannheim University of Applied Sciences, companies and the Welcome Centre Rhine-Neckar
- Heat Pump Training Centre: MVV, IHK, HWK

Financial expenditure

The financial costs for the city are relatively low. The survey of qualification needs and the conception of concrete support services, such as the recruitment of international experts, are purely personnel-related.

Monitoring / Indicators

The success of the measure can be mapped via concretely defined milestones, such as the implementation of the survey to determine qualification needs or the establishment of and number of participants in concrete qualification measures.

Conflicting goals and synergies

The measure specifically aims at synergies between climate protection and the qualification and recruitment of skilled workers. One obstacle, or conflict of objectives, could be the necessary financing within the companies for further training/personnel costs. If necessary, funding programmes of the Federal Employment Agency, etc. can be used here.

Good practice examples

- The Deconstruction Program in Portland, Oregon, USA, provided targeted training for longterm unemployed and hard-to-place people to deconstruct buildings for the reuse of components and materials: <https://www.portland.gov/bps/decon>
 - As part of the Caritas electricity savings check, long-term unemployed people are trained as energy advisors especially for low-income households: <https://www.stromsparcheck.de/>
- Both examples show how energy- and resource-saving programmes can be combined with social aspects and that not every measure in climate protection requires many years of training.

ACTION FIELD LAND USE



The way in which land is used in Mannheim not only has an impact on CO₂ emissions in the city. This is because land fulfils a variety of other ecological functions in addition to climate protection, and it is also subject to numerous competing demands for use. These include, for example, use for the construction and conversion of residential and commercial areas and transport infrastructure, use for biotope, landscape and nature conservation, and use as agricultural land such as arable land and grassland. Through the sealing of soils, habitat is lost and important soil functions are disturbed. This applies in particular to the function of soils as a component of the natural balance with its water and nutrient cycles, which is permanently degraded or destroyed, as well as the degradation, compensation and build-up function for material impacts. The sealing of soils also contributes to higher air temperatures and a reduction in air exchange, especially in inner cities. Soils are also important carbon reservoirs. This storage capacity must be safeguarded and increased, but it can be disturbed or reduced by human activities.

The use of land for settlement and transport purposes (land consumption) and the urban sprawl often associated with it contradict the model of a compact settlement structure, which is relevant from a climate protection perspective. Urban sprawl reduces the utilisation of infrastructure and increases infrastructure costs. In many cases, transport infrastructure also creates a separating effect that is problematic for people and wildlife. For the people of Mannheim, who primarily travel on foot or by bicycle, roads can cut up existing pathways, cause detours and make it difficult to reach destinations.

Accordingly, giving priority to inner development through redensification and conversion is an important contribution to reducing land consumption while at the same time increasing land demands, for example due to urgently needed housing.

A sparing use of land thus supports a more efficient use of already built infrastructures in which energy and resources are tied up and supports the measures of optimised land use in the fields of action "municipal administration" (7.9) and "Private households" (7.8) as well as emission reductions in the transport sector.

Another aspect to be mentioned is the bound CO₂ in greened and forested areas, which act as natural and permanent sinks, provided that the wood can act as a carbon sink through its permanent (non-energy) use. How many emissions are bound in green and forested areas depends on the actual land use implemented, the plants chosen and their resistance to the impacts of climate change, so they cannot be quantified in this context.

Framework conditions at EU, federal and state level

In order for Mannheim as a municipality to continue to implement effective measures for the sustainable as well as economical use of land, it is necessary to formulate **quantitative and qualitative goals for future land use**.

In addition, the **building and planning framework conditions** need to be **adapted**. Although "planning" is considered a municipal sovereign task, it is significantly influenced by higherlevel regulations such as the Building Code, the Building Use Ordinance, various DIN standards, the Building Energy Act, the Federal Transport Infrastructure Plan and many more. In some cases, these regulations impede and hinder climate-, land- and resource-saving urban development. Accordingly, these requirements must be urgently reviewed and adapted at higher levels in order to enable municipalities to achieve climate-neutral development.



A legal framework to prevent and sanction land speculation can also be supportive here. The state of Baden-Württemberg can also support municipalities in implementing effective measures by **providing guidelines for land-conserving settlement development and information**.

With regard to agricultural land, a clear orientation of **EU subsidy policy towards ecologically and sustainably oriented agriculture is** necessary.

BUILDING BLOCK 1: REDUCE LAND CONSUMPTION

Land consumption refers to the conversion of vegetation and water areas (arable land, meadows and forests, standing and flowing waters) into settlement and transport areas. This conversion reduces the CO₂ sink function of land or soils and thus indirectly contributes to increasing CO₂ emissions. The development itself, which is made possible by the conversion of open space into settlement land, entails further emissions through transport and construction activities as well as in the use of the settled area. Development in outdoor areas should therefore be avoided as far as possible in order to come closer to the goal of zero land growth on balance by 2030.

MEASURE 1: SAFEGUARDING OPEN SPACE AND OPEN SPACE DEVELOPMENT (PLANNING PRINCIPLE)

Framework conditons: In order to counteract the loss of land on Mannheim city territory, in addition to a binding target for land neutrality, corresponding provisions are needed in relevant plans. In addition to securing previously undeveloped ecologically and climatically valuable areas, potentials for unsealing areas should also be considered.

The **aim of** the measure is to further reduce the amount of land used for settlement purposes.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Expansion, preservation and qualification of urban green and recreational spaces and protected Areas
- Preservation of agricultural permanent grassland and development of ecological agriculture
- Development of objectives for the qualifying development of, among others, parks, urban gardening, possibly agri-PV, wooded areas, inner-city allotment gardens.
- Implementation of the biotope network planning and preparation of the biodiversity strategy
- Change of lease contents through corresponding contractual regulations
- Purchase of land for the implementation, preservation and restoration of the ecological and climatic functions of vegetation areas through unsealing, soil protection and repair of damaged soils.
- Implementation of the open space development concept "Freiraum Mannheim² - Grüne Bänder, blaue Ströme" of the City of Mannheim
- Unsealing of traffic areas that are no longer used or needed

Time horizon

This measure is already being implemented as a planning principle in urban planning. Other topics, such as biodiversity or unsealing, are also being implemented or can be started in the short term

Contribution to climate neutrality

An estimate of the **CO₂** savings potential is not possible at this point.

Responsibility

- Urban planning: FB 61
- Biodiversity: FB 67
- Unsealing measures on public traffic areas: EB 76, FB 61
- Implementation of structural measures in public spaces: EB 76
- Purchase of land, change of lease contents: FB 25, farmers

Financial expenditure

The implementation of the planning principle requires human resources. Due to analyses, expert reports, etc., additional financial expenditures are required as material resources. No additional direct costs are associated with the preservation of existing areas worthy of ecological protection. Costs are incurred, for example, when damaged, sealed or otherwise used areas have to be restored, and ensuring the accessibility of green and recreational areas on



foot, by bicycle or public transport also causes costs. A quantification of the costs to be expected with the implementation of this measure is not possible at this point due to its many individual activities and the necessary effort of implementation that still has to be determined.

Monitoring / Indicators

- Land consumption
- Renaturalised/unsealed areas
- Share of agricultural land

Conflicting goals and synergies

Conflicts of objectives can arise in relation to construction needs (e.g. the need for new housing) that cannot be easily met in existing settlements.

Synergies can be expected with activities to promote climate-friendly leisure mobility, for example, if open spaces in the residential environment enable leisure activities close to home and leisure routes to more distant leisure facilities or leisure opportunities are eliminated. In addition, an economical use of land is often also positive in terms of climate impact adaptation.

Good practice examples

- Qualification of the Mannheimer Grünzug Nordost: <https://www.mannheim.de/de/stadtgestalten/konversion/projekte/gruenzug-nordost>
- Mannheim Neckar restoration: <https://www.mannheim.de/de/nachrichten/naturnaheumgestaltung-des-neckars>
- Emscher renaturation: <https://metropole.ruhr/auf-dem-weg-zur-gruensten-industrieregion-der-welt/emscher-vorher-nachher>
- Mannheim open space preservation concept: <https://www.mannheim.de/de/stadt-gestalten/planungskonzepte/freiraumsicherungskonzept>

MEASURE 2: LAND-SAVING URBAN DEVELOPMENT (PLANNING PRINCIPLE)

Framework conditions: This measure is intended to promote urban development that can guarantee all urban functions with the least possible land consumption. Land-saving urban development that uses brownfield sites and closes gaps between buildings is based on internal rather than external development. Land-saving and dense settlement concepts create shorter routes, making it more attractive to travel by bicycle or on foot.

The **aim** of the measure is to reduce land consumption and to realise more compact, ecologically attractive settlement structures.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Land-saving development of new residential and commercial areas, i.e. no sprawling single-family housing estates, but attractive, dense neighbourhoods or adding storeys/multistorey commercial buildings.
- Careful and sensible use of space, for example the installation of car parking spaces in commercial areas and in large shopping centres no longer on open spaces, but on roofs or in basements.
- Promoting the overbuilding of open spaces and traffic areas with solar installations
- Promotion of multifunctionally used areas
- Use of brownfield sites for the various concerns of settlement development
- Strengthen regional cooperation
- Preference for climate-friendly modes of transport in the planning of transport areas
- Use of the register of brownfield sites and vacant lots
- Preservation and creation of new urban green and recreational spaces
- Establishment of a cadastre of polluted or damaged soils
- Use of the instruments of building law to reduce land speculation
- Special consideration of the urban climate analysis
- Promote dual internal development and redensification in order to avoid the use of external areas (implement vertical redensification as an option for internal development).
- Surface recycling of damaged soils



<ul style="list-style-type: none"> • Creation of an unsealing concept
<p>Time horizon This measure is already firmly anchored in the work of Department 61 and is already being implemented. It should be intensified and implemented permanently.</p>
<p>Contribution to climate neutrality An estimate of the direct CO2 reduction effect is not possible at this point. Nevertheless, the significance is high, as important preconditions are created at this higher planning level.</p>
<p>Responsibility</p> <ul style="list-style-type: none"> • Urban planning: FB 61 • within the framework of urban development contracts: 60.22 • Implementation: FB 67, FB 80, FB 40, EB 76
<p>Financial expenditure Due to the large number of individual components, a reliable cost estimate is not possible at this point. Some of the activities in this measure are planning principles, which in principle do not involve any financial expenditure. It should be noted that inner development sometimes requires much smaller-scale planning and work processes than the development of open spaces. This can lead to increased costs.</p>
<p>Monitoring / Indicators A suitable indicator for the success (or failure) of this measure is the development of the shares of land use in Mannheim. Other suitable indicators linked to the development of land use are the degree of new sealing or the unsealing of land.</p>
<p>Conflicting goals and synergies Conflicts of objectives are to be expected when there are competing demands for use of the (only limited) available land in terms of climate protection, e.g. when land is used for larger PV areas. Conflicts are also to be expected when land use claims with and without climate protection relevance compete with each other, for example when low-cost housing, childcare facilities or commercial areas are to be created. Conflicts of objectives are also to be expected within the measures. The desirable inner development often leads to further sealing and to possibly negative effects on the urban climate. Synergies arise with all other measures that aim to promote the use of environmentally friendly means of transport as an alternative to car use.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> • Mannheim Glücksteinquartier https://www.glueckstein-quartier.de/ • Mannheim Spinelli https://spinelli-mannheim.com/ • Media Harbour Düsseldorf https://www.duesseldorf.de/touristik/entdecken/medien.html • Phoenix Lake Dortmund https://www.dortmund.de/de/freizeit_und_kultur/phoenix_see_dortmund/start_phoenix_see/index.html • Mannheim Turley https://www.mwsp-mannheim.de/projekte/turley/
<h2 style="text-align: center;">BUILDING BLOCK 2: GREEN, FOREST AND AGRICULTURAL AREAS</h2>
<p>The measures in this component are aimed at maintaining and increasing the capacity of land and soils to bind carbon. Soils should serve as natural CO2 sinks. With regard to agricultural use, sustainable farming, i.e. extensive farming that does not use nitrogen fertilisers, should increasingly replace conventional farming.</p>
<h3 style="text-align: center;">MEASURE 1: DEVELOPMENT AND QUALIFICATION OF GREEN SPACES</h3>
<p>Framework conditions: Existing green spaces are to be preserved and new green spaces created.</p>
<p>The aim of the measure is to bind carbon in the soil and to raise the awareness of the citizens of Mannheim for the concerns of sustainable land use in terms of climate protection and climate adaptation</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Create/expand footpaths and cycle paths in coordination with green space conservation, incl. information stations (environmental education/nature experience). • Use land potential for the creation of near-natural green spaces or afforestation
<p>An estimate of the CO2 savings potential is not possible at this point.</p>



MEASURE 2: FOREST AREAS

Framework conditions: Trees remove CO₂ from the atmosphere by building up biomass and thus make an important contribution to climate protection. Forests store carbon in the biomass of the trees, in the organic layer and in the mineral soil over the long term.

When trees are harvested and put to material use, the carbon they contain is stored for the useful life of the respective product. Depending on the product, storage ranges from a few weeks, such as paper, to several decades, as in the case of construction timber. At the same time, emissions from fossil raw materials can be avoided through the use of wood if woodbased products are used instead of more energy-intensive products, such as concrete or steel. The climate protection performance of forests and wood thus consists, on the one hand, of emission compensation through the binding of carbon in the forest and, on the other hand, of emission avoidance through the substitution of fossil raw materials.

Like all plants, trees consume atmospheric carbon through photosynthesis. What many don't know: Plants then consume these carbohydrates in a reverse process called respiration, which converts them into energy and releases carbon back into the atmosphere. In trees, however, much of this carbon is not released and is instead stored as newly formed wood tissue. During their lifetime, trees act as carbon stores, drawing carbon out for as long as they grow. If the case occurs and the forest is deprived of more carbon through death and decomposition processes than it can bind through photosynthesis, it becomes a carbon source. Disturbances of the intact forest structure occur as a direct result of droughts, storm damage, fungal dieback and insect calamities. However, it is currently unclear whether the forest areas in Mannheim act more as a CO₂ source than as a sink due to the dieback processes of pines. An effective means of climate protection is the creation of additional carbon sinks, e.g. by increasing the forest area. In densely populated Mannheim, these possibilities are limited. Globally, however, afforestation can make a significant contribution. Forests with a high species diversity are more productive and more stable in the face of stress than those that are uniformly composed. Studies show that mixed stands with two or three tree species have an average of 25 to 30 percent higher productivity (measured in terms of wood growth) than forest stands with only one tree species. If a stand has higher productivity, it can also store more carbon and thus also reduces more carbon dioxide. In particular, it is important to further develop the existing Mannheim forest in a climate sensitive manner by planting suitable tree species and tree species mixtures so that it can be preserved under the changing climatic conditions. In this way, the burdens on the Mannheim settlement area and the people living there due to high temperatures during the day and at night, which will in all likelihood continue to increase in the future as a result of climate change, are to be reduced.

The **aim** of this measure is to further develop existing forest areas in the Mannheim city area into climate-stable mixed stands in a near-natural way and, where possible, to expand them by planting new forests.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Preservation and further development of climate-stable, near-natural and ecologically valuable forest stands, forest biotopes and clearings
- Expansion of forest areas, for example through the afforestation of fallow land
- Promote forest conversion by introducing trees with higher resilience to drought and high temperatures.
- Ensure on-site wood utilisation for energy and other purposes.

Time horizon

This measure can be implemented immediately. It is a permanent task.

Contribution to climate neutrality

Climate-stable and near-natural forest development and the expansion of forest areas as well as their sustainable use of wood have a great sink potential. With the current tree species composition, approx. **5990 t CO₂ /a** are bound in the urban forest through carbon storage in the trees. The very low sink capacity compared to other forests is due to the high proportions of pines and the increase in late blossoming weeping cherry, a semi-high species that only has a low wood volume. With the desired change in tree species and the development of forest stands towards multi-layered, colourfully mixed near-natural forests, the storage capacity could be significantly increased, provided that the CO₂ release does not exceed the storage capacity due to the ongoing climate change-related dieback of many forest trees.

Responsibility

The implementation of this measure is the responsibility of the forest owners. The City of



Mannheim owns approx. 1430 ha of the municipal forest, the Evangelische Stiftung Pflege Schönau owns approx. 111 ha of the collective forest, and Forst-BW owns 267 ha of the state forest.

Financial expenditure

The financial expenditure is strongly dependent on the procedure. In the case of extensive procedures, the necessary removal of the invasive late blossoming weeping cherry requires immense maintenance work in addition to the planting in order to promote the climate-stable tree species that are inferior in growth. The costs, including game protection, are around 100,000 euros per hectare.

Monitoring / Indicators

- Area of climate-siliently developed forest (in hectares)
- Development of new forest areas in hectares
- Proportion of forested areas in the total area of the city

Conflicting goals and synergies

Conflicts of objectives could possibly lie to a small extent in the release of the carbon bound in the humus layer. The removal of late blossoming weeping cherry mixes the humus layer on the planting areas. In addition, in the first years of growth, a smaller proportion of litter is added to the humus layer, so that its volume is reduced by decomposition processes. Since carbon storage in the subsoil is essentially determined by the initial substrate, the effects of tillage during forest development are limited to the humus layer and the topsoil.

In the medium term, however, the storage capacity in the forest stand is outweighed by the newly developing forest stand and in the newly forming humus layer. In the case of additional new afforestation on previously agriculturally used land, conflicts of use are unavoidable. Synergies arise with all other measures that expand green space in Mannheim or promote increased planting of plants that are resistant to drought and heat.

Mannheim's forests are among the most visited recreational forests in Baden-Württemberg and represent an attractive local recreational opportunity close to the city centre, which can also be reached by Mannheim citizens without a car or by bicycle thanks to the good public transport connections.

In addition, forest clearings, woody forest biotopes such as dry and wet sites and meadows can be lost as places of biodiversity.

At present, it is not yet possible to make a scientifically sound estimate of the **CO2 performance** of forest conversion.

MEASURE 3: PROMOTION OF ORGANIC FARMING

Framework conditions: Agricultural land that is currently still farmed conventionally should be farmed more sustainably in the future. Organic farming not only promotes soil quality and biodiversity, but can also contribute to reduced emissions through the reduced use of fertilisers.

The **aim** of this measure is to produce more agricultural products organically in Mannheim.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Promotion of regional food production and marketing
- Increased use of regional food in the canteens of public institutions, administration, schools, day-care centres, etc.
- Expansion of organic production in agriculture through regulation in leases
- Development of advisory services for agricultural practice
- Contractual regulations on fertiliser and pesticide use to reduce ammonia and nitrous oxide emissions and improve nitrogen efficiency
- Pilot projects: Agri-PV

An estimate of the **CO2** savings potential is not possible at this point.

BUILDING BLOCK 3: WATER BODIES

This module addresses the measures whose implementation and realisation make it possible to renaturalise standing and flowing waters. In addition, measures aimed at groundwater protection are addressed.



MEASURE 1: RENATURATION

Framework conditions: The renaturation of water bodies is primarily a measure for adapting to climate change. It is currently not possible to dispense with rainwater relief systems, as these relieve the combined sewer network during heavy rainfall events.

The aim of the measure is to increase the resilience of the settlement area against heavy rain and flood events.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Removal of structures in watercourses that have a negative impact on runoff in the event of flooding.
- Renaturation of watercourses, in particular the Neckar River
- Restoration of natural floodplains (alluvial zones)

An estimate of the **CO2** savings potential is not possible at this point.

MEASURE 2: GROUNDWATER PROTECTION

Framework conditions: This measure serves to protect groundwater from harmful human interference.

The **aim of** the measure is to protect groundwater in order to ensure the supply of drinking water and to permanently take into account the importance of groundwater for the soil ecosystem.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Reduce groundwater consumption through measures for the (mandatory) use of industrial and grey water, for example for the irrigation of gardens, sports fields and public green spaces.

An estimate of the **CO2** savings potential is not possible at this point.

BUILDING BLOCK 4: SYSTEMATISE PLANNING SPECIFICATIONS

Urban planning and projects can contribute to climate-friendly development at all spatial levels, from buildings and neighbourhoods to the city as a whole.

To achieve this, all planning levels and processes must take climate protection concerns into account at an early stage and as a priority. Jointly developed planning guidelines help to anchor climate protection, minimise the need for coordination between the participants and ultimately reduce conflict potential and time expenditure. At the same time, these guidelines must be applied and, if necessary, adapted to the specific project in the individual planning processes.

MEASURE 1: STRENGTHENING URBAN CLIMATE CONCERNS IN URBAN DEVELOPMENT PLANNING

Framework conditions: Informal planning instruments, such as urban planning competitions and other concepts, represent important foundations for the desired developments. Accordingly, climate protection concerns must already be incorporated into the planning process at these levels in the form of specifications.

The **aim of** this measure is to give special consideration to climatic specifications in the city's informal planning.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Standard consideration of climate-relevant aspects for urban planning competitions, e.g. urban climate analysis
- Consideration of climate protection issues and their inclusion in all urban concepts, for example in the Model of Spatial Order (MRO).

An estimate of the **CO2** savings potential is not possible at this point.

MEASURE 2: STANDARDISATION AND SAFEGUARDING OF CLIMATE COMPATIBILITY SPECIFICATIONS (CLIMATE



IMPACT ASSESSMENT)

Framework conditions: In order for the climate protection-relevant planning goals to be realised in a binding manner, it is necessary that corresponding specifications are secured through formal planning instruments, such as development plans or urban development contracts.

The **aim of** this measure is to establish standard provisions in urban land use planning or urban development contracts and to evaluate their effectiveness.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Development of model specifications within the framework of development plans for e.g. building greening, sealing, greening
- Development of standards within the framework of urban development contracts for building greening, energetic concepts, drainage and the energetic building standard

An estimate of the **CO2** savings potential is not possible at this point.

MEASURE 3: CONTRACTUAL REGULATIONS FOR CONSTRUCTION PROJECTS

Framework conditions: In addition to urban development contracts, other contractual provisions can be made that make it possible to realise planning goals relevant to climate protection. Especially when selling municipal properties, there is the possibility of contractually stipulating far-reaching climate protection measures that affect the property.

The **aim of** this measure is to contractually stipulate climate protection-relevant measures as standard in the context of the sale of municipal properties and thereby save CO2 emissions.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Continuous further development and adaptation of the climate specifications in the city's model purchase contracts (cf. also measure 7.4.4.2) for the aspects of energetic building standards, use of renewable energies, sealing and orientation towards the specifications for urban development contracts.

An estimate of the **CO2** savings potential is not possible at this point.

MEASURE 4: HARMONISATION WITH OTHER SECTORAL PLANS AND CONCEPTS

Framework conditions: Climate protection is an overarching task for the entire city, which is why the sectoral plans and concepts of a wide range of departments can contribute to achieving the goals. In particular, concepts such as the Master Plan Mobility 2035 explicitly refer to sectors with high CO2 saving potentials and must be harmonised with the Climate Action Plan 2030 accordingly.

The **aim of** this measure is to use synergies and resolve potential conflicts between different sectoral plans and concepts at an early stage and to establish the climate protection goals in the sectoral plans.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Deepen and consolidate cross-departmental participation and cooperation in sectoral planning and concepts
- Comparison of the CO2 savings targets and potentials of the concept with the potentials and targets of the Climate Action Plan 2030
- Close dovetailing of the Mannheim Mobility Master Plan 2035 (SUMP) and the Climate Protection Action Plan 2030 (SECAP)
- Development of a catalogue of criteria for assessing the environmental impact of tree felling in the context of projects, such as construction or road building (this is intended to take account of the diverse functions of trees and to strengthen their weighting in the context of projects).

It is not possible to estimate the **CO2** savings potential at this point. In addition, every tree preservation contributes to binding CO2 in the long term.

BUILDING BLOCK 5: OVERARCHING MEASURES

The building block of cross-cutting measures includes measures that address several areas of



action in equal measure.

MEASURE 1: RAISING AWARENESS AMONG THE POPULATION

Framework conditions: this measure is intended to sensitise the people of Mannheim to the importance and concerns of protecting land and water.

The **aim of** this measure is to create awareness among the population for the careful use of land and to achieve a corresponding change in behaviour with regard to the use of land.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Information material and campaigns on forest use, protection, conversion and development
- Information material and campaigns on groundwater protection
- Attractiveness of recreational areas through renaturation and accompanying promotion of appropriation (benches, sports equipment, etc.)
- Set up information stations (environmental education / nature experience) along existing cycle paths and footpaths.
- Extension and expansion of educational offers, e.g. Klimafit course
- Cooperation with city parks
- Environmental education such as biodiversity day and pooling

It is not possible to estimate the **CO₂** savings potential at this point.

ACTION FIELD GREEN-BLUE INFRASTRUCTURE



The measures in this field of action aim to improve the quality of living and health protection through urban green spaces and high-quality open spaces. These areas promote recreation and contribute to social participation for all population groups in Mannheim. In addition to the social component, this field of action is also highly relevant for the adaptation of the settlement area to the consequences of climate change, e.g. the reduction of heat islands and the increase of the city's resilience against heavy rainfall and flooding. High relevance is also given with regard to the visibility and feasibility of vertical and horizontal green spaces in high-density inner city areas. Measures in this field of action thus increase the visibility of Mannheim's climate protection and climate adaptation activities and thus contribute to raising awareness and activating Mannheim's citizens.

The measures are distinguished from the field of action "land use" by the fact that rather inner-city and small-scale measures are implemented and realised.

Even if "greening" and "water" are rather topics of climate impact adaptation, there are close interactions with climate protection. This becomes clear when areas are converted for car traffic, unsealed and greened, or when green roofs and façades contribute to increasing efficiency



in buildings. In addition, it is important to use greenery as a "natural sink" that binds CO₂. However, the small-scale nature of urban space does not allow for a meaningful quantification of this effect. As explained in detail, the way land is used affects CO₂ emissions or its binding in the soil in many ways. However, it is not possible to quantify the amount of avoided or bound emissions at this point.

Framework conditions at EU, federal and state level

In order for Mannheim as a municipality to be able to implement effective measures for the creation of new and the preservation of existing urban green spaces and high-quality open spaces, it needs the legal framework that applies to this. This should include both quantitative and qualitative specifications for the provision and design of these areas. **Funding programmes for private and commercial users of buildings** can be set up for measures to green building surfaces and the areas surrounding the buildings. It would make sense for the state and federal levels to provide financial support or assume full responsibility for this support, which is provided at the municipal level.

BUILDING BLOCK 1: GREEN ON AND AROUND BUILDINGS

Greening building surfaces helps to reduce the amount of energy needed to heat buildings in the cold seasons and to cool them in the warmer seasons. By greening the areas surrounding the buildings, carbon can be sequestered in the soil. The water storage capacity of the soil can also be increased through greening.

MEASURE 1: GREENING OF BUILDINGS

Framework conditions: This measure aims at greening the building envelope, i.e. the exterior walls and the roof surfaces.

The **aim of** the measure is to reduce energy consumption in the buildings through the necessary heating and/or cooling of the interior spaces, to improve water retention and to promote biodiversity.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Implementation of green roofs and façades on municipal buildings and facilities (role model function)
- Further development of standards for building greening in urban land use planning
- Expansion of the greening programme for commercial and private buildings (incl. communication campaign)
- Greening in redensification in the sense of "double internal development".
- Creation of a city-wide green roof and unsealing cadastre as an application in the geoportal
- Integrate building greening into architectural designs from the outset
- Greening of infrastructure (e.g. noise barriers) and implementation of greening projects to promote/market tourism
- Development of specifications for the design of the building environment through urban land use planning

An estimate of the **CO₂** savings potential is not possible at this point.

MEASURE 2: DESIGN OF THE BUILDING ENVIRONMENT

Framework conditions: This measure aims at the greening (green spaces, kitchen gardens, high-quality tree population) of the areas surrounding the buildings, such as car parking spaces or access roads to the buildings.



The **aim of** the measure is to increase the capacity of soils to store carbon. In addition, the water storage capacity of the soils is to be improved in order to increase resilience against heavy rainfall events, for example.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Incentives for private and commercial building owners for an ecological design of their properties, e.g. redesign of gravel gardens, partial unsealing of paths and parking spaces, (back) yard competitions for greening.
- Encourage the establishment of kitchen gardens & urban designation (e.g. urban gardening, school gardens, tenant gardens).

An estimate of the **CO2** savings potential is not possible at this point.

BUILDING BLOCK 2: GREENERY AND UNSEALING IN PUBLIC SPACES

The unsealing and greening of surfaces in public spaces serves both climate protection and climate impact adaptation. On the one hand, this increases the capacity of soils to store carbon (CO₂ binding). On the other hand, greened and unsealed areas should contribute to increasing Mannheim's resilience to heavy rainfall events and rising temperatures by improving the water absorption capacity of the soils and maintaining or restoring the cooling function of green spaces.

MEASURE 1: UNSEALING OF AREAS

Framework conditions: The unsealing of sealed areas of settlement and traffic areas and green areas contributes to reducing the burden of high temperatures during the day and at night on urban areas and the people living there. In addition, the unsealing of large areas contributes to improving or restoring the buffer function of the soil during normal rainfall events, also with regard to heavy rainfall events, for which a (further) increase in number and intensity is to be expected.

The **aim of** the measure is to increase the quality of stay in the public space by rededicating and redesigning areas used for motorised traffic and other sealed areas into green and recreational areas.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Elaboration of a roadmap for the development of green street spaces
- Unsealing of car parking spaces and conversion into green spaces or conversion for parklets, outdoor gastronomy and seating facilities
- Greening of tram lines/tracks
- Planting climate-adapted trees in the street space
- Promotion of micro-agriculture and urban gardening
- Unsealing and greening of public and private areas
- Greening of schoolyards and creation of school gardens
- Unsealing register

Time horizon

This measure can be started immediately and implemented successively, as it ties in with existing model projects and pilot projects in Mannheim or expands them. It should also be made permanent and implemented on a long-term basis.

Contribution to climate neutrality

Some greening and unsealing activities act as CO₂ sinks by absorbing CO₂ from the atmosphere. The land reallocations also indirectly reduce incentives for motorised private transport. An estimation of the direct CO₂ reduction effect is not possible at this point.

Responsibility

The implementation of this measure is the responsibility of the Mannheim administration. FB 61 is responsible for the planning and EB 76 for the construction. In addition, RNV, FB 40 and BBS (Bau- und Betriebsservice GmbH) are to be involved in the implementation.



- Elaboration of a roadmap for the development of green street spaces (FB 61)
- Conversion of car parking spaces into green spaces (EB 76)
- Equipping areas formerly occupied by motorised traffic with parklets, outdoor gastronomic areas, taking into account the interests of the directly adjacent residents (urban society according to specifications of FB 61).
 - Unsealing of car parking spaces (EB 76)
 - Greening of tram lines/tracks (MKB / RNV)
 - Planting trees in the street space (EB 76)
 - Promotion of micro-agriculture and urban gardening (open)
 - Unsealing and greening of brownfield sites (EB 76)
 - Greening of schoolyards / creation of school gardens (FB40, BBS)

Financial expenditure

This is highly dependent on the type and scope of the implementation of the individual components of this measure and can therefore not be estimated here either for individual measures or in summary.

Monitoring / Indicators

Suitable indicators are the absolute and proportional conversion of (sealed) traffic areas into green, recreational and leisure areas. Other suitable indicators are (a selection) the number of trees in public (street) space, the length of greened urban railway tracks and the number of schools with school gardens.

Conflicting goals and synergies

Conflicts of objectives are to be expected when there are competing demands for use of the (only limited) available land in terms of climate protection. Conflicts can also arise when land use claims with and without climate protection relevance compete with each other. This is the case, for example, when industries or institutions that are dependent on very good accessibility by car demand a corresponding distribution of land in favour of car traffic. In the same sense, the usability of public transport and bicycle traffic plays a role for some company decisions. Synergies exist when the increase in the quality of stay of public spaces contributes to the revitalisation or increased attractiveness of urban neighbourhoods. In addition, the reduction of car traffic would lead to less wear and tear on the transport infrastructure and thus less effort would be needed to maintain and repair this infrastructure.

Good practice examples

- Mannheim Spinelli <https://spinelli-mannheim.com/>
- Mannheim Turbine Factory <https://www.mannheim.de/de/nachrichten/das-turbinenwerk-wird-gruener>
- Mannheim Greening of roofs, façades and unsealed areas funding programme
- Mannheim Taylor <https://www.mwsp-mannheim.de/projekte/taylor/>
- Mannheim Schoolyard unsealing and greening
- Mannheim Track bed greening
- Duisburg Innenhafen Conversion into a park https://www.duisburg.de/tourismus/stadt_erleben/industriekultur/duisburger-innenhafen.php

BUILDING BLOCK 3: WATER IN THE CITY

Water areas in the city are characterised by lower ambient temperatures than built-up areas. Water surfaces are therefore an important component for the reduction of temperatures in the urban area during the day and at night. In addition, water surfaces can serve as retention or catchment basins for rainwater. Particularly in the case of heavy rainfall events, the intensity and frequency of which will probably continue to increase as a result of climate change, water areas can contribute to relieving the burden on the sewage system and to preventing local flooding.

Framework conditions: The consequences of climate change are particularly evident in the increasing number and duration of extreme weather events. This was made very clear in the summer of 2021, for example, by the heavy rainfall events in Rhineland-Palatinate and North Rhine-Westphalia and the associated devastating floods. Many cities are not designed for extreme heavy rainfall events. Urban areas have a high degree of sealing, which prevents rainwater from seeping



into the ground. As a result, precipitation has to be drained via the sewage system, which quickly reaches the limits of its capacity in extreme cases. The "sponge city" concept aims to create opportunities through unsealing and more green spaces so that rainwater can be retained above and below ground. This not only leads to greater resilience to heavy rainfall events and prevents the further spread of heat islands, but is also important for CO₂ storage in cities. Unsealing and greening restores the natural soil function and improves the ability of soils to store carbon.

The **aim of** the measure is to increase the capacity of soils to store carbon through the unsealing and greening of areas. In addition, the unsealing and greening of areas can also improve the water storage capacity of the soil and thus increase resilience to heavy rainfall events.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Implementation of the "sponge city" concept at project, neighbourhood and city-wide level (e.g. through green and open spaces as retention and infiltration areas, water-sensitive design of traffic areas, multifunctional land uses).
- Increase the carbon storage function of soils
- Expansion of rainwater utilisation in/on municipal buildings and on municipal land for irrigation purposes
- Promotion of rainwater harvesting in the private and commercial sector
- Examine and prepare neighbourhood-related drainage concepts for new plans
- (Partial) unsealing of public square and street areas
- Implement and further develop open space planning objectives
- Implementation of the open space development concept "Freiraum Mannheim2 - Grüne Bänder, blaue Ströme" of the City of Mannheim
- Rainwater infiltration concepts for public spaces (reduction of sewer discharge)
- Renaturation projects
- Water Protection Action Plan
- Implementation of the "Adaptation to Climate Change in Mannheim" concept
- Extension and updating of the tree cadastre

Time horizon

In order to implement the concept of the sponge city in a sustainable way, far-reaching changes in civil engineering are necessary. Public and private property owners are required to create sufficient retention areas. Therefore, this is a measure to be implemented in the short term, to be implemented permanently and to have a long-term effect.

Contribution to climate neutrality

The conversion to a sponge city only shows positive CO₂ savings in the medium term. The green spaces in the city should be seen as CO₂ sinks that promote the absorption of CO₂ from the atmosphere.

Responsibility

- Construction measures: EB 76, FB 25, all municipal and private property owners
- Urban planning: FB 61 in coordination with EB 76 and FB 67

Financial expenditure

The financial and personnel costs can be classified as high. Although the Sponge City, once it is internalised as a planning principle and implemented across departments, does not cause a high additional personnel effort, considerable financial resources are necessary for the construction measures, such as the unsealing of areas.

There are already a number of funding options for municipalities, such as the BMU's "Measures for Adaptation to Climate Change", the EU LIFE Programme of the ZUG or the Climate Passport of the State Bank of Baden-Württemberg (Zentrum Klimaanpassung, n.d.), which, however, do not reach the necessary financial volume for Mannheim.

Monitoring / Indicators

The implementation of the measure can be monitored mainly through the measure-related investments. Monitoring of the impact of the measure can also be depicted via a variety of indicators. For example, the reduction in damage to buildings due to heavy rainfall and flash floods could be mapped (Väth, S. J. et al. 2019).

Conflicting goals and synergies

A sponge city brings with it a number of synergies. Not only does the system counteract flooding during heavy rain, but the city also becomes more resilient to heat. In addition, green cities are perceived as more liveable, which can increase the attractiveness of a city.



Good practice examples

- Sponge City Berlin-Adlershof: <https://www.regenwasseragentur.berlin/future-living/>
- Measures
- Rotterdam: Redesign of Bentheplein city square <https://www.db-bauzeitung.de/architektur/freiflaechengestaltung/temporaer-geflutet-de-urbanisten/>
- Gelsenkirchen Küppersbusch housing estate <https://www.baukunst-nrw.de/objekte/Kueppersbusch-Siedlung--288.htm>
- Mannheim GBG Two apartment buildings as a green sponge city project: https://www.dbu.de/123artikel39388_2430.html

BUILDING BLOCK 4: OVERARCHING MEASURES

This module presents the measures that address several thematic priorities as cross-cutting tasks.

MEASURE 1: RAISING PUBLIC AWARENESS

Framework conditions: This measure is intended to sensitise Mannheim citizens to the issues of climate protection and climate impact adaptation in the area of blue-green infrastructures and to their own possibilities for action.

The **aim of** the measure is to activate the population of Mannheim to support the climate protection work of the administration through their own activities.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Mobile greening campaigns - such as the "Mobile Green Room"®, city tree, or similar - (information and awareness raising)
- STRENGTHEN GREENING (e.g. tree sponsorships, tree donations)
- Carry out planting actions with citizens
- Expand communication campaigns, e.g. against gravel gardens and on the municipal support programme for the greening of roofs, façades and unsealed areas).

It is not possible to estimate the **CO2** savings potential at this point.

ACTION FIELD MOBILITY



CO2 emissions from transport in Mannheim amounted to approximately 702,000 t CO2 in 2018. This is 22.4% of the total CO2 emissions generated in Mannheim in 2018. The largest emitter was passenger cars with 430,000 t CO2, the second largest emitter was trucks with 155,000 t CO2, followed by light commercial vehicles with almost 45,000 t CO2. 480,600 t CO2 were caused by passenger transport, 222,000 t CO2 by commercial and freight transport.



Around 14 % of Mannheim's emissions from the transport sector are caused by pure transit traffic, which merely passes through the city. At the local level in Mannheim, the most important goal is to handle the transit traffic in a compatible way, as the possibilities for avoiding and shifting it are very limited. Accordingly, measures that directly address these transports are not provided for in the Climate Action Plan, but are to be conducted in the regional and higher-level dialogue.

The development of traffic-related CO₂ emissions in Mannheim more or less mirrors the nationwide development. There has only been a slight decrease in the recent past. The total decrease in the period 2005 to 2018 was only 2.5 %, which means that the transport sector is clearly behind the reductions of the other consumption sectors. The decrease in emissions caused by passenger cars was 5.5 % in the period 2005 - 2018, but commercial and freight transport recorded an increase.

Car traffic currently poses the greatest challenge for more climate protection in transport in Mannheim. The car was the dominant mode of passenger transport in 2019, and the Mannheim population's choice of transport mode has been relatively stable in the recent past. For the passenger car, only a slight decline in use was discernible by 2019 compared to 2013. The high share of car use for short and medium trips is also striking. As many as 10% of journeys that are no longer than one kilometre are made by car by Mannheim residents. For journeys between one and three kilometres, it is already every third journey.

Within the framework of the Mobility Master Plan 2035, various scenarios of mobility development are currently being discussed and subsequently politically decided. With 528,000 tonnes, 75.2 percent of the traffic-related CO₂ emissions were generated by the Mannheim population and by companies and institutions located in Mannheim, with 102,000 tonnes 14.5 percent by transit traffic, 37,860 tonnes (5.4 percent) by commuters. Visitors were responsible for 34,760 tonnes (4.9 per cent).

In 2030, the measures described below could contribute to CO₂ emissions from transport being more than 291,000 t CO₂ below those of today.

Framework conditions at EU, federal and state level

The transport sector poses a particular challenge with regard to climate protection, as it has not yet succeeded, in contrast to most other consumption sectors, in reducing its CO₂ emissions to a quantitatively significant extent compared to 1990 levels. While the key parameters for vehicle and especially drive technology are set at EU and federal level and municipalities can only support this process, the strategic areas of **avoiding motorised transport and shifting it** to low-carbon and carbon-free means of transport are the original responsibility of municipalities. In order for the municipalities to be able to use their room for manoeuvre for a more climatefriendly mobility system, **binding targets for climate neutrality** in the public sector by 2030 are needed. If climate protection and climate impact adaptation become a mandatory municipal task, then the municipalities will also be forced to increasingly develop and implement measures to promote alternatives to the car.

The provision of financial resources is necessary for this. These are the funds for the urgently needed reconstruction of the transport infrastructure in the sense of improving the conditions of use for the means of transport of the environmental alliance as well as the financial means for the expansion of personnel capacities in the specialised planning of the administration.

BUILDING BLOCK 1: AVOID MOTORISED TRAFFIC

This module addresses measures that contribute to shaping the transport infrastructures as well as legal, organisational and administrative framework conditions in favour of the environmental alliance. Short distances and conditions that are favourable to environmental transport reduce the need to use private cars without significantly restricting the justified mobility needs of the population. Overall, these measures should contribute to making environmental transport more attractive than private transport.

MEASURE 1: REDUCTION OF PRIVILEGES OF MOTORISED INDIVIDUAL TRANSPORT (MIV)

Framework conditions: At present, the car still enjoys a whole series of privileges compared to other modes of transport that counteract the avoidance of car journeys or their shift, which is



necessary for a climate-neutral transport system. This is, for example, the preferential treatment of the car when using public space or the externalisation of the infrastructure, environmental, health and other costs caused by the use of the car. The aim of this measure is therefore to motivate citizens who currently use the private car to switch to environmental transport. It should be noted that public transport in particular must be significantly expanded, as it is already operating at the limits of its capacity (infrastructure and vehicles).

The **aim** of the measure is to shift car traffic to environmental transport and other climatefriendly modes of mobility.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Use of transport areas in favour of the environmental alliance
- Pricing of car mobility, e.g. congestion charge (legal framework is currently missing)
- Creation of financial incentives for the renunciation of car ownership and use (e.g. subsidies).
- Spatial and tariff expansion of parking space management in public spaces as well as in multi-storey car parks, e.g. staggering of tariffs according to vehicle size and motorisation
- Restructuring of charges for resident parking
- Consistent traffic monitoring and punishment of violations
- Stronger orientation of the number of private parking spaces to be provided to the quality of accessibility of the environmental network.

Time horizon

This measure can be implemented immediately or is already being implemented.

Contribution to climate neutrality

If Mannheim succeeds in reducing car traffic by ten percent compared to today by consistently reducing the privileges that the car still enjoys compared to the environmental network in the city area, then a saving of around **81,200** tonnes of traffic-related CO2 would be possible in Mannheim in 2030 compared to today.

Responsibility

- Planning and implementation of transport infrastructures and settlement development: FB 61, Mannheimer Parkhausbetriebe GmbH (MPB), EB 76
- Regulatory measures and control: FB 31, Mannheim Police Department

Financial expenditure

These cannot be estimated at this point due to the large number of individual activities.

Monitoring / Indicators

Suitable indicators are the development of the modal split of passenger transport in Mannheim and the number of cars registered in Mannheim.

Conflicting goals and synergies

Synergies exist with all other measures to promote the use of environmentally friendly modes of transport. In addition to a reduction of traffic-related CO2 emissions, less car traffic results in more traffic safety, especially for non-motorised road users, less emissions of traffic-related air pollutants, less traffic noise and a higher quality of stay in public spaces. Parts of the population could perceive the implementation of this measure as an interference in their own mobility choices.

Good practice examples

- Kassel - Rededication of traffic areas in favour of environmental transport: <https://www.staedtebaufoerderung.info/DE/ProgrammeVor2020/AktiveStadtOrtsteilzentren/Praxis/Massnahmen/kassel.html>
- Worpswede - Establishment of a shared space: <http://netzwerk-sharedspace.de/beispiele/worpswede/>
- Cologne - Parking space statutes with orientation towards public transport accessibility: https://ratsinformation.stadt-koeln.de/vo0050.asp?__kvonr=90432
- Freiburg Vauban Mobility concept: <https://www.freiburg.de/pb/208744.html>

MEASURE 2: REDUCE THE NEED TO BE (CAR)MOBILE

Framework conditions: This measure is intended to ensure that the citizens of Mannheim will have to be less (car)mobile in the future in order to participate in social life in the city through traffic-



saving housing development, a mix of urban functions and the establishment of new forms of working. Routes can thus no longer be necessary or can be shortened so that they can be covered well without a car.

The **aim of** the measure is to reduce the number and length of journeys made by Mannheim citizens by car.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Preservation of existing and creation of new traffic-saving settlement structures (incl. connection of commercial and industrial areas).
- Preservation of existing and provision of new residential care services
- Strengthening district centres
- Reduction of the compulsory presence at the workplace
- Service agreements on (permanent) mobile working in the city's administrative units
- Supporting companies in the implementation
- Realisation of much more traffic-calmed and traffic-reduced inner-city residential neighbourhoods

Time horizon

This measure can be implemented immediately, as it ties in with existing activities or expands them. Since the implementation can only be realised in the long term, it should also be made permanent.

Contribution to climate neutrality

If Mannheim succeeds in reducing car traffic by ten percent compared to today through a consistent policy and planning of the city of short distances or the city of 15 minutes, then in 2030 around **81,200 tonnes** of traffic-related CO2 could be saved compared to today.

Responsibility

- Planning and implementation of transport infrastructures and settlement development: FB 61, Mannheimer Parkhausbetriebe GmbH (MPB), EB 76
- Expanding mobile working: Employers
- Regulatory measures and control: FB 31, Mannheim Police Department

Financial expenditure

Due to the large number of individual components, the cost of the measure cannot be quantified at this point. In contrast to new infrastructural or conversion measures with high investment costs, these are rather small-scale developments. The total investment is therefore estimated to be low to medium.

Monitoring / Indicators

Suitable indicators are the development of the modal split of passenger transport in Mannheim, the number of cars registered in Mannheim and the development of average journey lengths differentiated by means of transport. As a further indicator, commuter traffic can provide information on regional networking.

Conflicting goals and synergies

In addition to a reduction of emissions from the transport sector, a better local supply has various other positive effects, e.g.

- More road safety through less car traffic
- Increased road safety and thus child- and elderly-friendly city
- less air and noise pollution and thus a healthier city
- Healthier city dwellers through more physical activity
- Better supply options for people without a car

Complete substitution will not be possible, so that corresponding infrastructures must also be maintained to the necessary extent.

Good practice examples

- Mannheim Franklin: <https://franklin-mannheim.de/quartier/mobilitaet/>
- Darmstadt - The Lincoln Settlement: <https://www.lincoln-siedlung.de>
- Freiburg - The car-free neighbourhood of Vauban: <https://intelligentmobil.de/freiburgvauban>

BUILDING BLOCK 2: SHIFTING MOTORISED TRAFFIC

This module describes the measures with which motorised traffic in Mannheim and the region in particular is to be shifted to the means of transport of the environmental alliance. To this



end, the conditions of use for the environmental alliance are improved to such an extent that it offers at least a fully adequate alternative to the use of the car in the city.

MEASURE 1: SHIFT MIV TO PUBLIC TRANSPORT

Framework conditions: This measure is intended to shift more car journeys to public transport. Through the quantitative expansion of public transport services, journeys that are currently made by car in Mannheim should be made by bus and train in the future.

The **aim of** the measure is to switch from car to public transport and thus to reduce the number and length of journeys made by car in Mannheim and the region.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Quantitative expansion (infrastructure and vehicles) of existing public transport services in the city and region
- Expansion of the public transport network through the creation of new lines in the light rail and bus sector to increase the number of direct and tangential connections and the continuation of on-demand services (e.g. Fips) with a high polling effect.
- Increasing the frequency, mainly in the bus sector
- Increasing the speed of travel for public transport
- Improving the connectivity of peri-urban areas and neighbouring communities
- Making the existing public transport services more attractive
- Improving reliability, cleanliness, safety and ticketing
- Easy, safe and comfortable access to all public transport stops for pedestrians and cyclists
- Improving cycle parking facilities around public transport stops
- Improving the multimodal linkage of the environmental network
- Structural, organisational and tariff linking of public transport with (new) mobility offers
- Mobility stations at bus stops
- Establishment of Park & Ride car parks already on public transport axes in the interconnected area with attractive parking and travel offers (e.g. family day ticket).
- Establishment of a shuttle (e.g. bicycle taxi) between car parks and shops for people with walking difficulties.
- Improved possibility to take the bicycle on public transport
- Creation of attractive public transport fares, sustainable financing of public transport through the creation of additional sources of funding.
- Welcome package for new citizens of Mannheim with information on public transport services in the city and a free VRN Discoverer ticket for one month

Time horizon

This measure can be implemented immediately, as it ties in with existing activities or expands them. The conversion itself is then to be understood as a long-term task. It should therefore be consolidated and made permanent.

Contribution to climate neutrality

If a consistent promotion of public transport succeeds in increasing its modal split share in passenger transport in Mannheim at the expense of the private car from currently about 15 to 20 percent in 2030, this would mean a CO₂ reduction in 2030 of about **23,000 tonnes**

Responsibility

- Transport planning: Dec. IV, Dec. I
- Public transport order: Dec. I
- Public relations: Dec. I, rnv, VRN
- Public transport service providers: rnv, VRN, as well as the SPNV companies, the state of BW as the public transport authority.

Financial expenditure

The costs will be determined in the further concretisations.

Monitoring / Indicators

One indicator for the promotion of public transport is the development of the modal split share of public transport in Mannheim's passenger transport, in connection with the development of the number of passengers as an indicator and/or development of useful and space kilometres.



Conflicting goals and synergies

Conflicts of objectives are to be expected when there are competing demands on the (limited) available transport space within the environmental network (e.g. extension of the urban railway). Necessities for delivery and craftsmen's services, for example, must be taken into account. With the reduction of car traffic, there would be less wear and tear on the transport infrastructure and thus less need for maintenance and repair of this infrastructure. Less car traffic also means less traffic-related air pollutants and less traffic noise. A good public transport system also contributes to the provision of public services. A comprehensive public transport service that is also available in areas with low demand and at times of low demand reduces the need to be mobile by car. It also improves the mobility options of people who cannot or do not want to use a car.

Good practice examples

- GreenCity Ticket Mannheim: Discounted public transport tickets: https://www.vrn.de/mam/verbund/presse/pm/dokumente/2018/62-18_modellstadt_umsetzung_ma%C3%9Fnahmen.pdf
- Vienna: Consistent expansion of the public transport network: <https://civity.de/de/matters/das-beste-angebot-ist-nicht-der-preis>
- Bonn: The free monthly ticket for new citizens: <https://www.bonn-macht-mit.de/dialoge/buergerdialog-zum-haushalt-20192020/kostenloses-neubuerger-ticket>
- Bremen: Mobile stations: <https://www.vcd.org/themen/multimodalitaet/beispiele/mobilpunkt-bremen/page>

MEASURE 2: SHIFT MIV TO CYCLING AND WALKING

Framework conditions: For a comparatively high proportion of journeys that could easily be made on foot or by bicycle, the car has been used in Mannheim up to now. In 2019, ten percent of the trips that were no longer than one kilometre were made by Mannheim citizens by car. For journeys between one and three kilometres, one in three journeys was made by car. By improving the infrastructural, legal, organisational and administrative framework conditions for cycling and walking, journeys can be shifted to the bicycle or pedelec or to walking.

The **aim of** the measure is to promote the shift of car journeys to environmental transport and thus to cycling and walking.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Qualitative and quantitative expansion of cycling infrastructure
- Improvement of existing paths
- New installation where there are gaps in the network
- Improve bicycle parking throughout the public space, also for cargo bikes and trailers.
- Expansion of bicycle parking facilities and supervised bicycle parking at railway stations
- Consistent improvement of cycling guidance at junctions, e.g. through needs-based signalling and green right-turn arrows for cyclists at junctions with traffic lights.
- Green wave for cyclists
- Increase the visibility of cycling in public spaces (distinctive markings, kerb borders to the MIV, creative cycling infrastructure e.g. comfortable "waiting bars" at traffic lights for cyclists).
- Expansion of the pedestrian infrastructure by improving existing paths, creating new paths in gaps in the network and pedestrian-friendly traffic light layouts.

Time horizon

This measure is to be implemented in the short term and on a permanent basis. It represents an expansion and continuation of existing activities with an increased level of ambition.

Contribution to climate neutrality

Permanently stabilising the current modal split share of walking and increasing the modal split share of cycling by 2030 will achieve significant CO2 reductions. For example, an increase in the share of cycling from 20 to 26 per cent with no change in the share of pedestrians can be expected to result in a reduction of around **27,200** tonnes. Concrete targets will be set within the framework of the Mobility Master Plan 2035.

Responsibility

- Traffic planning: FB 61



<ul style="list-style-type: none"> • Public relations: FB 61 • Construction and operation: EB 76 • Involvement of companies: Economic development
<p>Financial expenditure</p> <p>It is not possible at this point to estimate the extent to which an increase in the number of staff responsible for cycling and walking in the municipal administration would be useful or necessary. With regard to the investment costs, however, it should be noted that although the conversion initially generates costs, the provision and maintenance of the path infrastructure for cycling and walking is significantly cheaper than for private transport. Thus, each shift of trips to cycling and walking reduces the financial expenditure incurred by the city of Mannheim for the provision and maintenance of the infrastructure.</p> <p>Municipalities in Baden-Württemberg have the opportunity to receive financial support for the expansion of cycling infrastructure within the framework of the funding programme for municipal cycling and walking infrastructure (LGVFG-RuF) established by the state government in 2013. https://vm.baden-wuerttemberg.de/de/mobilitaet-verkehr/radverkehr/radwege/foerderung-kommunaler-radverkehrsinfrastruktur/</p>
<p>Monitoring / Indicators</p> <p>A suitable indicator is the development of the modal split in passenger transport in Mannheim. The development of the number of cars registered in Mannheim can also provide indications of the development between the surveys of the modal split.</p>
<p>Conflicting goals and synergies</p> <p>Conflicts of objectives are to be expected if the redistribution of public road space necessary to effectively promote cycling and walking and the reduction of parking space in public spaces worsens the conditions of use for other modes of transport. More cycling and walking, and thus less car traffic, have a wide range of positive effects beyond climate protection. In addition to the reduction of traffic-related CO2 emissions, the increased use of bicycles contributes to the reduction of traffic-related air pollutants and noise, and increases traffic safety and the quality of stay in public spaces. This results in synergies for health protection, road safety, and a child-friendly and environmentally friendly city.</p> <p>When creating footpaths and cycle paths as well as bicycle parking spaces, encroachment on existing open spaces and Mannheim's tree population must be minimised.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> • Mannheim 21-Point Programme: https://www.mannheim.de/de/service-bieten/verkehr/radfahren-in-mannheim/21-punkte-programm • Karlsruhe: Active mobility programme: https://www.karlsruhe.de/b3/mobilitaet/radverkehr.de • Bocholt: Continuous promotion of cycling: https://www.bocholt.de/rathaus/planenbauen-verkehr/fahrradstadt/ • Copenhagen Cykelslangen: https://www.zukunft-mobilitaet.net/72449/infrastruktur/cykelslangen-kopenhagen-radverkehr-infrastruktur-bruecke/

<p>MEASURE 3: LOW-CAR INNER CITY MANNHEIM (LIVEABLE INNER CITY MANNHEIM)</p>
<p>Framework conditions: By reducing car traffic, the quality of stay in the city centre and the conditions of use of alternatives to the car are to be improved. In addition, through-traffic through the city centre that was still taking place before the trial is to be avoided and spatially shifted to the designated sections of the road network. To this end, the already traffic-calmed area of the city centre will be spatially expanded. Traffic management measures will be taken for other areas (traffic trial). The supply of shops and restaurants will be ensured by setting up further delivery zones, as will accessibility for tradesmen. Stationary traffic in the city centre is to be directed to multistorey car parks. This measure is currently (2022-2023) being implemented as a temporary trial.</p>
<p>The aim of this measure is to reduce through traffic in Mannheim's city centre.</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Furnishing of the parking stands in the streets designated for closure - Structure of parklets - Construction of sports and fitness equipment



- Expansion of bicycle parking facilities
 - Evaluation of the measure on the basis of
- Traffic surveys
- Citizen survey
 - Increasing the quality of stay
- Greening of previous car parking spaces
- Gastronomic use of previous car parking spaces
 - Improve traffic routing for MIV around the closed areas
 - Establishment of Park & Ride car parks -already on public transport axes in the interconnected area with attractive parking and travel offers (e.g. family day ticket).
 - Reorganisation of the roadside parking
 - Establishment of further delivery zones as well as parking spaces for the craft sector

Time horizon

This measure is already being implemented, as it ties in with existing activities or expands them and has been the subject of political discussion in the city for some time. An expansion should be further examined from the perspective of transport-related climate protection.

Contribution to climate neutrality

The CO₂ savings potential of this measure is part of the savings achieved by avoiding and shifting car traffic. To avoid double counting, it is therefore not shown here. The potential savings are part of the measures 7.7.2.2 and 7.7.2.1.

Responsibility

- Urban development: FB 61
- Traffic planning: FB 61
- Execution and greening of streetscape design: EB 76
- Provision and management of parking space: Mannheimer Parkhausbetriebe GmbH
- Involvement of local businesses: FB 80

Financial expenditure

This cannot be estimated at this point.

Monitoring / Indicators

One indicator for the promotion of public transport is the development of the modal split share of the environmental alliance in the city as well as the traffic volume and the choice of means of transport in the spatial environment of the city centre. The type and extent of the use of transport on the routes with the explicit destination of Mannheim city centre can also serve as an indicator for the effectiveness of this measure. A qualitative indicator for an increased quality of stay would be an increased use of offers in the public space also outside the opening hours of the shops (increased quality of stay).

Conflicting goals and synergies

Conflicts of objectives are to be expected or already exist today when there are competing demands within the environmental alliance for the limited traffic space available, especially in the densely built-up inner city area. With the reduction of car traffic, there would also be less wear and tear on the transport infrastructure and thus less effort required to maintain and repair this infrastructure. Less car traffic also means less traffic-related air pollutants, less traffic noise and thus a healthier city centre and higher quality of stay. The latter is also a reason why the often mentioned negative effect of a dying inner city has not occurred with comparable measures in other cities.

However, solutions must be considered for delivery traffic, the trades and emergency supplies.

Good practice examples

- Santiago de Chile: Paseo Bandería: <http://www.coffeebreak-blog.de/paseo-banderadiese-fussgaengerzone-in-chile-ist-ein-riesiges-kunstwerk/>
- Mannheim traffic trial: <https://www.mannheim.de/de/service-bieten/umwelt/stadtraumservice-mannheim/planung-und-bau/grossprojekte-und-aktuelle-planungen/lebenswerte-innenstadt>
- Hamburg: Low-car neighbourhood in the centre of the Ottensen district: <https://ottensenmachtplatz.de>
- Paris: The 15-minute city: <https://www.goethe.de/ins/fr/de/kul/dos/nhk/22079262.html>



BUILDING BLOCK 3: MAKING MOTORISED TRANSPORT MORE EFFICIENT

Not all motorised traffic in Mannheim can be avoided or shifted to more climate-friendly modes of transport. Shifting through traffic is only possible to a limited extent within the city's sphere of influence. The measures presented in this module therefore aim to provide these transports with less energy consumption and thus less CO2 emissions per kilometre travelled by improving vehicle and, in particular, drive technologies. Even though the EU and the federal government are responsible for promoting this change in drive systems, Mannheim as a municipality has many opportunities to increase the impact of this EU and federal policy.

MEASURE 1: PROMOTE NEW DRIVE CONCEPTS

Framework conditions: The drive system turnaround is one of the central strategies for a more climate-friendly transport system. Vehicles with conventional combustion engines are to be replaced by vehicles with low-carbon and carbon-free drives. The focus of the drive system turnaround is (currently) on the expansion of electromobility. The goal of this measure is to accelerate the substitution of vehicles with conventional combustion engines with electrically powered vehicles and to complement the upstream goal of avoiding traffic or shifting it to the environmental network. The focus here is on the conversion to battery-electric vehicles. However, according to the current state of technology, the hydrogen fuel cell can also support the drive turnaround, especially in those vehicle segments where the battery cannot yet offer a fully fledged alternative to the conventional combustion engine. Where electromobility does not yet offer a fully-fledged alternative, other alternative drive concepts can be considered, provided that appropriate vehicles are available on the market that can fulfil the tasks required of them. The focus should be on private cars, car-sharing services as well as light and heavy commercial vehicles that are used by the city of Mannheim or by companies and institutions that are located or mobile in Mannheim. Although the central political decisions on the drive system turnaround are mainly made at federal and EU level, the city of Mannheim and the other actors in the city have many opportunities to support and accelerate this process.

The **aim** of the measure is to reduce vehicle-kilometre-specific energy consumption and the associated CO2 emissions.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Decarbonisation of bus transport through conversion to alternative drives
- Promotion of pedelecs and e-bikes
- Conversion of the municipal fleet to vehicles with alternative drive systems
- Expansion of the public electricity and hydrogen filling station infrastructure
- Expansion of the non-public and semi-public charging infrastructure for car sharing vehicles
- Establishing Mannheim as a model city for alternative drive concepts
- Promoting the conversion of commercial fleets to new drive concepts
- Promoting the provision of charging infrastructure on company premises
- Preference for electrically powered commercial vehicles on the roads

Time horizon

This measure can be implemented immediately, as it ties in with existing activities or expands them. The drive turnaround will only be fully implemented in the long term, which is why it should be made permanent.

Contribution to climate neutrality

If the measures implemented in Mannheim were to contribute to achieving the goal of 15 million battery-electric cars nationwide in 2030, which is anchored in the coalition agreement of the Federal Government, then a reduction in emissions caused by passenger car traffic of **160,000 tonnes** would be possible in Mannheim in 2030 compared to today .

Responsibility

- Development of support programmes for private e-mobility: FB 61 (E-)cargo bicycles, if necessary Klimaschutzagentur Mannheim gGmbH, FB 67
- Municipal vehicle fleet: EB 76
- Construction of the public electricity and hydrogen filling station infrastructure: EB 76
- Development of parking concepts: FB 61

Financial expenditure



The financial expenditure is the responsibility of the respective owners of the vehicles, and thus also of the City of Mannheim with regard to its own vehicle fleet. However, in various cases there are funding opportunities, for example for battery-electric vehicles, which are currently still more expensive than comparable combustion vehicles in many cases. In order to nevertheless offer purchase incentives, various funding programmes of the federal government or the state of Baden-Württemberg for passenger cars, commercial vehicles and charging infrastructure can be taken advantage of.

Through the state initiative *III Market Growth Electromobility BW20*, the state of Baden-Württemberg offers funding in the various areas of electromobility. There are funding opportunities for companies, municipalities and transport companies for the procurement of electric vehicles and charging infrastructure, as well as advisory and information services for fleet operators.

As an alternative to the state subsidy, a federal subsidy can also be claimed for the procurement of electric vehicles. The *Directive on the Promotion of the Sale of Electrically Powered Vehicles (Environmental Bonus)* of 21 October 2020 regulates the financial promotion of the purchase or leasing of electric vehicles in Germany. If necessary, a combination of federal and state funding is also possible. <https://vm.baden-wuerttemberg.de/de/politik-zukunft/elektromobilitaet/foerderung-elektromobilitaet/>
https://www.bmwk.de/Redaktion/DE/Downloads/B/bekanntmachung-der-richtlinie-zur-foerderung-absatzes-von-elektrisch-betriebenenfahrzeugen.pdf?__blob=publicationFile&v=4

Monitoring / Indicators

One indicator for the drive turnaround is the development of new registration figures for alternatively powered vehicles or the share of alternatively powered vehicles in all new registrations.

Conflicting goals and synergies

The shift to environmental transport continues to be a priority. Conflicts of objectives can arise if a particularly attractive design of the conditions of use for electric cars leads to a constantly high or increasing number of vehicles registered in Mannheim. The continuing high space requirements for moving and stationary car traffic in such a development would make it more difficult to redistribute traffic areas in favour of the environmental alliance.

The establishment of zero-emission zones can, if necessary, have the effect that the areas of the city outside this zone or zones are more heavily polluted by their emissions due to evasive traffic from still existing vehicles with combustion engines.

Good practice examples

- RNV: Conversion to electric and hydrogen-powered buses: <https://blog.rnv-online.de/2022/neue-elektrobusse-fuer-die-rnv/>
- Mannheim: Bridging IT: <https://www.handelsblatt.com/mobilitaet/elektromobilitaet/handelsblatt-testet-die-tesla-rivalen-holen-auf-so-bewerten-flottenmanager-e-autos/27678022.html?ticket=ST-677182-rtxWJmKxNoRiUcaktQg6-cas01.example.org>
- Mannheim: Sustainable mobility strategy EB 76 Conversion of the EB 76 vehicle fleet to alternative drives incl. development of a charging and refuelling infrastructure strategy.
- Neuwied: Electric mobility concept of the municipal utility: https://map.now-gmbh.de/sites/default/files/project_pdf/03EMK246_Elektromobilitaet%20Neuwied_final_geschwaerzte%20Version%20fuer%20Veroeffentlichung_oeffentlich.pdf
- Dülmen: Electrification of the municipal fleet and expansion of the public charging infrastructure: <https://elektromobilitaet-duelmen.de/>

BUILDING BLOCK 4: CREATION OF NEW MOBILITY OFFERS

By creating new mobility offers and intelligently linking them with the classic means of transport of the environmental alliance, it is intended to enable route chains that make it possible to travel easily, quickly, reliably and comfortably without having to own a car. The measures in this component are primarily aimed at designing the organisational, administrative and structural framework conditions that are necessary for convenient linking of the various alternatives to the private car.

MEASURE 1: PROMOTION OF MULTIMODAL LINKS



Framework conditions: The aim of this measure is the substitution of car journeys along the entire route chain by offering attractive, intelligent and combined mobility services. New and innovative mobility offers are optimally linked with the environmental network in terms of organisation, construction and tariffs. In this way, offers are created for the entire route chain that offer (at least) a fully-fledged alternative to the use of the (private) car.

The **aim of** the measure is to shift car journeys to the combined use of environmental transport modes.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Establishment of a network of mobility stations, if necessary with cycle service points.
- Establishment of charging infrastructure and priority (e.g. parking) for car sharing vehicles.
- Expansion of on-demand services as part of the public transport system (e.g. FIPS).
- Linking mobility offers with public transport
- City-wide and comprehensive provision of car and bike sharing services
- (Expansion of) cooperation with commuter source towns (Mobility Pact Region)

The **CO2** savings potential of this measure is part of the savings achieved by avoiding and shifting car traffic. To avoid double counting, it is therefore not shown here. The potential savings are part of the measure 7.7.2.1.

BUILDING BLOCK 5: REDUCE COMMERCIAL TRANSPORT AND PROVIDE IT MORE EFFICIENTLY

This module addresses the economic and freight transport carried out in Mannheim and the region. These include all transports that are caused by economic activities in Mannheim. The measures in this module aim to create a more climate-friendly mobility system for business and freight transport in Mannheim and the region. On the one hand, these transports are to be reduced through organisational, administrative and regulatory measures. On the other hand, the remaining transport should be converted to other drive technologies where possible. The reduction of traffic and the conversion of drive technology should take place without restricting the economic activities of the companies located or active in Mannheim.

MEASURE 1: REDUCTION OF COMMERCIAL TRANSPORT (CEP)

Framework conditions: In the context of the economic activities of many companies, journeys are absolutely necessary for the provision of services or the delivery of goods. Due to the minimisation of the use of resources for the provision of services, these journeys are usually organised efficiently, which is why the CO2 savings potential through the optimisation of mileage is considered subordinate.

The focus of this measure is therefore on reducing the number of trips made by courier, express and parcel services (CEP services), as there is still considerable potential for reducing and optimising trips in this economic sector due to the company structures and the type of service provided.

The **aim of** the measure is to make commercial and freight transport, especially CEP transport, more climate-friendly by reducing the number of journeys and the distances travelled.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Promotion of packing stations and microhubs
- Bundling of journeys
- Last mile transport with (e-)cargo bikes
- Strengthening regional economic cycles, e.g. by using regionally produced (and seasonal) food in day-care centres, schools, public institutions and canteens of companies based in Mannheim.
- Promoting the bundling of delivery journeys

The **CO2** savings potential cannot be estimated at this point.

MEASURE 2: PROMOTING THE SHIFT OF FREIGHT TRANSPORT FROM ROAD TO RAIL AND WATERWAYS

Framework conditions: The focus of this measure is on shifting goods transport, for which trucks are currently still used, to the much more climate-friendly transport by rail or inland waterway. It



should be noted that flows of goods are often of a supra-regional nature and thus cannot be influenced by the city of Mannheim alone. Furthermore, the Port of Mannheim makes an important contribution to the sustainable transport of goods and commodities.

The **aim of** the measure is to make economic and freight transport more climate-friendly by shifting it from road to rail and water. In addition, the duration of approval procedures is to be shortened and noise protection improved.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Establishment of a coordination office for sidings/waterways to support Mannheim companies in the reactivation of disused sidings and the expansion of existing sidings.
- Support model projects for shifting freight transport to rail and waterways
- Examination and expansion of infrastructure to create facilities for shifting freight transport from road to rail and water in the urban area.
- Support for a model project of regional rail transport to and from the seaports
- Support for a model project on the decarbonisation of shipping

The **CO2** savings potential cannot be estimated at this point.

MEASURE 3: ACCELERATING THE DRIVE TURNAROUND IN COMMERCIAL FLEETS

Framework conditions: This measure is intended to provide more efficient services for commercially conducted journeys that can neither be avoided nor shifted to other means of transport. In doing so, however, it must be ensured that the companies located or active in Mannheim are not restricted in their commercial activities.

The **aim of** the measure is to reduce the vehicle-kilometre-specific energy consumption and the associated CO2 emissions of journeys with a commercial purpose by means of a drive turnaround.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Consultancy and funding offers for alternative drives in commercial fleets
- Initiation of innovative pilot projects (e.g. hydrogen in logistics)

The **CO2** savings potential cannot be estimated at this point.

BUILDING BLOCK 6: OVERARCHING MEASURES

This focus of action includes measures that address both passenger and commercial and freight transport across the board.

MEASURE 1: COMMUNICATION AND PUBLIC RELATIONS

Framework conditions: Communication and public relations work has the task of communicatively supporting the provision of the infrastructure necessary for more environmental mobility and fewer cars. It should sensitise citizens to the issues of climate-friendly mobility in the city and, where there are gaps in the knowledge of citizens, businesses and traders, inform them about existing alternatives to the car.

The aim of this measure is to support the use of alternatives to the car by reducing knowledge deficits among Mannheim citizens, businesses and tradespeople

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Raising awareness and creating acceptance for the transport transition
- Expand communication and public relations work on all mobility-related topics, focusing on the positive effects of less MIV

An estimate of the **CO2** savings potential is not possible at this point.

MEASURE 2: SPEED REDUCTION IN THE ROAD NETWORK

Framework conditions: An area-wide speed reduction in Mannheim's road network can help motivate people who do not use the bicycle due to safety deficits caused by high car speeds to use the bicycle more. At the same time, lower speeds produce fewer CO2 emissions.

The **aim of** the measure is to reduce the use of cars in Mannheim in favour of the environmental alliance (public transport, cycling and walking, car sharing, etc.).



The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Introduction of 30 km/h speed limit on all roads in the city area where the road traffic regulations allow it.

An estimate of the **CO2** savings potential is not possible at this point.

MEASURE 3: MOBILITY MANAGEMENT

Framework conditions: In future, companies based in Mannheim are to receive even more support in the climatefriendly handling of the transport associated with their activities. Employee transport (i.e. the journeys of employees to their place of work), business mobility and the use of company vehicle fleets should be carried out with lower transport-related energy consumption and CO2 emissions. A high degree of company mobility should be realised with as little traffic as possible.

The **aim of** the measure is to ensure that all transport associated with the economic activities of Mannheim's companies is handled in the most climate-friendly way possible.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Expansion of corporate mobility management
 - Institutionalisation of corporate mobility management through advisory services offered by the City of Mannheim's departments for Mannheim companies
 - More attractive conditions for job tickets, for example regarding the minimum purchase per company
 - Promoting the formation of car pools
- Expanding mobility education for children with a focus on sustainable mobility

The **CO2** savings potential of this measure is part of the savings achieved by avoiding and shifting car traffic and by promoting the drive system turnaround. To avoid double counting, it is therefore not shown here.

ACTION FIELD PRIVATE HOUSEHOLDS



The share of private households in energy consumption in the Mannheim city area is 2,515 GWh, or 24 %, and the share of associated emissions is 22.5 %, or 704,925 t CO2 . Residential buildings are an essential building block in this field of action, but consumption and food also play a relevant role for a climate-neutral Mannheim.

Assuming a current refurbishment rate of 1 % and the target scenario (cf. chapter 8), it quickly becomes clear that this level of ambition cannot be achieved through consultation and existing funding programmes alone.

Framework conditions at EU, federal and state level

In the area of residential buildings, a **renovation obligation**, at least in the case of a transfer of ownership, is considered indispensable in order to bring the building stock up to an appropriate



efficiency standard within the framework of the set target. A gradual renovation obligation is currently also being discussed at European level in the context of the amendment of the Energy Performance of Buildings Directive (EPBD)²².

In addition to climate protection targets at EU, federal and state level, there is also a **land protection target**: by 2050, **new land use is** to be reduced to "**net zero**". At the same time, however, new construction subsidies, expansion of road infrastructure, etc. promote further land sealing and make it much more difficult to achieve climate protection goals. Stringent policy-making at all levels would be helpful for municipalities to eliminate these conflicting goals. This includes, for example, a clear focus on existing buildings, not only with regard to energy-efficient refurbishment, but also with regard to optimising the use of existing buildings and land. There is a need to qualify the 400,000 new housing units per year in Germany mentioned in the coalition agreement and how these can be produced as far as possible without taking up new land. In addition, **funding programmes** such as those of KfW Bank should **take regional specifics into account**: Where is housing actually needed? And if so, what kind of housing offers? How can housing offers suitable for the elderly be created that at the same time lead to family-friendly housing being freed up for a change of generations? Although planning and urban development is a municipal task, the Building Code, state building regulations, DIN standardisation and many other guidelines and laws, among others, impose requirements that tend to be a hindrance to the optimised use of buildings and spaces.

And finally, a **clear orientation towards sustainable production** is necessary for the area of **sustainable consumption** at European as well as national and state level. This applies to agriculture,

for example, where agricultural subsidies still support conventional farming and mass production, while at the same time a large part of the food it produces is already disposed of on its way to private households (Ludwig-Ohm & Dirksmeyer, 2019). **Clear guidelines are** needed here so that **sustainable products and also services** can be offered across the board and ultimately become the standard.

BUILDING BLOCK 1: RESIDENTIAL BUILDINGS

Residential buildings - and especially space heating - are responsible for a large share of final energy consumption and the associated emissions of private households. An essential key is energy refurbishment and a supply of the remaining residual heat via renewable energies. New buildings should meet these requirements from the outset, taking into account that new construction also consumes a lot of energy and resources, as does demolition and disposal (see also Measure 7.8.1.3). It is therefore important to use existing buildings as efficiently as possible in order to keep the need for new buildings as low as possible.

MEASURE 1: OPTIMISED USE OF LIVING SPACE AND AREAS

Framework conditions: The need for new housing construction until 2040 is around 17,000 flats in Mannheim. The creation of new and affordable housing is a challenge that many cities want to solve with new construction and the designation of new settlement areas (Böcker et. al., 2021). In contrast, the city of Mannheim has advocated zero land growth in the outer areas in its integrated spatial urban development concept (model spatial order). Against the backdrop of further population growth, this and meeting the demand for new construction exclusively in the inner area pose a particular challenge.

In Mannheim, more than half of the population entitled to reside live in single-person households, with a slight upward trend (Stadt Mannheim, 2022). It can therefore be assumed that the building stock offers some potential for optimised use. It should be noted, however, that shared flats and unmarried couples are also usually recorded as one-person households, although more than one person lives in the dwelling. The population register does not contain any information to identify these household forms. The actual proportion of people living alone is therefore probably noticeably lower.

In order to determine the potential, it would be necessary to identify vacancies, potential for conversion and under-occupied buildings and residential units. However, since there are no comprehensive primary data sources, reliable results can only be generated through comprehensive surveys and interviews with the associated expenditure of time and resources. In addition, the possibilities of redensification should be analysed, for example by closing gaps



<p>between buildings or adding storeys. The next step is to approach and support owners and tenants with appropriate advice on conversion, subletting or relocation, so that the existing potential can be used more efficiently. For the remaining major part of the new construction demand, the housing demand forecast 2040 not only takes into account households moving in, but also possible adaptation needs of the local population. For example, the provision of age-appropriate housing or communal housing projects may be accompanied by a reduction in the amount of space and building volume that needs to be built, resulting in the release of larger living space suitable for families, for example. Financial relocation assistance, e.g. for renovation or relocation costs for people with low incomes, can complement a corresponding offer. Therefore, this measure is a mixture of stock analysis, counselling and financial incentive. However, these internal shifts in housing demand will - not least because of the remanence effect (see below) - only be able to reduce the demand for new construction to a small extent.</p>
<p>The aim of this measure is to establish a corresponding advisory service for the creation of housing in the existing stock and thus to reduce the need for new construction as well as redensification, for example by closing gaps between buildings or adding storeys.</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Analyse underutilisation: GIS-supported neighbourhood analyses (e.g. vacancy analyses and residential land register). • Housing counselling services for optimised use of housing, buildings and spaces
<p>Time horizon This measure can be started in the short term and implemented in the medium term. In the process, the organisational and personnel structures are to be created in the short term so that the inventory analyses and advisory services can begin in the near future.</p>
<p>Contribution to climate neutrality The emission reduction is not accounted for at this point. This measure does not avoid current emissions, but rather future emissions through reduced new construction and the associated consumption of energy, resources and land.</p>
<p>Responsibility</p> <ul style="list-style-type: none"> • GIS-based neighbourhood analyses: FB 61 • Consultation: Cooperation with owners' associations, housing associations, real estate developers, etc.
<p>Financial expenditure New staff positions need to be created, especially for housing counselling. Financial relocation assistance can expand the range of services and should be taken into account accordingly.</p>
<p>Monitoring / Indicators How well the housing counselling is accepted can be determined by the number of people counseled annually as well as the use of relocation assistance. Even without taking advantage of financial support, it should be evaluated in the context of personal counselling how often it has actually come to an adjustment of one's own housing situation through the offer.</p>
<p>Conflicting goals and synergies Synergies of this measure are mainly to be found in the aspect of redensification. For example, the creation of new housing units in areas that have already been developed "infrastructurally" or the optimised use of land and buildings is associated with less planning effort and construction costs. The measure also has a positive effect on the field of action "land use", as less previously undeveloped land is needed for settlement development. Possible conflicts of objectives arise when new building projects have to be reconciled with the objective of avoiding new building activities. In view of rising rents and property prices, moving is usually a losing proposition for long-term tenants and homeowners. Without a controlling intervention in market prices, there will always be the so-called remanence effect (= inertia). Fallow land ensures the welfare effect of people in urban areas, is a retreat for flora and fauna and offers great potential for the protection of biodiversity. The use of these areas must therefore be undertaken with a sense of proportion, taking nature conservation into account.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> • Smaller living - better living: https://energieagentur-regio-freiburg.eu/kleiner-besserwohnen/ • In the OptiWohn project, both corresponding analyses and counselling services were developed and tested: https://wupperinst.org/p/wi/p/s/pd/824



- The LebensRäume and ReHABITAT projects have dealt specifically with single-family homes: <https://www.oeko.de/forschung-beratung/projekte/pr-details/kommunen-innovativ-lebensraeume>, <https://rehabitatprojekt.wordpress.com>
- A systemic view of urban areas and structures that are no longer in use and their potential for conversion to residential and other uses can be found here: <https://obsolete-stadt.de>
- The City of Frankfurt supports the move to smaller flats for people who live in social housing that has become too large: <https://frankfurt.de/themen/planen-bauen-und-wohnen/wohnen/vermittlung-von-gefoerderten-wohnungen-und-fehlbelegungsabgabe/wohnungssuche---wohnungsvermittlung/umzugspraemie>

MEASURE 2: RENOVATION OFFENSIVE

Framework conditions: Another major savings potential is to be found in the energy-efficient retrofitting of older existing buildings. The diverse structure of owners - from owner-occupiers and private renters to companies and cooperatives with larger portfolios - requires a target group-specific approach.

Here, it is necessary to identify renovation potential, to impose regulatory requirements on existing buildings, to support owners in their implementation through advice and funding, and at the same time to protect tenants' interests.

The **aim** of this measure is to increase the rate and depth of renovation in Mannheim.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Establish a one-stop shop for renovation: Advice and support from a single source, e.g. through the Mannheim Climate Protection Agency (Klimaschutzagentur Mannheim gGmbH).
 - Energetic refurbishment
 - Greening
 - Potentials of optimised building use
- Examine the potential for serial rehabilitation in Mannheim and support its implementation
- Further training measures for energy consultants and tradespeople
- Ambitious refurbishment strategies of the local housing companies
- Model projects for rent-neutral refurbishments
 - Expand energy rehabilitation areas (Kfw 432), with a focus on areas with low district heating accessibility
 - Examination of district heating expansion potentials within the framework of municipal heating planning and, if necessary, support in implementation.
 - Obligation to test PV and greening measures on existing buildings in the case of (roof) renovations

Time horizon

In order to achieve a largely climate-neutral building stock by 2030, the renovation offensive should be developed and launched in the short term. Overall, however, this is a long-term measure that, depending on the renovation rate, will also extend beyond the year 2030. Assuming an ambitious annual renovation rate of 4 % (in relation to energy consumption), a total of 32 % of existing private households can be renovated by 2030. Complete renovation can be expected by 2047 if the renovation rate is maintained.

Contribution to climate neutrality

At the above-mentioned renovation rate, the CO₂ savings of this measure can be estimated at **95,000 t CO₂** for the year 2030. The success of the One-Stop-Shops contributes to this with a saving of **61,000 t CO₂**. A PV obligation on existing buildings would have a potential of **26,000 t CO₂**.

The refurbishment of municipal housing associations can achieve savings of **7,000 t CO₂** by 2030.

Responsibility

- One-Stop-Shop: Klimaschutzagentur Mannheim gGmbH
- Neighbourhood concepts: FB 67, Climate Protection Agency Mannheim gGmbH



- Obligation to check PV (new and existing buildings), greening, etc.: FB 61, FB 60
- Model projects with housing companies: Klimaschutzagentur Mannheim gGmbH, including GBG Unternehmensgruppe (BBS, GBG)
- Support implementation of serial refurbishments: Klimaschutzagentur Mannheim gGmbH, Chambers of Crafts

Financial expenditure

The financial expenditure for the analysis and advisory activities can be classified as medium: For the analysis of potential and support of owners, among other things through one-stop shops, additional personnel and training costs are to be expected.

Various funding programmes at federal and state level are available for the renovation measures to be implemented. Advice on this is offered by the State Energy Agency KEA-BW, among others. The KfW programme is currently being further developed, expanded and, if necessary, extended. Whether or to what extent additional financial incentives will have to be provided by the City of Mannheim is therefore difficult to foresee at present. The city is already providing additional financial incentives with the Energy Efficiency Renovation funding programme. For this reason, reference is made at this point to the municipal climate fund (Measure 7.9.5.3).

In contrast, the investments made by local and municipal housing companies as part of the refurbishment offensive are a far greater cost factor. Depending on the scope, measure and efficiency standard, subsidies from the KfW Bank can be used for this purpose, or financing models within the framework of contracting can be used. Particularly ambitious projects or larger existing housing estates can also be suitable as pilot projects, such as those funded by the National Climate Protection Initiative or the German Federal Environmental Foundation.

Monitoring / Indicators

The individual steps of the renovation offensive each have different indicators that can be used to monitor the measure.

- The interest and acceptance of the One-Stop-Shops can be assessed by the annual number of counselling appointments. In addition to the number of projects for implementation support, surveys of participants can also provide information on the effectiveness of this measure.
- Using sales data from the local energy supplier, the energy consumption as well as the shares of renewable energy can be checked.
- The city-wide renovation rate serves as a general indicator

Conflicting goals and synergies

The topic of costs is a sensitive one, especially for owners and tenants, so it is not only important for a municipality to advise on rent-neutral renovation, but also to set a good example for its own housing associations.

Furthermore, there are conflicting goals in connection with the general shortage of craftsmen, without whom a renovation offensive can hardly be carried out.

The willingness of private households to switch to renewable energies also depends on the offer of the local energy supply company. Therefore, a renovation offensive is also only possible in combination with a city-wide energy transition. The advisory services should also take into account the other (residential) building-related measures within the framework of the KSAP, specifically the optimised use of living space (Measure 7.8.1.1). 7.8.1.1) and the greening of buildings.

The promotion of these measures may result in the loss of habitats of building nesting birds and building-inhabiting bats. These must be functionally compensated. Already during the implementation of building renovations, species protection must be observed and disturbances must be avoided.

Good practice examples

- Examples of one-stop shops in the "ProRetro" project: <https://proretro.eu/de/>
- Serial refurbishment and warm rent neutrality according to the principle of "Energiesprong": <https://www.energiesprong.de/was-ist-energiesprong/>
- Climate Protection Agency Mannheim funding programmes: <https://klima-ma.de/energie/foerderprogramme>



MEASURE 3: CLIMATE-NEUTRAL NEW CONSTRUCTION

Framework conditions: As already mentioned in section 7.8.1.2 described, requirements for climate neutrality must also be set for new buildings in the private household sector. Here, energy efficiency plays just as important a role as resource efficiency. Here, the city of Mannheim can expand the requirements that currently apply nationwide to include corresponding aspects.

The **goal of** this measure is climate neutrality in new construction (cf. also measure 7.4.3.2).

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Set "Mannheim Standard" for energy and resource efficient new construction for urban properties, including
 - Benchmarks for energy, space and resource efficiency
 - Supply with 100 % renewable energies in new buildings
 - Adaptation potential for optimised use through flexibility in floor plan design

The individual activities contribute to this as follows:

The **CO2** savings potential of the measure can be estimated at **approx. 2,200 t CO2 /a.**

- Requirements for compactness and building orientation as well as high efficiency standards for new buildings: 1,200t CO2
- PV utilisation requirement: 1,000 t CO2

MEASURE 4: DIGITAL INFORMATION PROVISION

Framework conditions: Digital applications can also speed up application procedures in the building sector. Flanders, for example, has introduced a digital building passport that provides owners with information about the (energy-related) condition of the building and makes it easier to plan necessary or possible renovation measures. On the other hand, the municipal authorities have access to this file, so that formalities can be minimised in the event of an application for the building. In addition, information can be made available to companies and private individuals on questions such as: Is the roof of my house suitable for a solar system? What kind of heat supply makes ecological sense for my house?

The **aim of** this measure is a digitalisation strategy for the planning and construction industry.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Introduction of the digital building file: Compilation of all relevant documents on a building as a basis for simplified and accelerated approval procedures.
- Introduction of a digital building application
- Provision of a solar land register
- Digitalisation of Mannheim's building typology for recording and monitoring the energy consumption and energy status of the building stock

No direct **CO2** savings potential can be attributed to the measure itself. Rather, it serves as a basis for assessing the potential of the measures. 7.8.1.1 to 7.8.1.3 can be exploited more quickly.

BUILDING BLOCK 2: CLIMATE-FRIENDLY NUTRITION AND CONSUMPTION

Another component of private households concerns consumption decisions. In addition to everyday products and food, this also includes more durable goods such as clothing, furniture, household appliances, computers, mobile phones and many more. Every day, people make consumption decisions and thus influence their "personal CO2 or ecological footprint". Emissions from production and transport, which are "bought in", the materials used in products, the efficiency of electrical devices, the durability and reparability, all these aspects determine the sustainability of products. In the behaviour of consumers, there are also the questions of what and how much is consumed, how goods are handled with more or less care, and how they are disposed of. These issues need to be addressed from both the supply and demand sides.

MEASURE 1: AVOID WASTE, IMPROVE RECYCLING



Framework conditions: Over the past decades, emissions from waste management in Germany have fallen significantly. However, the volume of waste is constantly high, including municipal waste. In Germany, municipal waste can be attributed an annual share of over 50 million tonnes (UBA2021b), or 12% of the total waste produced (UBA 2021c). Municipal waste is very heterogeneous and resource-relevant and is often seen as representative of the challenges facing the entire waste management sector. The reduction of waste generation is thus a relevant contribution to climate protection and can be supported, among other things, by a zero waste strategy. Second priority is given to the long-term reuse and re-use of products and only in last place should recycling come: "reduce, reuse, recycle".

The aim of this measure is on the one hand to significantly reduce the amount of waste generated in private households and on the other hand to promote the reuse and recycling of goods.

The activities of the City of Mannheim and its stakeholders in this regard are:

- Expansion and intensification of the information campaigns of the waste advisory service of the city space service and the climate protection agency on the topics: Waste avoidance, waste separation, waste recycling
- Targeted support for initiatives, second hand offers and flea markets or platforms to promote sharing, swapping, passing on and reuse
- Development of a zero waste strategy and its link to the plastic strategy of the city of Mannheim
- Implementation of the measures of the Urban Plastic Strategy
- Waste separation in public spaces (minimum criterion: paper and residue)
- Introduce waste separation in public buildings and at events (minimum criteria: paper, recyclable, organic and residual waste).

Time horizon

The expansion of the information campaigns and the development of a Zero Waste Strategy and its connection to the plastic strategy of the City of Mannheim can be tackled in the short term. However, since the Zero Waste Strategy is an independent catalogue of measures, it is not possible to specify a uniform time horizon. The individual measures of the Zero Waste Strategy range from short to long term.

Contribution to climate neutrality

The emission reduction for this measure results from avoided production and transport for short-lived goods, which are mainly located outside the Mannheim city area. The amount of CO₂ savings potential depends on the concrete measures of the Zero Waste Strategy and cannot be assessed at this point.

Responsibility

- Information campaigns: EB 76, Klimaschutzagentur Mannheim gGmbH
- Zero Waste Strategy: EB 76, FB 67, Klimaschutzagentur Mannheim gGmbH, FB 15

Financial expenditure

Given the large number of possible measures, the financial cost of this measure can only be estimated after a zero waste strategy has been drawn up. The preparation of the strategy in the narrower sense is associated with little effort.

Monitoring / Indicators

In principle, this measure can be measured on the basis of waste generation in tonnes and on the basis of the recycling share, which can then be converted into CO₂ equivalents.

Conflicting goals and synergies

In addition to CO₂ savings, waste avoidance can lead to further synergies. In the long term, the dependence on imports of raw materials can be reduced, which, after the experiences of the Corona pandemic and the Ukraine conflict, represents a significant contribution to supply security. In addition, regional value creation can benefit from the development and expansion of a circular economy.

Good practice examples

- Mannheim Plastic Strategy: <https://www.mannheim-gemeinsam-gestalten.de/plastikstrategie>
- Zero Waste Concept Kiel: https://www.kiel.de/de/umwelt_verkehr/zerowaste/_dokumente_zerowaste/zerowaste_kiel_konzept.pdf



MEASURE 2: PROMOTE THE SUPPLY OF REGIONAL AND ORGANIC PRODUCTS

Framework conditions: The emissions associated with the production and transport of products can be reduced through regional and ecological production. Many companies have long since reacted to the increasing demand, especially in the food sector, by expanding their product ranges accordingly. For other products, there is a lack of a comprehensive offer. Furthermore, it is important to create awareness about the different forms of nutrition and the resulting emissions.

The **aim of** this measure is to expand the supply of regionally and ecologically produced goods and food

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Targeted support of civil society initiatives on sustainable production in the sense of "economic and structural promotion" (see measure 7.4.4.1), e.g. production according to ecological and social criteria, recycling or upcycling products, etc.
- Raise awareness of different diets (meat consumption, vegetarian or vegan diets) and the emissions they produce.

The **CO2** savings potential is due to avoided emissions from the production and transport of imported goods, especially outside the Mannheim urban area (Scope 3). Accordingly, it is not quantified here.

BUILDING BLOCK 3: OVERARCHING MEASURES

In addition to the measures described, there are those that address several building blocks and support the implementation of other measures.

MEASURE 1: EXPANSION OF EXISTING URBAN SUPPORT PROGRAMMES

Framework conditions: In addition to information and technical support, financial support is an essential motivation for implementing measures to save energy and increase energy efficiency, to produce and use renewable energies or to green buildings. A thematic and financial expansion of the existing funding programmes of the City of Mannheim should accelerate the incentives for the implementation of climate protection and climate impact adaptation measures by the urban society. In addition, the municipal climate fund (cf. measure 7.9.5.3) should promote innovative climate projects from the urban community that do not meet the criteria of the existing funding programmes but nevertheless reduce emissions.

The **aim of** this measure is to expand the existing funding landscape and increase the number of funded climate protection measures

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Thematic and financial expansion of existing funding programmes of the City of Mannheim, e.g. energy refurbishment and efficiency measures, greening of roofs, façades and unsealing areas, SolarBonus
- Expansion of the municipal climate fund to support innovative climate protection and climate impact adaptation projects of associations, initiatives, companies, etc.
- Establishment of a municipal "points system" to create a further incentive for climatefriendly behaviour

The **CO2** savings potential is largely dependent on the number and type of measures applied for. Due to these uncertainties, it cannot be quantified.



ACTION FIELD MUNICIPAL ADMINISTRATION



Under the approach described in chapter 5 assumption that the share of the municipal administration in the final energy consumption and CO₂ emissions in the Mannheim city area is 1.5 %, the energy consumption amounts to 157 GWh and the emissions to 31,330 tonnes. 157 GWh and the emissions amount to **31,330 t**.

Against the backdrop of the municipal role model function vis-à-vis local businesses and the population of Mannheim, municipal institutions should aim to become climate-neutral before 2030. In addition to financial and personnel capacities, this also requires organisational measures that allow for a significant acceleration of processes and decision-making.

Framework conditions at EU, federal and state level

In order to give municipalities room for manoeuvre in general, there is a need for **binding targets for climate neutrality in the public sector** by 2030. Climate protection and adaptation should thus become a mandatory municipal task.

This should be linked to the **provision of financial resources**. A **consistent reduction of climate-damaging subsidies or grants** can help to direct the available funds towards the goal of climate neutrality. This includes, among other things, using subsidies in a regionally targeted manner. The many differences and local specifics, such as those between large and small municipalities, between growing, stagnating and shrinking regions, also entail different needs. Which funding is appropriate where should play a greater role in the future in the design of funding programmes, which today still often apply equally across the board, in order to avoid bad investments. Finally, the federal and state governments can support the municipalities in upcoming tasks, such as **collecting missing data or building and maintaining corresponding databases** (such as building information or traffic data). Application-oriented **guidelines and information** that municipalities can use for climate protection activities on the ground should also be further developed and actively disseminated

BUILDING BLOCK 1: CLIMATE-NEUTRAL PROPERTIES

A large potential of this field of action for CO₂ savings and thus also for climate neutrality lies in the energy consumption of municipal properties. Older buildings often have high energy consumption and cannot meet the required energy standards of a climate-neutral building stock. On the one hand, this is due to the heating energy demand, which is largely defined by the energy and building physics quality of the building envelope. But heating energy generation is also inefficient with older technologies and, when fossil fuels are used, is associated with high CO₂ emissions. Particularly after the partially flexible working models caused by the pandemic, as well as possible changes in time models, there are also opportunities to use buildings, rooms or spaces differently. Improved efficiency of use and the energy and resources already used in buildings can lead to a reduced need for new construction.



MEASURE 1: REFURBISHMENT OF MUNICIPAL BUILDINGS

Framework conditions: Increasing the rate and depth of renovation is one of the most important measures in the building sector to achieve climate targets. Therefore, the renovation of the 330 municipal buildings of the City of Mannheim can make a significant contribution towards climate neutrality of the administration. Last but not least, in addition to the actual relevance, the exemplary function of the administration should also be emphasised.

The refurbishment of existing buildings addresses two points to reduce CO₂ emissions: Firstly, the reduction of energy demand. This can be achieved by optimising the energy efficiency of the building envelope, which not only leads to a reduction in heating energy demand, but also brings savings in systems engineering, such as ventilation systems, due to better building tightness. Further energy savings are possible with improved energy efficiency of building technology, e.g. use of LEDs. Secondly, the remaining energy demand should be covered by the use of renewable energy sources, so that CO₂ emissions can be reduced as effectively as possible. Against this background, it makes sense to use renovation roadmaps to determine the appropriate measures for individual buildings and to develop a prioritisation for the entire building stock.

The **goal of** this measure is the comprehensive energy refurbishment towards a climate-neutral building stock.

The city of Mannheim has initially focused on the replacement of fossil fuels. In particular, buildings that currently use natural gas should be connected to existing district heating networks as soon as possible or supplied with renewable energies.

An external report concludes that with a 2% refurbishment rate, 16% of the area of the buildings under the administration of the municipal department of building and property management (25) could be refurbished to make them more energy-efficient by 2030. This would require a financial outlay of around € 29 million and an increase in staff of 7 positions. Further acceleration towards a renovation rate of up to 4 % would be desirable for the climate-neutral building stock.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Revision of the renovation roadmap for the entire municipal building stock and alignment with the goal of GHG neutrality before 2030.
- Draw up and implement individual renovation roadmaps for individual buildings
- Renew energy and resource efficiency standard
- Regular examination of the possibilities of PV use, roof and façade greening in the case of redevelopment and on an ongoing basis for properties not due for redevelopment.
- Initiation of a pilot project: training cooperation between Mannheim University of Applied Sciences, HWK and the City of Mannheim for the refurbishment of public buildings

Time horizon

The implementation of the measure should start immediately. The planning and implementation of the refurbishments take time and must be given appropriate weight in the budget, which is why they will only be completed in the medium to long term. Under an ambitious assumption of an annual refurbishment rate of 4% until 2030, a total of 32% of the building stock would be refurbished. The refurbishment of the entire building stock would take until 2045 if the refurbishment rate is maintained. An acceleration is therefore desirable, but at present hardly realistic to assume without massive flanking measures.

Contribution to climate neutrality

An estimate of the CO₂ reduction potential for 2030, assuming the above-mentioned renovation rate, yields a saving of approx. **11,000 t CO₂** with a renovation rate of 32 %. Around **8,000 t CO₂** are accounted for by energy-efficient building refurbishment with conversion to renewable energies and efficiency measures to optimise ventilation and air-conditioning systems and lighting. Around **3,000 t CO₂** can also be saved by installing PV systems on the roofs of the renovated buildings.

In total, this can save about 36 % of the CO₂ emissions of the municipal administration.

Responsibility

- Building refurbishment: All departments with their own properties (GBG group of companies (BBS, GBG), FB 25, FB 40, FB 52, FB 80, NextMannheim, EB 16, EB 42, EB 46, EB 47, EB 76, EB 69, EB 75, Alte Feuerwache (Old Fire Station), Mannheim nursing homes for the elderly, Mannheim wholesale market, Central Institute of Mental Health, Mannheim University Medical School



- PV offensive: sMart City Mannheim GmbH, MKB
- "Pilot Project Training Cooperation": FB 80, HWK, IHK

Financial expenditure

The costs are significantly dependent on the initial energy status of the buildings and systems and the measures that need to be implemented to upgrade them. In addition, there have been significant price increases and fluctuations for building materials in recent years, which makes a realistic calculation for the next few years impossible. The costs should therefore be understood as a rough estimate.

The "Climate City Plan Mannheim" arrives at investment costs in the heating sector of municipal buildings of € 58 million per year.

Furthermore, there is a great need for personnel to implement the renovation of municipal buildings.

Financial support is offered by both KfW Bank and the Federal Office of Economics and Export Control (BAFA):

[https://www.kfw.de/inlandsfoerderung/%C3%96ffentliche-Einrichtungen/Kommunen/F%C3%B6rderprodukte/Bundesf%C3%B6rderung-f%C3%BCr-effiziente-Geb%C3%A4ude-Kommunen-Zuschuss-\(464\)/](https://www.kfw.de/inlandsfoerderung/%C3%96ffentliche-Einrichtungen/Kommunen/F%C3%B6rderprodukte/Bundesf%C3%B6rderung-f%C3%BCr-effiziente-Geb%C3%A4ude-Kommunen-Zuschuss-(464)/)

https://www.bafa.de/DE/Energie/Effiziente_Gebaeude/Sanierung_Nichtwohngebaeude/sanierung_nichtwohngebaeude_node.html

Alternative financing models can also be examined within the framework of contracting or intracting:

<https://www.kompetenzzentrum-contracting.de/contracting/contracting-modelle/>

Furthermore, it is important to observe whether further funding is made available at a higher administrative level - whether through competitions or directly.

Monitoring / Indicators

Taking the framework conditions into account, the effectiveness of the measures can be verified very well via the final energy consumption (electricity and heat) of the buildings.

Conflicting goals and synergies

In addition to financing and the provision of raw materials, a major obstacle to rapid implementation is the shortage of skilled workers, which is becoming more serious not only in this field of action. Against this background, it is all the more relevant to direct the available manpower towards upgrading the existing stock.

In the medium to long term, necessary investments can pay for themselves through energy savings. This does not only apply to saved heating energy, which is usually used to measure the economic efficiency of energy measures. Foreseeable future increases in energy consumption for cooling during hot spells can also be reduced by efficient building envelopes, thereby ensuring an improved indoor climate. Despite the prospect of payback, the initial investment represents a high volume.

With this measure, the city of Mannheim is living up to its role model function vis-à-vis companies and civil society. Conflicts of objectives are also possible from the perspective of nature conservation if habitats of building nesting birds and building-inhabiting bats are lost. These can be functionally compensated for by installing additional nesting aids or roosts as part of the renovation, if necessary, in order to promote biodiversity. Already during the implementation of building renovations, species protection must be observed and disturbances must be avoided.

Good practice examples

- Kunsthalle Mannheim: pioneer (among others) in building technology, lighting, procurement, green roofs and PV
- Mannheim: Friedrich Ebert Primary School, Franklin School: <https://www.mannheim.de/de/bildung-staerken/schulbau>
- Mannheim: Redevelopment of GBG housing stock Group of companies (BBS, GBG) on the Schönau: <https://www.mannheim.de/de/service-bieten/bunte-stadt/stadtteileben/schoenau/schoenau-nord/modernisierung-gbg-schoenau-mitte>
- Mannheim: Franklin Square: <https://franklin-mannheim.de/gbg-mannheim/square/>

MEASURE 2: CLIMATE NEUTRALITY IN NEW CONSTRUCTION

Framework conditions: In addition to renovation, it is equally important to strive for climate neutrality in the construction of new municipal properties. Two factors are decisive for effective CO₂ neutrality in new buildings: for the utilisation phase, energy efficiency, which goes hand in hand with an energetically optimised building envelope and systems technology, as well as the supply of



renewable energies for heat and electricity. On the other hand, processes already consume energy before or with the creation of a building. This "grey energy" corresponds to the energy consumption and associated CO₂ emissions associated with the production, transport and installation of the required materials, later deconstruction and disposal. In addition to the greenhouse gas-neutral operation of buildings, the choice of building materials and the use of ecological and CO₂-neutral materials, e.g. renewable raw materials such as wood or recycled building materials such as recycled concrete, are therefore relevant. In order to be able to make even better use of the existing building stock as a raw material store in the future, new building projects must be planned according to the principles of the circular economy or following Cradle to Cradle, and deconstruction concepts must be consistently provided for and implemented. This not only leads to better availability of products, but also saves CO₂ by reducing the need for new building materials.

The **goal of** this measure are Mannheim guidelines that tighten up the current status of building guidelines (especially the Building Energy Act) in order to make new construction as climate-neutral as possible, from production to use to deconstruction. The guidelines should also enable a goal-oriented consideration of when renovation and when new construction is the solution of choice.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Set a standard for climate-neutral new construction in terms of energy and resource efficiency and cradle to cradle.
- Consistent implementation of PV use in accordance with §8a KSG BW and standard testing of green roofs and façades
- Pilot project: "Transparent building site" to use exemplary climate-neutral construction for public relations work

Time horizon

The introduction of a mandatory energy and resource efficiency standard for new municipal buildings can take place in the short term. This is a measure without an end of term. If necessary, the requirements should be evaluated and adjusted over the years with regard to the current state of the art or climate protection requirements.

Contribution to climate neutrality

The CO₂ savings potential of the measure is estimated at approx. **220 t CO₂**. The individual activities contribute as follows:

- Implementation of compactness and ideal building orientation as well as high efficiency standard in new construction: **160 t CO₂**
- PV utilisation requirement: **60 t CO₂**

Responsibility

- Setting the standards for climate neutrality: FB 67, Klimaschutzagentur Mannheim gGmbH, departments with their own properties (GBG Group of Companies (BBS, GBG)FB 25, FB 40, FB 52, FB 80, NextMannheim, EB 16, EB 42, EB 46, EB 47, EB 76, EB 69, EB 75, Alte Feuerwache, Altenpflegeheime Mannheim, Großmarkt Mannheim, Zentralinstitut für Seelische Gesundheit, Universitätsmedizin Mannheim).
- Implementation PV commitment: sMart City GmbH, MKB, FB 25, departments with their own properties (GBG Group of Companies (BBS, GBG)FB 25, FB 40, FB 52, FB 80, NextMannheim, EB 16, EB 42, EB 46, EB 47, EB 76, EB 69, EB 75, Alte Feuerwache, Altenpflegeheime Mannheim, Großmarkt Mannheim, Zentralinstitut für Seelische Gesundheit, Universitätsmedizin Mannheim).
- Pilot project "Transparent building site": Klimaschutzagentur Mannheim gGmbH, Klimaschutzallianz, Chamber of Crafts, building trade

Financial expenditure

On the one hand, special requirements for efficiency, materials and construction result in additional costs in the planning and construction phase compared to a "standard building". On the other hand, innovative building concepts can ensure that overall space and floor space requirements are reduced (cf. measure 7.9.1.3). 7.9.1.3), which can save costs. Operating costs can also be saved through climate neutrality in operation.

Monitoring / Indicators

As with the existing buildings, the final energy consumption serves as an indicator for monitoring.



In this way, it can be checked whether the annual final energy consumption corresponds to the final energy demand on which it is based.

Conflicting goals and synergies

New buildings are often in conflict with the field of action "land protection" and a variety of usage demands. They should therefore be built primarily on conversion sites, in gaps between buildings or as replacement buildings, if other aspects of climate-friendly urban planning do not conflict with this. Here, a balance must be struck between internal densification and the effects on the urban climate. The installation and use of renewable energies can make a contribution to the energy transition (see section 7.2), green roofs and façades can counteract the heat island effect (see Section 7.6). Buildings are usually designed for long-term use. It is not yet possible to foresee whether the demand for use will continue for the same length of time or whether it will change over the course of the building's life. Flexibly planned buildings and floor plans can also be converted and repurposed with relatively little effort if needs change.

The construction of new buildings can conflict with species protection if there are no niches or gaps for animals inhabiting buildings. These animal groups can be supported by artificial roosts.

Good practice examples

- Extension to the Federal Environment Agency Dessau-Roßlau: <https://www.umweltbundesamt.de/neuer-erweiterungsbau-am-hauptsitz-dessau-rosslau>
- Freiburg: City Hall: <https://www.dgnb-system.de/de/projekte/rathaus-freiburg>
- In Venlo, an administration building was constructed according to the principle: "Cradle to Cradle": <https://c2cvenlo.nl/de/stadtverwaltung-venlo/>

MEASURE 3: OPTIMISED USE OF BUILDINGS

Framework conditions: The challenges for employers and employees created by the COVID19 pandemic have increased awareness and acceptance of flexible working models and office concepts. To what extent and to what extent the possibilities to work part of the time in a home office will be maintained in the future is not yet finally foreseeable. However, a framework agreement on flexible mobile working already exists for the administration. Flexible room and usage concepts are also an option for making better use of the City of Mannheim's premises in the case of parttime work, temporary absence, business trips or parental leave. The possibilities range from multiple occupancy of individual workplaces or rooms to flexible workplaces where there are no longer fixed seats for individual persons as well as concepts that represent a mixed form. In addition, many municipal buildings are only used at certain times of the day, such as core working hours in office buildings or rehearsal and performance times in cultural venues. Use by external parties with different time requirements could therefore also represent an intensification of the use of municipal buildings. The measure thus includes on the one hand the optimised use of space and rooms within the own staff as well as possibilities for the use of buildings or rooms by external parties outside the core working hours. For the intensive use of school buildings, the use in the sense of the school development from half-day school to all-day school must be taken into account.

The **aim** of this measure is to increase the efficiency of use of buildings in order to reduce the need for new construction elsewhere.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Introduction of flexible utilisation concepts of office workplaces and spaces for the optimised use of buildings
- Examination and testing of flexible use of premises and buildings by external users

Time horizon

Models of flexible work locations have also found their way into public administration. Since a large number of structures have already been set up as a result of the pandemic, a change



in working models can also be tested beyond the pandemic. With the help of monitoring concepts, such approaches can be evaluated over a longer period of time and gradually adapted to the needs of the municipal administration.

Contribution to climate neutrality

No CO2 savings potential is accounted for in this measure, as no current emissions are avoided. Rather, it is a question of future savings potential resulting from the avoided need for new buildings in terms of energy, resources and land consumption. By increasing the share of flexible work and thus reducing the number of employees on site, current emissions in municipal buildings can be saved, but some of these are added in private households. Savings also result from avoided commuting. However, since no data is available on the potential of flexible working and commuting by employees in the administration, no estimate can be made at this point.

Responsibility

- Testing of flexible working models and monitoring: FB 11
- Construction impact: FB 25, EB 76, FB 40, BBS

Financial expenditure

The future CO2 savings from avoided new construction are also accompanied by future cost savings. In addition, individual one-off investment costs can occur when it comes to supporting employees in setting up their home offices. If office workplaces are reduced and the unused space is rented out, this measure can also generate income.

Monitoring / Indicators

The effect of this measure can be measured, for example, by the office space required per employee. This is reduced if workplaces are used by several employees on a part-time basis or in a home office. Overlapping presence times must be taken into account. The flexible use of the rooms could be proven through rental income when used by external parties. The acceptance of flexible workplace models can also be measured by increased employee satisfaction, e.g. through fewer sick days.

Conflicting goals and synergies

A number of synergies can occur through the expanded use of office space, for example through partial use of third parties or other departments. Especially in the case of home office workplaces, the health precautions of the employees must be guaranteed and insufficient equipment of workplaces must be avoided. Conflicts of objectives may arise within the framework of the operator's responsibility when premises are made available to third parties, which would have to be regulated. Furthermore, increased expenses for caretaker services, etc. may occur.

Good practice examples

- At the Heldergroen design agency in Amsterdam, flexible furnishing was installed where tables can be pulled under the ceiling in the evening and shelves rolled aside. This allows the space to be used outside core working hours for events, workshops and more:
- Mannheim: Multiple use of a meeting room as a dance floor

BUILDING BLOCK 2: CLIMATE-FRIENDLY PROCUREMENT, USE AND DISPOSAL

Municipalities have a large and diverse range of products that they purchase, use and dispose of. This ranges from equipping workplaces with appropriate furniture and equipment, consumables in office supplies, food in canteens and cafeterias to vehicles for official use and special products in individual areas, such as teaching materials in the education sector or medical equipment and disposable products in the medical sector. Thus, on the one hand, a municipality has a role model function vis-à-vis local companies and the population as far as more sustainable consumption is concerned, and on the other hand, through its demand, it has an influence on corresponding markets and offers that should not be underestimated. It can start with its own procurement guidelines, as well as make corresponding specifications for existing or newly awarded framework contracts. Furthermore, this component addresses the issue of



handling products and goods as well as the resulting energy consumption. And finally, there is also potential for optimising energy and resource conservation in the handling of waste and goods that are no longer used.

MEASURE 1: REGULATE PROCUREMENT

Framework conditions: Sustainable procurement only partially has a direct influence on the development of emissions in the city of Mannheim, for example, when products are delivered and emissions are thus generated in freight transport. However, the influence of the measure on the greenhouse gases that arise in the supply chain through the production, transport and disposal of goods and services outside Mannheim (Scope 3) is much more relevant. In addition to energy consumption, resource consumption is also a relevant factor: a procurement system that is geared towards a circular economy helps to ensure that products and the materials they contain are used and recycled for longer. It should also be noted that from 2023 the Supply Chain Sourcing Act will come into force, which will initially apply to companies with 3,000 or more employees and from 2024 to companies with 1,000 or more employees. According to this law, companies must ensure that the minimum social standards for their products and goods are met along the entire supply chain. In many countries, social standards go hand in hand with environmental standards, for example when the use of hazardous substances endangers human health as much as nature. The introduction of the Due Diligence or Supply Chain Act is thus a good basis for realigning procurement in the city of Mannheim.

The **aim of** this measure is to establish eco-social procurement within the administration of the City of Mannheim. The measure is closely linked to measure 3 "Management of equipment and goods", which also aims to reduce consumption and thus the goods procured.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Consolidate and intensify procurement guidelines according to ecological and social criteria (cf. V271/2022 - Ecologically and socially sustainable procurement at the municipal administration).
- Using the e-file in targeted areas
- Create sample calls for tender (e.g. in database) within the administration and make them generally available.
- Renegotiation of existing framework agreements

MEASURE 2: ENERGY MANAGEMENT

Framework conditions: Continuous monitoring of energy consumption can reveal "hidden" savings potentials that arise from inefficient or poorly adjusted system technology, unnecessary lighting at night or the operation of devices in buildings. The energy-relevant behaviour of users also plays a role here (see also Measure 7.9.5.2). The introduction of a certified energy management system, for example according to ISO 50001, can support this. So far, there is no comprehensive energy controlling in the city of Mannheim. This can provide an overview of the building stock as a whole as well as for individual buildings and identify potential for energy savings in the public space (see measure 7.9.3.2) can be identified.

The **aim of** this measure is to introduce a comprehensive energy management system to control consumption in the facilities of the City of Mannheim

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Full implementation of energy management across all buildings
- Establish building control systems to monitor and control e.g. heating and ventilation systems, lighting and shading systems (in implementation)
- Introducing sensor-based consumption control

The **CO₂** savings potential for the expansion of energy management systems in building operation can be estimated at **approx. 5,000 t CO₂** for a city like Mannheim

MEASURE 3: MANAGEMENT OF EQUIPMENT AND GOODS

Framework conditions: Devices such as printers or copiers not only take up space, but also energy. In the city administration, only floor printers and combination devices have been purchased for some time now, which has made their use more efficient. The same applies to the installation of kitchenettes where coffee machines, kettles, etc. are shared. In connection with measure 7.9.1.3



this measure also includes the shared use of computers, non-electrical work utensils and office furniture through the multiple occupancy of workplaces in flexible working time models, where this is possible in terms of work processes.

The **aim of** this measure is to reduce the amount of (electrical) equipment and other office equipment to be purchased and the associated energy consumption.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- Consistent equipment with shared devices
- Examination of used, leased or rented alternatives, incl. exchange within administrative units

The **CO2** savings potential for this measure is largely dependent on the application cases on site or the potentials in Mannheim. However, no data is available on the initial situation.

MEASURE 4: DISPOSAL

Framework conditions: Avoiding waste is the top priority in climate and resource protection. The second step is the reuse of products and materials or the preparation for reuse, and only in the third step, before other recovery (especially energy recovery and backfilling) and final disposal, is recycling.

Besides management issues (see measure 7.9.2.3), offers for waste separation and a corresponding sensitisation of employees support the avoidance of waste and a better separation of waste. staff support the avoidance of waste and a better separation of waste. Depending on the institution, different approaches are to be created for this. For example, significant reductions in food waste can be achieved in canteens and cafeterias, "paperless offices" can be established and offers for the disposal of recyclable products can be created.

The primary **goal of** this measure is to reduce the amount of waste produced. In addition, waste that cannot be avoided should be reused or recycled.

The **activities of** the City of Mannheim and its stakeholders in this regard are:

- A "Zero Waste" concept for the city of Mannheim. It includes not only waste from the administration, but also from other areas and thus interfaces with the fields of action private households, tertiary sector and industry. The Mannheim Plastic Strategy is a component of the concept.
- For a better separation of different types of waste, disposal points should be set up in administrative buildings, for example for residual waste, paper waste, organic waste as well as electrical appliances and other recyclables.
- The measure should be accompanied by campaigns to raise awareness and inform employees in the administrative buildings.

BUILDING BLOCK 3: CLIMATE PROTECTION IN PUBLIC SPACES

In addition to the properties, the City of Mannheim also has scope for climate protection measures in public spaces. This includes the design and use of streets and squares to promote climate-friendly mobility, lighting and traffic lights.

MEASURE 1: CORPORATE MOBILITY MANAGEMENT IN THE ADMINISTRATION

Framework conditions: The transformation of transport is an essential pillar on the path towards climate neutrality and is discussed primarily in the field of action "mobility". Even though the municipal administration's share of transport emissions is comparatively low, it should not be neglected and is therefore presented as a separate measure. Furthermore, the administration also acts as a role model for the urban society with regard to the traffic turnaround. For some departments of the City of Mannheim, official journeys are often unavoidable or are part of the scope of duties, e.g. waste management and green space maintenance. These offer further potential for CO2 reduction with regard to the climate neutrality of the city of Mannheim. Wherever possible, journeys by car should be replaced by journeys by bicycle, pedelec or public transport by creating appropriate incentives and offers. If car journeys cannot be avoided, switching to alternative drives and optimised route planning also leads to lower CO2 emissions.



<p>The aim of this measure is to reduce emissions by avoiding operational traffic, shifting to alternative means of transport and converting the remaining traffic to alternative drives.</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Conversion of operational fleets to alternative drives as completely as possible, innovation projects for alternative drives in the municipal vehicle fleet • Reduce the use of company cars by replacing them with company bicycles, pedelecs or public transport tickets. • Conversion of car parking spaces for employees into bicycle parking spaces or unsealing and greening of parking spaces. • Testing or introduction of smart applications for optimised route planning
<p>Time horizon</p> <p>This is a measure that can be implemented in the short to medium term. Above all, the organisational measures, such as optimised route planning, but also the conversion of business trips to cycling or rail transport, as well as an offer for public transport tickets, can be implemented in the short term. In contrast, the procurement of company bicycles, a fleet of vehicles with alternative drives, and the conversion of car parking spaces are medium to long-term measures.</p>
<p>Contribution to climate neutrality</p> <p>With regard to the emissions of the municipal administration, this measure has a CO2 savings potential of approx. 2,500 t CO2 . The largest share is contributed by the conversion of the company fleet to alternative drives with around 1,500 t CO2 savings. The reduction in the use of company cars and their replacement with company bicycles, pedelecs or public transport tickets is attributed a saving of just under 1,000 t CO2</p>
<p>Responsibility</p> <ul style="list-style-type: none"> • Minimising the use of official vehicles: All departments • Alternative drives: EB 76 • Operational mobility management: FB 11 • Conversion of car parking spaces: FB 25, FB 40
<p>Financial expenditure</p> <p>Reduced use of company cars and optimised route planning mean lower operating and maintenance costs. If the number of fleet cars is also reduced and partially replaced by company bicycles and pedelecs, procurement costs are also saved. Converting car parking spaces into bicycle parking spaces or unsealing them can save additional maintenance costs.</p>
<p>Monitoring / Indicators</p> <p>The CO2 reduction can best be assessed on the basis of the municipal fuel consumption or electricity consumption of the official vehicles. The kilometres travelled by the respective means of transport can also be used to demonstrate the effectiveness of this measure. At the same time, there are synergies with regard to employer attractiveness or employee satisfaction.</p>
<p>Conflicting goals and synergies</p> <p>As already mentioned, the measures in the mobility concept of the municipal administration have a positive influence on measures in the field of action "mobility". Although this is rather a small share of the CO2 emissions of the entire municipal transport, the exemplary function of this measure can increase the acceptance and thus the effectiveness of the measures in the field of action "mobility". For the city as an employer, but also for employees, further positive effects can be listed. For example, especially in urban areas, the switch to cycling and public transport leads to time savings. There are also advantages for employees due to "financial savings potential, new mobility options (partly also for private mobility, for example through offers such as job bike leasing) and an increase in comfort" (Zukunftsnetz Mobilität NRW, 2020), which can result in higher employee satisfaction and employer attractiveness. The shift to walking and cycling in particular also has positive health effects.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> • Mannheim: Establishing sustainable fleet management: https://buergerinfo.mannheim.de/buergerinfo/getfile.asp?id=8167264&type=do • Mannheim: Sustainable mobility strategy - EB 76 electric mobility concept • Mannheim: Use of company bicycles and pedelecs (DA Dienstfahräder) • Mannheim: Optimised route planning waste management and city cleaning (as part of the electric mobility concept and part of SmartCity) • BARshare - Barnim County27



- JobBike BW28
- JobTicket RNV: <https://www.rnv-online.de/tickets/weitere-angebote/job-ticket/>

MEASURE 2: REDUCTION OF ENERGY CONSUMPTION IN PUBLIC SPACES

Framework conditions: Electricity and heat applications in public spaces offer potential for CO₂ savings. For example, times of use and the efficiency of night-time lighting, e.g. of streets or buildings, can be optimised.

There is a close connection to the measure 7.9.2.2. However, care must be taken that this does not counteract possible safety aspects by under-lighting public spaces in the dark. The refurbishment and new construction of street lighting will be carried out according to the specifications of DIN-EN 13201, using only energy-efficient and insect-friendly LED technology according to current standards. Heat applications in public spaces, such as the use of mushroom heaters, can also be optimised.

The **aim** of this measure is to reduce energy consumption through lighting and lighting installations in streets, squares and overall public spaces.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Check at which point lighting in accordance with DIN EN 13201 is necessary and sensible
- Intensification and acceleration of LED conversion in street lighting and light signals (according to § 21 para. 3 Nature Conservation Act Baden-Württemberg, existing lighting installations must be converted or retrofitted with insect-friendly lighting by 2030).
- Reduction of permanent nocturnal lighting, e.g. on buildings (for public buildings, the lighting ban according to § 21 para. 2 Nature Conservation Act Baden-Württemberg must be observed).
- "Intelligent lighting" project with sensor-based dimming function or control of lighting according to need
- Support for the dismantling of mushroom heaters
- Establishment of taboo zones in protected areas
- Dismantling of lighting systems that are no longer required

Time horizon

Due to existing approaches in Mannheim, the measure can be considered to be initiated in the short term. A complete conversion of the street lighting to LED, on the other hand, can be implemented in the medium to long term, due to the enormous scope of the conversion of several thousand light points.

Contribution to climate neutrality

The **CO₂** savings potential for LED conversion in street lighting can be estimated at **approx. 5,700 t CO₂**

Responsibility

- LED conversion: EB 76, MVV Energie AG
- Lighting requirements: FB 67 and EB 76

Financial expenditure

According to calculations by the City of Mannheim on the current street lighting concept, the investment costs for the conversion of 14,000 mercury vapour lamps and 14,600 lighting poles amount to approx. 43 million euros (incl. lighting poles). At the same time, 450,000 euros can already be saved after the first two years. This increases to an annual saving of 1 million euros in energy costs and up to 300,000 euros in operating costs by the time of full implementation (City of Mannheim, 2017).

In addition, subsidies for luminaires of 25 % of the eligible costs can be applied for from the federal government (HMWEVW, 2022). The state of Baden-Württemberg supports municipalities in project development for contracting agreements for the energy-efficient refurbishment of street lighting within the framework of the Climate Protection Plus funding programme.

Monitoring / Indicators

The best way to check this measure is through the annual electricity consumption and the ratio of LED-converted lanterns to the total stock.

Conflicting goals and synergies

By assessing the need for lighting, deconstructing lighting installations and selecting the right systems, night-time light pollution in the city can be reduced, thus relieving not only the



surrounding ecosystem but also the inhabitants. For example, street lights should be used that have shielding against upward light radiation and lights with a very low blue component, as well as allowing dimming and at the same time being suitable for resolving the conflict of objectives with the protection of species in the area of insects and other animals. In connection with digitalisation strategies (smart lighting, smart parking), additional fields of application and savings potential can be identified.

Good practice examples

- Bans on mushroom heaters in cities e.g. Stuttgart (currently suspended due to the COVID-19 crisis)
- Mannheim: Conversion of street lighting to LED: <https://www.mannheim.de/de/nachrichten/neue-strassenbeleuchtung-bis-2026>
- Mannheim: Switching off the lighting in public buildings: <https://www.mannheim.de/de/nachrichten/energiesparverordnung-reduzierte-beleuchtung>

BUILDING STOCK 4: ADMINISTRATIVE STRUCTURES AND PROCESSES

Climate protection and climate impact adaptation, like digitalisation, are typical "cross-cutting issues" in the tasks of an administration. This means that different departments with partly different approaches and objectives deal with the same field of action or, in the case of neighbourhood development, with the same areas. This can lead to conflicts of objectives, for example if the creation of affordable housing is opposed to reducing land use as much as possible or to the costs of highly efficient buildings. In many processes, the conflicts only arise in the course of a procedure, which leads to delays in the implementation of sustainable urban development measures. Accelerating these processes, establishing appropriate standards and resolving potential conflicts at an early stage through constructive solutions (such as intensive citizen participation) is an essential building block for achieving the ambitious climate protection goals of the city of Mannheim

MEASURE 1: STRENGTHEN ANCHORING OF CLIMATE PROTECTION/CLIMATE COMPATIBILITY IN ALL ADMINISTRATIVE UNITS

Framework conditions: The broad participation process set up as part of the development of the present KSAP is to be used as a basis to enter into implementation together with all departments and thus to anchor climate protection more firmly in all administrative units. In this sense, the responsible units for transport, planning, economy, education, culture, etc. understand the goal setting in the area of climate protection as their responsibility and task. The achievement of the goals is accompanied and supported by the Climate Protection Department, but the main responsibility for individual measures lies decentrally in the responsible units.

The *aim* of this measure is to establish a task understanding within the administration that encompasses the contribution of each department to achieving climate protection goals. The establishment of internal administrative structures and processes is the core of an accelerated implementation of measures, the avoidance of conflicting goals and contradictory developments.

The *activities* of the City of Mannheim and its stakeholders in this regard are:

- Decentralised anchoring of the measures of the KSAP in the objectives and tasks of the departments of the City of Mannheim
- Establish cross-departmental working groups on specific topics

The measure itself does not result in any **CO₂ savings potential**; rather, it is a prerequisite for realising the reductions in the other fields of action and building blocks.

MEASURE 2: STRENGTHENING INTEGRATED ADMINISTRATIVE ACTION

Framework conditions: To accelerate the implementation of measures, more flexible organisational structures within the administration are expedient. Flexible project teams can be helpful here, which are composed of the various relevant units of an administration and discuss and plan concrete implementation measures in the Mannheim city area together from the beginning.

The *aim* of this measure is to involve the different perspectives of participating units in concrete development projects at an early stage in order to identify possible conflicts of objectives, find solutions and thus accelerate their implementation.



<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Continuation and expansion of the establishment and testing of interdepartmental project teams for planning and decision-making processes to speed up the implementation of measures. • Citizen participation
<p>Time horizon Organisational structures and work processes cannot be changed in the short term. Agile project approaches are increasingly being tested and consolidated within the framework of the evaluation of organisational structures of the administration.</p>
<p>Contribution to climate neutrality No direct CO2 savings potential can be attributed to the measure. However, by accelerating implementation, corresponding potentials in other fields of action will be exploited earlier.</p>
<p>Responsibility</p> <ul style="list-style-type: none"> • Creating organisational flexibility: FB 11 • Citizen participation: FB 15
<p>Financial expenditure No additional costs are expected with the changed work processes. If necessary, it can be helpful to have the process accompanied and evaluated by external expertise.</p>
<p>Monitoring / Indicators Takes place within the framework of the evaluation of organisational structures of the administration.</p>
<p>Conflicting goals and synergies Changes to established work processes may initially meet with rejection from employees. It therefore seems sensible to start the measure as a pilot project in a participatory and cocreative way with relevant organisational units and committed employees.</p>
<p>Good practice examples</p> <ul style="list-style-type: none"> • Mannheim: Heat action plan in cooperation between FB 67 and FB 58: https://www.mannheim-gemeinsam-gestalten.de/sites/default/files/unit/files/mannheimer_hitzaktionsplan.pdf • Mannheim: Interdisciplinary Planning Team Spinelli

<p>MEASURE 3: SMART ADMINISTRATION</p>
<p>Framework conditions: Digitalisation in the administration can support the acceleration of processes and the implementation of various measures. Among other things, this concerns the exchange of information, participation procedures and the avoidance of traffic routes.</p>
<p>The aim of this measure is to implement digitisation strategies that support the implementation of the KSAP.</p>
<p>The activities of the City of Mannheim and its stakeholders in this regard are:</p> <ul style="list-style-type: none"> • Digitisation of administrative units, e.g. through - Equipping with hardware for more flexible work organisation • Implementation of administrative procedures on a digital basis • Expansion of relevant digital and online offerings - Application procedure for the reduction of journeys to offices - Expansion of digital information and advisory services on climate and energy topics - Inspection of files on a digital basis • Establishing data transparency and information transparency • Consolidate and analyse all existing (digital) information sources to accelerate and improve the identification and evaluation of climate change mitigation measures.
<p>Direct CO2 savings are possible with the implementation. With the introduction of the e-file, the MARCHIVUM has been able to save around 165 running sheets of paper and thus over 4 t CO2 . A little discipline and consistency - and the benefits are manifold; not only, but also for the environment and the economy. The expansion of digital applications can lead to higher energy consumption in individual cases. However, intelligent use creates the prerequisite for potential savings in other fields of action and building blocks.</p>



BUILDING BLOCK 5: OVERARCHING MEASURES

Hardly any of the measures in the KSAP can be successfully implemented without public relations work and accompanying communication with Mannheim's urban society of citizens, businesses, science, politics, associations, initiatives and the administration. The module is therefore to be understood as a cross-sectional task for all measures described in the various fields of action. In addition to advisory services and public relations work, it also includes financial support for climate protection measures through the climate fund.

MEASURE 1: CLIMATE PROTECTION MANAGEMENT IN THE NEIGHBOURHOOD

Framework conditions: Neighbourhoods have different starting situations with regard to climate protection measures, depending on the local target groups and the condition of the existing building infrastructures.

For example, commercial neighbourhoods differ from inner-city neighbourhoods with mixed use or purely residential areas. While some measures of the KSAP can be seen city-wide (such as the public transport network), other climate protection measures to be implemented and the associated information and consultation needs vary (e.g. conversion to renewable heat based on municipal heat planning). Since the ambitious climate protection goals of the City of Mannheim can only be achieved with the active participation of all Mannheim residents, there should be appropriate local advisory services that can address the specifics of small areas.

The *aim* of this measure is to set up contact points in relevant neighbourhoods in the city of Mannheim to activate, inform and advise different target groups, especially within the framework of KfW 432 (national funding programme energetic refurbishment of urban quarters).

The *activities* of the City of Mannheim and its stakeholders in this regard are:

- Consolidation of activities in the previous KfW 432 neighbourhoods
- Identification of further relevant neighbourhoods with a particular need for consultation and refurbishment, with a focus on areas with low district heating development.
- Establishment of contact points in Mannheim neighbourhoods for advice and information on the topics of climate protection and climate impact adaptation

Time horizon

The first energy-related neighbourhood concepts have already been drawn up and implemented. These and new measures must be continued and intensified.

Contribution to climate neutrality

The measure has a calculated *CO₂ savings potential*, which, however, depends very much on the individual neighbourhoods and their number. In the neighbourhoods Käfertal-Zentrum and Friedrichsfeld-Zentrum, CO₂ emissions were reduced by 18.4 % and 20.5 %, respectively, from the beginning to the end of the measures. CO₂ emissions in Käfertal-Zentrum were reduced by around 1320 t CO₂ from 2010 to 2018. In Friedrichsfeld-Zentrum, a reduction of a good 1400 t CO₂ was achieved.

Responsibility

- Preparation and implementation of the remediation concepts: FB 67

Financial expenditure

The energy-related neighbourhood concepts are currently funded by KfW Bank with up to 75 % of the eligible costs. If the programmes are intensified, additional management staff will be needed.

Monitoring / Indicators

Monitoring is carried out as part of the reporting on the projects (investment volume, CO₂ savings).

Conflicting goals and synergies

There are synergies, for example, with municipal heating planning, the renovation offensive for private households and the PV offensive.

One challenge is the already existing shortage of skilled workers in the trades, which could be exacerbated by an increased demand for refurbishment.

Good practice examples

- Mannheim: KfW 432 Käfertal Quarter <https://api.klima-ma.de/api/download/pn-sanmgmtkafertal-abschluss-190705-bbr.pdf>
- Bottrop: Innovationcity Ruhr: <https://www.icm.de/wp-content/uploads/>



2021/06/210615_Datensheet_Abschlussbilanz_InnovationCity-Ruhr.pdf

MEASURE 2: INTENSIFY EDUCATION AND AWARENESS-RAISING WORK

Framework conditions: One of the biggest uncertainties in energy consumption is the users themselves. Thus, "incorrect" use, e.g. heating with the window open, can lead to considerable losses in efficiency.

Awareness-raising, information and education on energy-saving behaviour is thus a complementary measure to various efficiency measures of the KSAP. It relates to energy consumption in buildings and in mobility, but also to emission reduction, which is associated with reduced waste generation. The Mannheim city administration has an important role model function here.

The **aim** of this measure is to promote energy-saving and climate-friendly behaviour in all areas: in private households, in companies and in the field of mobility.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Conduct events of the City of Mannheim in a climate-neutral manner (in accordance with ISO standard 20121 for the sustainable conduct of events).
- Campaigns, media coverage and target group specific actions
- Expansion of existing environmental and climate education through the Climate Protection Agency as well as children's and youth education and information at schools and daycare centres
- Expand adult education: Establish an educational offer for adults, for example together with the evening academy, climate protection agency, universities and companies.
- Energy saving programmes and campaigns

The **CO2 savings potential** in behaviour-related measures is difficult to estimate in the current situation with the impending energy supply bottleneck. Earlier studies came up with energy savings through optimised user behaviour of 20 %, which can lead to savings of up to 6,000 t CO2 -emissions of the municipal administration at the current level

MEASURE 3: CONTINUE AND EXPAND CLIMATE FUND

Framework conditions: With the Emergency Plan (V446/2019), additional financial resources were made available in the form of a climate fund. The climate fund is a budget to accelerate urban measures to reduce CO2 emissions by the administration of the City of Mannheim and its companies in the four fields of action of the emergency plan: Energy Production, Mobility, Buildings, Urban Green. The financial means are of great importance so that the exemplary function of the City of Mannheim becomes clear. The continuation and expansion of the climate fund beyond 2023 is an important component on the way to a climate-neutral administration. In addition, the fund will be expanded beyond the administration to include innovation projects of clubs, associations, initiatives, companies, etc. and to also include actors from the city society in the decision-making processes. Donations from private individuals and companies to the climate fund should be made possible.

The **aim** of this measure is to accelerate the implementation of climate protection measures in the Mannheim city area.

The **activities** of the City of Mannheim and its stakeholders in this regard are:

- Continuation and expansion of the climate fund
- Review of revolving shares (partial profit repatriation by beneficiaries)
- Controlling of the implemented measures
- Pilot projects in urban space

The **CO2 savings potential** is largely dependent on the number and type of measures implemented and can therefore not be quantified at this point in time.

SUMMARY STRATEGY FOR RESIDUAL EMISSIONS

B-2.3: Summary strategy for residual emissions

(Detail how residual emission will be offset, if applicable)

Path 1 SECAP: Residual emissions



In scenario path 1, CO₂ emissions fall to around 446,100 t CO₂ in 2030, from 3,280,700 t CO₂ in 2020. This represents a reduction of around 86% compared to 2020 (see Figure 15).

Path 2 SECAP: Residual emissions

As described in section 8.2.2 pathways 1 and 2 differ mainly in **the application of CCUS** and a bundle of measures in the transport sector. Due to these, the residual emissions in path 2 are almost halved to around 224,700 t CO₂ compared to path 1, which corresponds to a reduction of around 93 % compared to 2020.

The strategy for residual emissions by MVV energy utility :

A reduction of at least 80% of GHG-emissions by 2030 is currently being developed on a scientific basis with the SECAP 2030 (e.g. energy framework study). The net-zero GHG scenario takes into account local potentials, needs and framework conditions: The coal plant closure until 2030 will reduce total emissions by 89%. With BECCUS we can achieve negative emission of 300 tsd t which can compensate the residual emissions in other sectors. The potential for green power generation (PV) is 1 TWh. Decarbonisation of district heating is through waste heat, deep geothermal, river heat pumps or biomass.

CCUS always starts with the process of capturing CO₂ (CC) and is based on technologies that can filter CO₂ out of industrial waste gases or ambient air. MVV has commissioned studies from various CC plant manufacturers. MVV is planning a cooperation with chemical companies for the utilisation (U) of CO₂ in the Metropol region. Examination of the sale of CO₂ from biogas processing at MVV plants and additional additional revenue from biomethane sales with GHG reduction through CCU at NawaRo plants. Future-proofing and long-term use of biomethane by the MVV Group is being examined. MVV is looking at options for long-term CO₂ storage in deep geological storage sites (onshore and offshore) (S). The commissioning of the pilot plant at the Mannheim location is planned for Q3/2022, with commissioning planned for Q4/2023. The aim of this activity is for the MVV Group to develop the C-sink property and its balance sheet contribution to decarbonisation targets in order to create offsetting opportunities for potential CO₂ sinks by balancing them. CO₂ sinks to achieve compensation opportunities for further MVV emitters up to "climate positivity".

Natural offsets for residual emissions:

I:DEAL for Mannheim:the City always sees climate neutrality as closely linked to climate adaptation, preservation of biodiversity and a better quality of life. The **balancing effect of the city forest, green spaces as natural CO₂ sinks** and the protection against heat and heavy rain are specifically addressed with measures such as a heat alarm plan, a heavy rain hazard map and the reforestation with over 60,000 trees.

2,300 new city trees will be planted as part of the National Garden Show 2023. The 82-hectare former military conversion site of the Spinelli Barracks will be the venue of the Federal Horticultural Show until 2023 and will then be preserved as a permanent green corridor to the north-east. Almost three quarters of the area will be unsealed and greened in the future, bringing Mannheim residents more fresh air and quality of life.

As part of the "Trees in Cities" Challenge, the city of Mannheim has planted around 70,000 trees since 2021 to strengthen the sustainable management of urban forests.

4.3 Module B-3 Indicators for Monitoring, Evaluation and Learning

NOTE: At this point, we would also like to point out that the **corresponding data for all measures are already stored in the Climate Action Plan KSAP**. It would be disproportionately time-consuming to read them all out again individually for this table. We ask you to take this into account and refer here to **Table B 2.2**.

B-3.1: Impact Pathways



Outcomes/ impacts addressed	Action/ project	Indicator No. (unique identified)	Indicator name	Target values		
Mannheim Layout in Climate Action Plan 2030 – see table of measures B - 2.2						
aims addressed CO2 saving potential	Activities of the measures	xy	Monitoring and Indikatoren	Time horizon		
				2025	2027	2030
(list early changes/ late outcomes and impacts to be evaluated by indicator)	(list action/ pilot project if applicable)	(indicate unique identifier)	(Insert indicator name)	(list one value per indicator)	(list one value per indicator)	(list one value per indicator)

NOTE: At this point, we would also like to point out that the **corresponding indicators data, direct and indirect impacts for all measures** are already stored in the Climate Action Plan KSAP. It would be disproportionately time-consuming to read them all out again individually for this table. We ask you to take this into account and refer here to **Table B 2.2**.

B-3.2: Indicator Metadata	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	
Indicator Unit	
Definition	
Calculation	
Indicator Context	
Does the indicator measure direct impacts (i.e. reduction in greenhouse gas emissions?)	[yes/no]
If yes, which emission source sectors does it impact?	Fields of action according to GHG inventory format – Module A-1
Does the indicator measure indirect impacts (i.e. co-benefits)?	[yes/no]
If yes, which co-benefit does it measure?	Co-Benefits
Can the indicator be used for monitoring impact pathways?	[yes/no]
If yes, which NZC impact pathway is it relevant for?	Impact Pathways according to - according to Module B-1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	[yes/no]
Data requirements	
Expected data source	
Expected availability	
Suggested collection interval	
References	
Deliverables describing the indicator	
Other indicator systems using this indicator	

INDICATOR SET STRATEGIC MANAGEMENT SYSTEM MANNHEIM

In addition, the city of Mannheim uses indicator sets and key figures in the city's strategic management system, which is also used for the target review and budget preparation along the target agreement. The **TOP indicators of the strategic goals form a system** that comprehensively maps the strategy and its success strategy and its success for the entire Mannheim city administration, and with the help of which the social developments in Mannheim are monitored. They support the managers in all departments and municipal companies to derive specific management goals from the



strategic goals. They also serve to improve transparency with regard to of the activities of the city administration vis-à-vis the city council and the citizens. As a result of the newly adopted Mannheim 2030 mission statement, it was necessary to revise the TOP key figures.

Selection criteria were, among others, relevance and comprehensibility, collection effort, consistency, indirect influenceability and comparability with other cities. This selection of TOP indicators covers all strategic goals and at the same time remains manageable due to the limited number of indicators.

In the following section, the TOP indicators and their actual values are presented.

Environment/Climate

The →car density (number of registered cars per 1,000 inhabitants) in Mannheim continues to rise steadily. While the figure in 2015 was 451 cars per 1,000 inhabitants, it has now risen to 483 cars per 1,000 inhabitants.

However, →car use has been below the level of 2019 in the last two years. Only half of the Mannheim residents surveyed used cars and/or motorbikes as one of the most common means of as one of the most frequent means of transport on normal working days. It remains to be seen, however, whether this is a temporary effect due to the corona

Exposure to air pollutants was further reduced. The →annual mean values of particulate matter and oxides of nitrogen at the Mannheim measuring stations on the Friedrichsring and Mannheim-Nord continuously in recent years. Here, too, a special effect due to reduced mobility in the Corona-pandemic, but also continues the positive trend of the years 2014 to 2019.

There was a significant drop in →satisfaction with public transport due to Corona. As a result As a result of the Corona pandemic, the proportion of citizens who are very or rather satisfied with the public transport system fell from dropped from 83% in 2018 to 69% in 2020. Despite the subsequent recovery (2022: 73 %), the level of satisfaction is far far from the initial year.

In the last two years, the annual balance of →street trees shows a negative sign.

Due to drought damage, injuries and diseases, the number of removed street and trees removed exceeded the number of new trees planted. In order to counteract the climate-induced loss of trees in future the current replanting quota of 300 trees needs to be substantially increased. It The goal is to replace or replant 1,000 trees per year in the existing stock. (V276/2021).

The carbon footprint commissioned by the city (V136/2021) shows that →CO₂ emissions in the period from 1990 to 2018 have fallen by a total of 27.7 per cent. This means that the target set out in the Climate Protection Concept 2020 2020 to reduce CO₂ emissions by 40 per cent by 2020 compared to 1990 levels.

In the area of private households, a reduction in emissions by 30 percent, from 1.011 million to 0.706 million tonnes. In the industry and commerce sector, the reduction was 32 per cent and in the transport sector emissions fell by 8 per cent.

After a slight decrease in →domestic waste in the years 2016 to 2019, it increased again sharply to 400 kg.



Indicators for the Mannheim 2030 vision

Strategic control FB 15

No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
1	Mannheim ensures educational equality and prevents poverty. The social and cultural participation of all Mannheim residents is ensured.				
1.1	Availability of affordable housing	Average rent	Average rent in euros per sqm according to Mannheim rent index	→	Mannheim Rent Index FB 61
1.2					
1.3	Age-appropriate language development of children	Children without speech problems	Proportion of children without language problems at school enrolment		School enrolment examination
	School dropouts	School leavers without lower secondary school leaving certificate	Proportion of pupils who leave schools without a lower secondary school leaving certificate		State Statistical Office
	Integration into the training market	Unsupplied applicants on the training market	Share of unplaced applicants in all registered applicants on the training market (as of 30.9.)		Federal Employment Agency
1.4	Participation in working life	Unemployment rate	Share of unemployed in all civilian labour force (in %)		Federal Employment Agency
	Poverty risk of the population	Minimum security quota	Share of minimum income recipients in the population (in %)		Federal Employment Agency
	Gainful employment that does not provide a livelihood	Top-up rate	Proportion of employed persons entitled to benefits under Book II of the Social Code ("top-up recipients") in all Employees subject to social security		Federal Employment Agency

Indicators for the Mannheim 2030 vision

Strategic control FB 15

No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
2	Mannheim offers a high urban quality of life as a basis for a healthy, happy life for people of all ages and thus wins more people over.				
2.1	Exercise/healthy lifestyle	Sports activity	Proportion of respondents who actively participate in sport at least weekly	↔	Citizen survey
2.2	Subjective quality of the green spaces	Satisfaction with green spaces	Proportion of respondents who are very or rather are satisfied with "green spaces such as public parks and gardens".	↔	Urban Audit / Citizen Survey
	Subjective quality of public space	Satisfaction with public spaces	Proportion of respondents who are very or rather are satisfied with "Public areas such as markets, squares, pedestrian zones".	↔	Urban Audit / Citizen Survey
2.3	Child health development	Children with overweight	Proportion of children found to be overweight at the school enrolment examination		School enrolment examination
	Child health development	Children with motor deficits	Proportion of children with motor problems in the school enrolment examination		School enrolment examination
	Risk of poverty among children and young people	SGB II rate under 15 years	SGB II rate of benefit recipients not capable of working (under 15 years)		Federal Employment Agency
2.4	Self-determined lifestyle of older people	Nursing home rate of those aged 75 and over	Proportion of persons aged 75 and over in inpatient care facilities in the population of the same age		Federal Statistical Office (Care statistics)
2.5					
2.6	Subjective feeling of safety	Proportion of Mannheim citizens surveyed who feel safe in Mannheim	Proportion of respondents who agree or strongly agree with the statement "I feel safe in Mannheim".	↔	Urban Audit / Citizen Survey
	Exposure to violent crime	Crimes in public spaces and violent crime	Offences in public spaces and violent crime per 1,000 Inhabitants		Police crime statistics



Indicators for the Mannheim 2030 vision

Strategic control FB 15

No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
3	Mannheim is characterised by a solidary urban society and is a role model for living together in metropolises. The people of Mannheim recognise the equal rights of diverse human identities and lifestyles.				
3.1	Educational success of children with a migration background	School leavers with a migration background without qualifications	Proportion of school leavers without qualifications among all school leavers with a migration background (in %)		School statistics
3.2	Subjective quality of cultural institutions	Satisfaction with cultural facilities	Proportion of respondents who are very or rather satisfied with "Cultural institutions such as Concert halls, theatres, museums or libraries".	↕	Urban Audit / Citizen Survey
	Participation in cultural activities	Use of cultural offers	Proportion of respondents who use cultural services	↕	Citizen survey
3.3	Acceptance of sexual diversity	Acceptance of homosexual persons	Proportion of respondents who would not like to have homosexuals as neighbours		Citizen survey
	Labour force participation of women	Full-time employment rate of women	Proportion of women in full-time employment subject to social insurance as a percentage of all women aged 15 to under 65 Years	↕	Federal Employment Agency
	Subjective assessment of integration	Consent to successful integration of people with a migration background	Proportion of respondents who agree with the statement "In the city of Mannheim, the integration of people with disabilities is successful. Strongly agree or tend to agree with "migration background	↕	Citizen survey
3.4	Cohesion of the urban society	Proportion of respondents who have confidence in their fellow human beings	Proportion of respondents who agree with the statement: "Generally speaking, the people in Mannheim can be Strongly agree or tend to agree with "trust	↕	Citizen survey
	Subjective quality of living together	Satisfaction with people living together in Mannheim	Proportion of respondents who are satisfied with the way people live together in Mannheim	↕	Citizen survey
3.5					

Indicators for the Mannheim 2030 vision

Strategic control FB 15

No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
4	Mannheim is characterised by a strong city society and good administrative behaviour. The people of Mannheim are more committed than average to taking advantage of the opportunities to participate in the development of their city through democratic and transparent processes.				
4.1	Political participation	Voter turnout in municipal and mayoral elections	Percentage of eligible voters who participated in the election with a valid or invalid vote.	↕	Election statistics
	Subjective quality of citizen participation	Satisfaction with citizen participation	Proportion of respondents who are satisfied with citizen participation as it currently exists in Mannheim	↕	Urban Audit / Citizen Survey
4.2	Acceptance of local political processes	Trust in the Mannheim City Council	Proportion of respondents who have confidence in the Mannheim municipal council	↕	Citizen survey
	Transparency of administrative action	Sufficient information about the actions of the municipality	Proportion of respondents who feel sufficiently informed about the actions of the municipality	↕	Citizen survey
4.3	Voluntary commitment	Proportion of respondents who say they do voluntary work	Proportion of respondents who say they do voluntary work	↕	Citizen survey
4.4	Active club life	Proportion of respondents who say they have been involved in an association in the last 12 months. To have been	Proportion of respondents who say they have been involved in an association in the last 12 months	↕	Citizen survey



Indicators for the Mannheim 2030 vision

Strategic control FB 15

No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
5	Mannheim creates as a digital and innovative metropolis provides the conditions for companies of all sizes to realise diverse and sustainable value creation and to attract talent and skilled workers.				
5.1					
5.2	Intelligent and sustainable mobility	Intensity of use of "Shared Mobility" offers	Number of users of shared mobility services (Next- Bike, Stadtmobil, etc.) and number of rentals in the Calendar year	↕	Survey of suppliers
5.3	Digital citizen services	Use of municipal services available online	Proportion of online users among all users of the five most important municipal services provided on the Citizens' Portal. Services	↕	FB 33 / FB 12
	Subjective evaluation of the administration's performance	Agreement with "If you approach the city administration in Mannheim, you are helped quickly and without complications"	Proportion of respondents agreeing with the statement: "If you contact the city administration in Mannheim, you get help quickly and without complications" very much or	↕	Urban Audit / Citizen Survey
5.4	Subjective assessment of the potential for skilled workers	Satisfaction of the companies with the supply of qualified workers	Proportion of companies surveyed that are very or somewhat satisfied with the supply of qualified labour are	↕	Business survey FB 80
	Highly qualified employees	Proportion of socially insur. Employees with (highly) complex activities	Proportion of employees in job levels 3 ("Complex specialist jobs") and 4 ("Highly complex jobs") according to the BA classification. These categories include activities that require a high level of technical knowledge, the ability to perform advanced technical and managerial tasks, or a high level of knowledge and skills. require a high level of	↕	Federal Employment Agency
	Retention of young talents and young professionals	Proportion of students who potentially stay in Mannheim after graduation	Proportion of students surveyed who have firm plans, are seriously considering it or can imagine it, after graduating in Mannheim and the region to	↕	Student Convocation FB 80

Indicators for the Mannheim 2030 vision

Strategic control FB 15

No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
6	Mannheim is a climate-friendly - perspective, a climate-neutral - and resilient city that is a role model for environmentally conscious living and action.				
6.1	Degree of motorisation	Cars per 1,000 inhabitants	Number of registered cars per 1,000 inhabitants		Municipal Statistical Office
	Load from motorised individual traffic/heavy goods traffic	Annual sum of the motor vehicles registered at the automatic counting stations			Urban traffic census
	Exposure to air pollutants	Annual mean values (NO2, PM10) in the urban background	Annual mean concentrations of nitrogen dioxide (NO2) and particulate matter (PM10) in µg/m³ in the urban background (traffic monitoring station Mannheim Friedrichsring)		State Office for the Environment, Measurements and Nature conservation
	Subjective quality of public transport	Satisfaction with public transport	Proportion of respondents who are very or rather satisfied with public transport in Mannheim	↕	Urban Audit and/or Survey RNV
6.2					
6.3					
6.4	Climate-damaging emissions	CO2 emissions (tonnes per capita)	emissions of carbon dioxide (CO ₂) in tonnes per inhabitant. Calculated The polluter-related emissions from the		State Statistical Office
	Use of climate-friendly energies	Share of electricity from renewable energy sources in electricity consumption		↕	
	Waste generation	Domestic waste in kg per inhabitant	Domestic waste (household waste, bulky waste and recyclables) per inhabitant in kilogram		State Statistical Office
6.5					
6.6					



No.	Which facts are being measured?	Indicator	Definition	Target direction	Data source
7	Mannheim is a role model for international cooperation between cities. Municipal development policy and responsible consumption contribute to global justice and sustainable international politics.				
7.1	Sustainable consumption	People who regularly buy regional food	Proportion of respondents who regularly buy regional food as a percentage of all respondents	↔	Citizen survey
	Sustainable consumption	People who regularly buy fair trade products	Proportion of respondents who regularly buy fair trade products among all respondents	↔	Citizen survey
	Sustainable municipal procurement	Municipal expenditure on fair trade products	Municipal expenditure on fair trade products in relation to total municipal expenditure	↔	
7.2					
7.3	Positive basic attitude towards the EU	Citizens who see an advantage in EU membership.	Positive answers to the question: "When you think about your country's membership in the EU, do you think the advantages outweigh the disadvantages or do the advantages and disadvantages balance each other out? Disadvantages the scale?"	↔	Citizen survey
7.4	Municipal development policy	Expenditure for development cooperation	Municipal expenditure on development cooperation measures and projects (in euros)	↔	FB 19

MONITORING DASHBOARD CLIMATE VIEW

Furthermore, the City of Mannheim is in **the process of filling the monitoring dashboard with Climate View. All levers and indicators for controlling the measures of the Climate Action Plan are stored here.** The work and the process are still ongoing and we want to connect the Action Plan with the Investment Plan by the end of the year.



Indicators and targets Climate View (not finished yet – *currently transferred data of Mannheim*)

Municipal administration



▼ Kommunale Verwaltung					
Umstellungselement	Indikator	Basisindikator 2018	Indikatorziel 2030	Geplante Projektkosten	Direkte Auswirkungen
Energieeffiziente öffentliche Gebäude (Sanierung)	Anteil der Flächen in öffentlichen Gebäuden, die durch Sanierung das Energieeffizienz-Ziel erreichen	0 %	55 %	0 Euro	Emissionsreduzierung 2030 • 17.555,271 Tonnen
Umstellung auf Fernwärme in öffentlichen Gebäuden	Anteil der mit fossilen Energieträgern beheizten Flächen in öffentlichen Gebäuden, die an die Fernwärme angeschlossen werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • -12,933 Tonnen
Öffentliche Gebäude mit erneuerbaren Biobrennstoffen heizen	Anteil der mit fossilen Energieträgern beheizten Flächen in öffentlichen Gebäuden, die auf erneuerbare Biobrennstoffe umgestellt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 4.401,321 Tonnen
Wärmepumpen in öffentlichen Gebäuden	Anteil der mit fossilen Energieträgern beheizten Flächen in öffentlichen Gebäuden, die neu mit Wärmepumpen beheizt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 3.970,007 Tonnen
Betriebliches Mobilitätsmanagement in der Verwaltung (DIY)		0 Elektrofahrzeuge	749 Elektrofahrzeuge	0 Euro	Emissionsreduzierung 2030 • 2.481,550 Tonnen
Stromverbrauch reduzieren (DIY)			32000 t CO2	0 Euro	Emissionsreduzierung 2030 • 22.000,000 Tonnen

Energy production and trade, commerce, services

Wirtschaftliche und finanzielle Indikatoren sowie Kosten-Szenario ⓘ

☑ Alle Umstellungselemente

▼ Energieproduktion					
Umstellungselement	Indikator	Basisindikator 2018	Indikatorziel 2030	Geplante Projektkosten	Direkte Auswirkungen
CO2 Bilanz Ausgleich (DIY)	CO2 Bilanz Ausgleich Energieproduktion		2269000 t CO2	0 Euro	Emissionsreduzierung 2030 • 1.500.000,000 Tonnen
PV-Anlagen auf Dächern	Anteil der konsumierten Elektrizität, die durch Photovoltaik auf Dächern produziert wird	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 40.465,750 Tonnen
▼ Industrie					
Umstellungselement	Indikator	Basisindikator 2018	Indikatorziel 2030	Geplante Projektkosten	Direkte Auswirkungen
Ausgleich CO2-Bilanz (DIY)		-6 t CO2	1500000 t CO2	0 Euro	Emissionsreduzierung 2030 • 1.300.000,000 Tonnen
▼ Gewerbe, Handel, Dienstleistungen					
Umstellungselement	Indikator	Basisindikator 2018	Indikatorziel 2030	Geplante Projektkosten	Direkte Auswirkungen
CO2 Bilanz Ausgleich (DIY)	CO2 Bilanz Ausgleich Energieproduktion		2269000 t CO2	0 Euro	Emissionsreduzierung 2030 • 1.500.000,000 Tonnen
Wärmepumpen in gewerblichen Gebäuden	Anteil der mit fossilen Energieträgern beheizten Flächen in gewerblichen Gebäuden, die neu mit Wärmepumpen beheizt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 5.474,977 Tonnen



Mobility / Transport

▼ Mobilität					
Umstellungselement	Indikator	Basisindikator 2018	Indikatorziel 2030	Geplante Projektkosten	Direkte Auswirkungen
Autofahrten durch ortsunabhängiges Arbeiten reduzieren	Anteil der Auto-Pendler, die neu zu Hause arbeiten	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 33.288,470 Tonnen
Umstieg von Auto auf Bahn	Anteil der Pkw-Fahrten in Personenkilometer, die neu mit der Bahn zurückgelegt werden	0 %	20 %	0 Euro	Emissionsreduzierung 2030 • 52.197,707 Tonnen
Anteil öffentlicher Verkehrsmittel (Straßenbahn) erhöhen	Anteil der Auto-Pendler, die auf öffentliche Verkehrsmittel (Straßen- und S-Bahnen) umsteigen	0 %	25,92 %	0 Euro	Emissionsreduzierung 2030 • 31.173,201 Tonnen
Anteil öffentlicher Verkehrsmittel (Elektrobus) erhöhen	Anteil der Pendler, die vom privaten Auto auf öffentliche Verkehrsmittel (Elektrobusse) umsteigen	0 %	12,98 %	0 Euro	Emissionsreduzierung 2030 • 15.944,196 Tonnen Nettoersparnisse 2018-2030 • Fahrzeugwartungskosten, 5.591.966,61 Euro • Treibstoffkosten, 52.001.432,22 Euro • Kosten von Partikelemissionen, 166.148,80 Euro • Kosten von Stickstoffemissionen, 503.867,51 Euro • Kosten von Unfällen, 3.427.076,68 Euro • Lärmkosten, 447.357,33 Euro • Kosten Kohlenstoff, 3.948.994,01 Euro
Anteil des Rad- und Fußverkehrs erhöhen	Anteil der Pendler, die vom privaten Auto auf das Fahrrad umsteigen oder neu zu Fuß gehen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 34.687,132 Tonnen Nettoersparnisse 2018-2030 • Treibstoffkosten, 100.119.685,42 Euro • Kosten von Feinstaubemissionen, 319.890,53 Euro • Kosten von NOx-Emissionen, 970.108,98 Euro • Kosten von Unfällen, 4.258.862,87 Euro • Kosten von Geräuschemissionen, 861.308,49 Euro • Kosten von Kohlenstoff, 7.603.099,02 Euro • Gesundheitsvorteile, 213.942.876,61 Euro Nettokosten 2018-2030 • Fahrzeugkosten, -507.137.320,08 Euro • Wartungskosten, -19.225.635,93 Euro
Verbesserte Antriebstechnologien	Anteil der Pkw mit Verbrennungsmotor, die durch verbesserte Fahrzeugtechnologie eine Emissionsreduzierung erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 2.189,057 Tonnen
Elektroautos	Anteil der Pkw mit Verbrennungsmotor, die durch Elektroautos ersetzt werden	0 %	20,86 %	0 Euro	Emissionsreduzierung 2030 • 57.885,058 Tonnen Nettoersparnisse 2018-2030 • Fahrzeugkosten, 529.044.440,27 Euro • Wartungskosten, 20.964.779,81 Euro • Treibstoffkosten, 71.415.825,18 Euro • Kosten von Feinstaubemissionen, 335.602,77 Euro • Kosten von NOx-Emissionen, 2.075.937,07 Euro • Kosten von Geräuschemissionen, 0,00 Euro • Kosten von Kohlenstoff, 12.462.859,80 Euro Nettokosten 2018-2030 • Kosten von Unfällen, 0,00 Euro
Erneuerbaren Anteil im Diesel erhöhen	Anteil Biokraftstoff (HVO) in Diesel	10 %	32 %	0 Euro	Emissionsreduzierung 2030 • 3.346,965 Tonnen
Wechsel zu gasbetriebenen Fahrzeugen	Anteil der privaten Autos, die auf Gas (CNG oder CBG) umgestellt wurden.	0 %	3 %	0 Euro	Emissionsreduzierung 2030 • -2.260,015 Tonnen
Verlagerung auf den Schienenverkehr	Anteil der Güter, die von Schwertransportern auf die Schiene verlagert werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 49.423,918 Tonnen
Auslastung von Leichttransportern verbessern	Verbesserte Auslastung (Anteil der ungenutzten Kapazitäten, die neu genutzt wird)	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 1.527,522 Tonnen
Transportrouten von Leichttransportern optimieren	Anteil der Leichttransporter, die durch Routenoptimierung eine Emissionsreduzierung von 20% erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 3.131,420 Tonnen
Auslastung von Schwertransportern verbessern	Verbesserte Auslastung (Anteil der ungenutzten Kapazitäten, die neu genutzt wird)	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 0,000 Tonnen



Erdgasbetriebene Leichttransporter	Anteil der Leichttransporter, die auf Gas (CNG oder CBG) umgestellt wurden.	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 4.486,961 Tonnen
Erdgasbetriebene Schwertransporter	Anteil der Schwertransporter, die auf Gas (CNG, CBG, LNG) umgestellt wurden.	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 5.011,682 Tonnen
Biokraftstoff für Leichttransporter	Anteil Biokraftstoff (HVO) im Diesel-Mix für Kleintransporter	10 %	33 %	0 Euro	Emissionsreduzierung 2030 • 1.996,107 Tonnen
Sparsames Autofahren	Anteil der Autofahrer, die durch sparsames Fahren eine Emissionsreduzierung von 10% erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 1.167,645 Tonnen
Verbesserte Fahrzeugtechnik für Leichttransporter	Anteil der Leichttransporter, die durch verbesserte Fahrzeugtechnologie eine Emissionsreduzierung erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 389,828 Tonnen
Elektro-Leichttransporter	Anteil der Leichttransporter mit Verbrennungsmotor, die durch Elektro-Leichttransporter ersetzt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 17.082,321 Tonnen
Biokraftstoff für Schwertransporter	Anteil Biokraftstoff im Kraftstoffmix für Schwertransporter	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 0,000 Tonnen
Effizientere See-Güterschifffahrt	Anteil der Schiffe, die durch verbesserte Fahrzeugtechnik eine Emissionsreduzierung erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 13,133 Tonnen
Biokraftstoffe für den Flugverkehr	Anteil der Flugzeuge, die 100% Biokraftstoff verwenden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 10.245,894 Tonnen
Biokraftstoffe für die See-Güterschifffahrt	Anteil der Schiffe, die 100% Biokraftstoff verwenden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 119,138 Tonnen
Binnen-Güterschifffahrt elektrifizieren	Anteil der Binnenschiffe, die auf Elektroantrieb umstellen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 156,824 Tonnen
Elektro-Schwertransporter	Anteil der Schwertransporter mit Verbrennungsmotor, die durch Elektro-Schwertransporter ersetzt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 37.698,840 Tonnen
Verbesserte Fahrzeugtechnik für Schwertransporter	Anteil der Schwertransporter, die durch verbesserte Fahrzeugtechnologie eine Emissionsreduzierung erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 589,740 Tonnen
Wasserstoff für Leichttransporter	Anteil der Leichttransporter, die auf Wasserstoff umstellen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 17.604,168 Tonnen
Wasserstoff für Schwertransporter	Anteil der Schwertransporter, die auf Wasserstoff umstellen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 44.185,967 Tonnen

Private Households

Private Haushalte					
Umstellungselement	Indikator	Basisindikator 2018	Indikatorziel 2030	Geplante Projektkosten	Direkte Auswirkungen
CO2 Bilanz Ausgleich (DIY)	CO2 Bilanz Ausgleich Energieproduktion		2269000 t CO2	0 Euro	Emissionsreduzierung 2030 • 1.500.000,000 Tonnen
Energieeffiziente Einfamilienhäuser (Sanierung)	Anteil der Flächen in Einfamilienhäusern, die durch Sanierung das Energieeffizienz-Ziel erreichen	0 %	32 %	0 Euro	Emissionsreduzierung 2030 • 66.220,342 Tonnen
Umstellung auf Fernwärme in Einfamilienhäusern	Anteil der mit fossilen Energieträgern beheizten Flächen in Einfamilienhäusern, die an die Fernwärme angeschlossen werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 12.463,646 Tonnen
Energieeffiziente Mehrfamilienhäuser (Sanierung)	Anteil der Flächen in Mehrfamilienhäusern, die durch Sanierung das Energieeffizienz-Ziel erreichen	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 46.717,335 Tonnen
Wärmepumpen in Einfamilienhäusern	Anteil der mit fossilen Energieträgern beheizten Flächen in Einfamilienhäusern, die neu mit Wärmepumpen beheizt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 33.297,567 Tonnen
Einfamilienhäuser mit erneuerbaren Biobrennstoffen heizen	Anteil der mit fossilen Energieträgern beheizten Flächen in Einfamilienhäusern, die auf erneuerbare Biobrennstoffe umgestellt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 40.561,640 Tonnen
Einfamilienhäuser mit Biogas heizen	Anteil der mit fossilen Energieträgern beheizten Flächen in Einfamilienhäusern, die auf Biogas umgestellt werden	0 %	25 %	0 Euro	Emissionsreduzierung 2030 • 45.949,143 Tonnen



5 Part C – Enabling Climate Neutrality by 2030

5.1 Module C-1 Organisational and Governance Innovation Interventions

NOTE: At this point, we would also like to point out that the **corresponding data**, also the **enabling and organisational activities for all measures are already stored** in the Climate Action Plan KSAP. It would be disproportionately time-consuming to read them all out again individually for this table. We ask you to take this into account and **refer here to Table B 2.2**

OVERVIEW WITH THE ENABLING TOP MEASURES IN THE CLIMATE ACTION PLAN KSAP:

PRIORISATION TOP MEASURES (DECISION 10/22)

Municipal influence	Influence of several actors
<p><u>Direct CO2 savings potential</u></p> <ul style="list-style-type: none"> - ▲ <u>Rehabilitation of municipal buildings</u> - ▲ <u>Shift MIV to public transport</u> - ▲ <u>Need to reduce (car)mobility</u> - ▲ <u>Climate neutrality in new construction</u> - ▲ <u>Reduction of energy consumption in public spaces</u> - ▲ <u>Forest areas</u> - ▲ <u>Energy self-sufficient sewage treatment plant</u> - ▲ <u>Shift MIV to cycling and walking</u> - <u>Operational mobility management in the administration</u> - <u>Optimised use of buildings</u> - <u>Mannheim city centre with few cars</u> - 	<p><u>Direct CO2 savings potential</u></p> <ul style="list-style-type: none"> • ▲ <u>District and local heating</u> • ▲ <u>Renovation offensive</u> • ▲ <u>PV offensive</u> • <u>Geothermal energy</u> • ▲ <u>Establishment and expansion of intelligent energy control and smart grids</u> • <u>Use and expansion of renewable energies (industry)</u> • <u>Optimised use of housing and space (private HH)</u> <p><u>Enabler</u></p> <ul style="list-style-type: none"> • <u>Circular economy in the construction industry</u> • <u>Avoid waste, improve recycling</u> • <u>Promoting new drive concepts</u> • <u>Hydrogen strategy</u>
<p><u>Planning principles (long-term impact)</u></p> <ul style="list-style-type: none"> • <u>Unsealing of surfaces</u> • <u>Sponge City Mannheim</u> • <u>Strengthening integrated administrative action</u> • <u>Land-saving urban development</u> • <u>Securing and developing open space</u> 	
<p><u>Enabler</u></p> <ul style="list-style-type: none"> - ▲ <u>Climate protection management in the neighbourhood</u> - ▲ <u>Promotion for the conversion of the heat supply</u> - ▲ <u>Qualification offensive</u> - <u>Economic and structural development</u> - <u>Network "Resource Efficiency & Circular Economy"</u> - <u>Dismantling the privileges of MIV</u> 	

Legend: ▲ Start-up financing ▲ Highest priority ▲ High priority ▲ 100 CNC measure

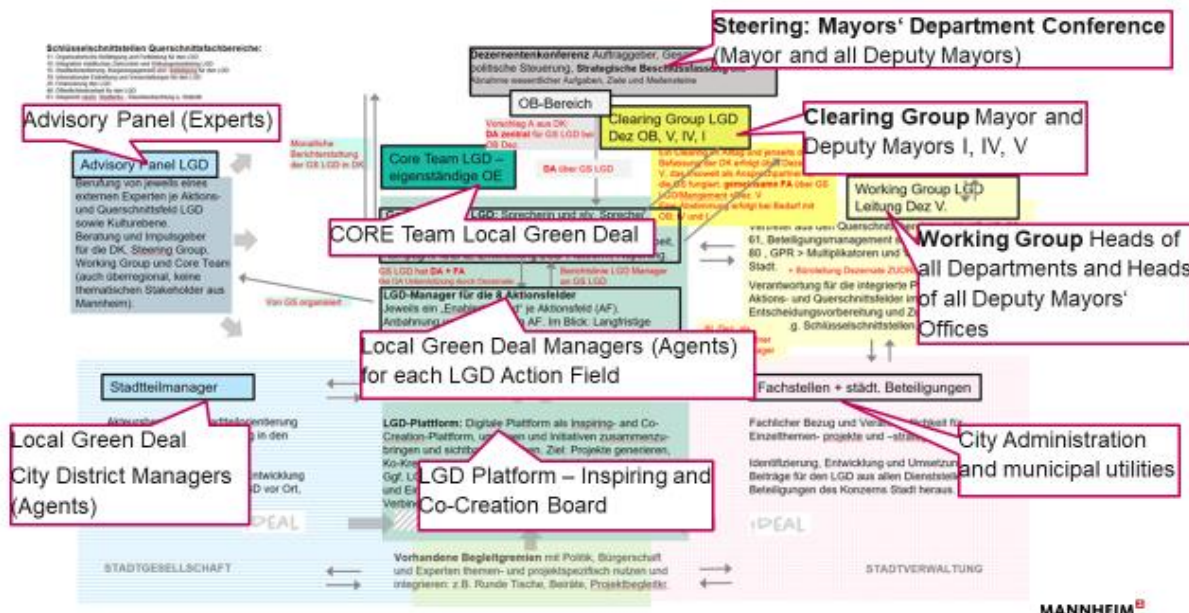
C.1.1: Enabling organisational and governance interventions					
Intervention name	Description	Responsible entity/ dept./ person	Involved stakeholder	Enabling impact	Co-benefits
(indicate name of intervention)	(describe the substance of the intervention)	(indicate responsible)	(list all stakeholder involved and affected)	(describe how intervention enables climate neutrality)	(indicate how intervention helps achieve impact listed in Module B-1)
All in Table B 2.2.	All in Table B 2.2.	All in Table B 2.2.	All in Table B 2.2.	All in Table B 2.2.	All in Table B 2.2.



C-1.2: Description of organisation and governance interventions – textual and visual elements
 (Please provide here any further detail on listed interventions)

MAIN GOVERNANCE INTERVENTION: Local Green Deal Mannheim 100CNC/LGD Transition Team

NEW LOCAL GREEN DEAL– 100 CNC GOVERNANCE STRUCTURE



A **strong mandate** enabled the 2030 Climate Neutrality Decision (Decision 05/2021 on Local Green Deal pilot city and 100CNC model city with target 2030, strengthened with KSAP 11/2023 decision) and the establishment of the transition team as a **new innovative governance structure** acting between the municipality and the ecosystem citywide and the cooperation with networks and **multi-level structures** (local, regional, national). **Additional staff** was hired, in the Climate Department, in the Local Green Deal Team, in the Climate Action Agency and further departments as for Urban Planning, Transport and Energy Management.

Pilot Cities CoLAB approach:

The CoLAB cities are not only extremely ambitious in their climate goals as selected cities of the 100CNC Mission, but are also committed to the UN SDGs and strive for the city of the future for all, leaving no one behind. Knowing that the implementation of climate neutrality as a whole and the implementation of the 1.5 degree lifestyle, which is important for CoLAB, require an innovative approach, Mannheim, Aachen and Muenster have already successfully initiated a system change. Mannheim and Aachen received the 2021 Federal Award ‚Cooperative City‘ for exemplary examples of cooperation between politics, administration and civil society. All cities were recognised for their innovative sustainability achievements in the area of tension between global needs and strong citizen participation for their creative and transparent approach by being placed among the ‚Most sustainable large cities in Germany‘. This was only possible because the cities had already repositioned themselves in a change management process. CoLAB is now to play a reinforcing role in networking these new transition teams in the city administration with strong actors in the city society. Therefore, the CoLAB cities have set up a comprehensive programme with work package 1 ‚Project coordination and management‘ to successfully implement the pilot activities for innovative consumer behaviour solutions. **These activities aim to build capacity within and outside the organisation by bringing together different teams that can bridge silos and collaborate across departments to develop an integrated planning and design process for the transformation platform.** This includes the task ‚Managing the City Transition Team‘ with: Leading the CoLAB project management, designing collective collaboration between the CoLAB and the transition team, defining shared responsibilities within the core urban transition team, implementing the governance model of the transition team by extending it to the urban ecosystem and the task ‚Coordinating the urban ecosystem‘ with: Stakeholder mapping and analysis, orchestrating the city-wide transition team with key stakeholders, the task ‚Co-



Creating the Climate City Contract Commitment' with Co-Development CCC Commitment, obtaining regional/national support, Developing citizen support and the task 'Monitoring and Evaluation of impact' with: Establishing a monitoring and evaluation tool for climate neutral action, Anchoring the presentation of progress towards goals in the platform, Developing KPIs for non-technical measures that lead to sustainable behaviour. Within the CoLAB team in the cities, the cooperative team members and their responsibilities are defined (involved departments proposal overview). As highly experienced in peer learning and knowledge sharing, CoLAB cities have the expertise, skills and capacity for the implementation of the NZC Mission and the Pilot Cities activities. In 2022, the Local Green Deal Office Mannheim, responsible for the structural integration and implementation of the Green Deal at the local level, was further developed into a city-wide matrix structure to ensure that all relevant departments are involved. All staff of the Transition Team, which works across departments and is composed of all departments dealing with the Local Green Deal action areas, including the teams implementing SECAP, SUMP, SUDP and the Local Green Deal Office, as well as the International Affairs Office will be involved in the design of the Climate City Contract. Another important actor is the Climate Action Agency, a non-profit organisation run by the City of Mannheim, which is also part of the consortium.

Enabling measures in the city budget 2023

Achieving the climate protection ambitions in Mannheim will only be possible with a high level of financial and personnel commitment from all those involved. In parallel to the further concretisation of all measures and activities towards the most concrete CO₂ reduction potential estimates and cost calculations possible, the first, accelerated implementation of measures should already take place in 2023, where this is possible and efficient. This is necessary to meet the ambition level of the KSAP as well as the emergency decision (V446/2019).

The budget for 2023 therefore includes an unspecified "start-up funding KSAP" of €3 million in addition to existing funding in the relevant departments and their specific targets. This submission specifies the planned use of funds. Following the resolution of the KSAP, TOP measures from the KSAP were taken up for the year 2023, which are measures that can be implemented particularly quickly according to efficiency and effectiveness for the financial year 2023. As far as possible, despite the required urgency, concrete CO₂ estimates were made. The same applies to the cost side. Here the estimates are already quite detailed. For the measures planned in 2024 and the following years, these calculations will be available in more detail, among other things, within the framework of the Climate City Contract of the 100 Climate Neutral Cities Mission of the EU, so that a differentiated decision-making picture can be presented.

For the year 2023, obviously effective measures are prioritised, which also enable quick effects in particular. In order to allocate the € 3 million for the 2023 budget, the administration selected various measure modules that can be initiated and completed or advanced in the 2023 budget year.

The administration selected the measures that can be implemented quickly according to efficiency and effectiveness based on the **following criteria**:

- Efficient use of funds (euros per tonne of CO₂ saved)
- Quick implementation in 2023 ("accelerate project pipeline", increase funding for efficient measures)
- Create leverage for third-party investments
- Enabling measures that cannot be postponed and are essential for overall success
- Supplementary: Contributions to overcoming the energy crisis

Particularly in the areas of energy advice, support for citizens, but also for accelerated PV expansion, these could be included or had already been selected by the administration as priorities for the use of funds. In these areas, the proposed measures fulfilled the efficiency criteria demanded by the municipal council when adopting the KSAP.

In addition, the "Annex: € 3 million start-up financing for the implementation of the KSAP in the financial year 2023" shows a more detailed breakdown of the implementation modules from the logic of the KSAP measures. In addition, information on participants and a rough estimate of the CO₂ savings potential of the activities can be found.



Currently, a detailed CO₂ estimate cannot yet be made for all measures of the Climate Action Plan. The same applies to the financing of the measures. This information gap will be largely closed in the course of the preparations for the Climate City Contract as part of the 100 Climate Neutral Cities in the course of spring 2023, so that comprehensive information and decision-making bases can be presented for the following packages of measures in 2024 onwards.

Explanation of the selection of measures

Acceleration of initiated project activities / existing project pipeline:

Accelerated PV expansion on schools (750,000 €, FB40/sMArt City Mannheim GmbH, TOP measure 7.9.1.1 Refurbishment of municipal buildings, page 142).

The PV expansion on larger (flat) roofs is generally one of the most efficient measures for CO₂ reduction in the direct sphere of influence of the municipal administration. Depending on the specific project design, an annual saving of approx. 62 t CO₂ can be achieved with a PV system output of 100 kW_{peak}.

The sMArt City Mannheim GmbH installs photovoltaic systems on suitable school roofs on behalf of the Department of Education. There is a project pipeline of around ten schools that cannot currently be realised immediately due to available funding. With additional funding, about six projects with a system capacity of about 400 kW_{peak} (annual CO₂ savings of about 250 t) can be implemented promptly, as the necessary planning steps have already been advanced.

Unsealing/planting measures in public places / schoolyard unsealing programme (100,000 € / 50,000 €, EB 76 / FB 40, TOP measure 7.6.1.2 "Unsealing of surfaces", p. 103)

In the context of the submission V653/2021 "Greening Public Squares", the administration reported on the implementation status and prioritisation of planting and unsealing measures on public squares in Mannheim and presented an implementation sequence. With the proposed means, measures can be implemented particularly efficiently through planting and unsealing in the city districts with a high heat load and thus also a low CO₂ sink capacity. Assuming a lifetime of a tree of 80 years, each planted tree binds about one tonne of CO₂ in its life cycle. The exact number of trees to be planted depends on the project. For example, an unsealing/planting measure on Habichtplatz (Käfertal) would be suitable for implementation. In this context, the concept of so-called Tiny Forests on the Lindenhof is also currently being examined.

In the past few years, smaller planting and unsealing measures on school playgrounds were carried out as part of a funding project.

unsealing measures were carried out on schoolyards, e.g. Hans-Christian-Andersen-Schule. The projects at the public schools were implemented by the BBS and, in addition to the concrete implementation, also had a lasting positive effect on the students' environmental awareness. Since the funding programme has expired and the funds have been exhausted, the programme cannot be continued despite the existing project pipeline. The funds can be used to implement schoolyard projects at Vogelstangschule and Elisabethgymnasium up to the amount of the funds made available.

Expansion of existing offers / adaptation to framework conditions and evaluations:

Expansion of fips (€250,000, MV / RNV, TOP measure 7.7.2.1 "Shifting MIV to public transport", p. 115).

The on-demand service "fips" of the rnv, funded by the Federal Ministry of Digital Affairs and Transport and by the state of Baden-Württemberg as part of the Strategy Dialogue Automotive Industry BW, closes network gaps with e-shuttles, especially in the less densely populated suburbs. This supplement to public transport makes switching to buses and trains more attractive and reduces dependence on private cars.

The first results of this model project show high user acceptance of the service. However, the project has also shown that the potential of this service for the off-peak hours of the day and the frequency of service have not yet been fully exploited. The funds earmarked for the project are to be used to further develop fips and to raise and evaluate the potential of the system. The funds are not to be used for additional vehicles but rather for their more efficient use and extensions of the operating area or the operating hours of the service.



Energetic rehabilitation in the neighbourhood - doubling of the rehabilitation areas (220,000 € / 1.0 VK, FB 67, TOP measure 7.9.5.1 "Climate protection management in the neighbourhood", p. 161f) Under the programme number "KfW 432", the Kreditanstalt für Wiederaufbau (KfW) provides a 75% subsidy for the development of energy-related neighbourhood concepts and the associated refurbishment management. The core objective of this programme is in particular to increase the rate of refurbishment of private buildings and housing companies, environmentally friendly mobility offers and other building blocks at neighbourhood level, including the design of climate-neutral heat supply concepts. The programme can be combined with other funding programmes at federal, state and municipal level.

Starting with the measures already completed in the districts of Käfertal and Friedrichsfeld, the City of Mannheim has implemented or is implementing projects in a total of five districts. KfW 432 activities are currently underway in Gartenstadt, Neckarstadt-West and Feudenheim-Nord.

The evaluation of the measures carried out so far shows that the refurbishment rate in these districts is significantly higher than the other average (national average around 1 %, Mannheim just under 1 %). The renovation rate could be increased to 1.6% annually in Käfertal and to a very good 2.8% in Friedrichsfeld. The CO₂ savings in the districts of Käfertal and Friedrichsfeld compared to 2010 as the year of comparison were -18.4% / -1,322 t CO₂ annually and -20.4% / -1,408 t CO₂ annually, respectively.

No final figures are yet available for the districts with ongoing KfW432 procedures. However, these are likely to be of comparable dimensions.

Support programmes of the Climate Protection Agency (920,000 € / total 2.5 VK, Climate Protection Agency, TOP measures 7.2.3.4 "Support for the conversion of heat supply", p. 58f and TOP measure 7.8.1.2 "Renovation offensive", p. 133)

The promotion of households or property owners with the objectives of climate protection and climate change adaptation have a long tradition in Mannheim. Particularly through subsidies from the city, but also from MVV Energie AG, hundreds of properties in Mannheim have been renovated for energy efficiency and/or equipped with PV. The subsidies have proven to be highly efficient, as each euro invested as a subsidy generates large leverage effects for third-party investments.

In concrete terms, the following effects were achieved through the funding in the funding period of 2022 alone for the two largest programmes with a special focus on CO₂ reduction.

In previous years, the effects and leverage effects were comparable:

- Energy-efficient refurbishment (preliminary -20,160 t CO₂ over 40 years; municipal funding per reduced t CO₂: €27; average funding rate 5% => 1 euro generates follow-up investments by third parties of €18, 2022 budget: €550,000, funding pot is currently significantly oversubscribed)
- Solar bonus from the city / MVV (preliminary -24,074 t CO₂ over 25 years; installed capacity in 2022: 1,675 kw peak; municipal subsidy: €10 per t CO₂ saved, average subsidy rate 5% => €1 generates third-party follow-up investments of €18, budget 2022: €180,000 / €55,000, subsidy pot of the city was exhausted after 10 weeks)

In addition, there are equally efficient programmes in the area of "hydraulic balancing" and "biogas", although they are much smaller in scope. Furthermore, there is a support programme for greening (roof and façade) as well as unsealing in private gardens.

The funding programmes of the city and MVV, which are offered and technically managed by the Climate Protection Agency - in combination with effective, free energy advisory services - are highly efficient. The above-mentioned funding pots are oversubscribed, so that potentials can still be raised here. In order to be able to raise this potential, several building blocks would be helpful: increasing effective subsidies, adding new subsidies with high efficiency, expanding to subsidies for (low-income) tenants.

In concrete terms, the following additions to the existing canon of subsidies and advisory services are planned:

- Subsidy programme "scrapping premium oil/gas" => partly already included in "energetic refurbishment" (buildings), deliberate expansion due to energy crisis topic (400,000 €)
- Citizen information "District heating in priority areas / heat supply in areas without connection prospects" (50,000 €)
- Increase of existing support programmes for owners and new support programmes for tenants:



- a) Photovoltaics / energy-efficient refurbishment (€ 300,000 in total) [Currently: € 100,00 / € 500,000].
- b) Scrapping premium for refrigerators for low-income and (50,000 €) [NEW].
- c) Balcony PV (120,000 €) [NEW].

Personnel requirements: For the considerable expansion of the funding programmes and the processing of several hundred additional funding objects per year, the Climate Protection Agency requires a total of 2.0 staff in the area of (energy consulting / funding programme and project management), supplemented by personnel support for the administrative part of the funding programmes. The Climate Protection Agency is currently issuing a call for tenders for special funding management software in order to minimise the need for personnel. Nevertheless, 0.5 FTEs will be required as reinforcement for the administrative tasks.

Within the framework of this submission, the cornerstones of the new funding framework, the thematic priorities and the budget framework are to be decided. The exact content and calibration will be determined in the context of the draft resolution V670/2022, which is required as the basis for the city's subsidy to the climate protection agency. Page 11 of 11

Urgent enabling and preparatory measures / controlling:

Creation of the personnel requirements to push forest conversion / Preparatory analysis of biodiversity, esp. forest (50,000 € / 2.0 VK, EB 76, TOP measure 7.5.2.2 "Forest areas", p. 93). Forests and forest soils have a high CO₂ sink potential. Due to climate change, large areas of forest are already severely damaged by drought and invasive species. This makes forest conversion measures urgent for reasons of climate protection, climate impact adaptation and biodiversity. The task of achieving climate-stable forests through forest conversion is not only costly from a financial point of view, but also requires a high level of technical competence and preliminary basic work on how a climate-stable forest can be designed in the first place. With regard to the preparatory analyses for the biodiversity strategy (A392/2022), an oral report was given in the AUT on 08.12.2022 referring to the planned implementation in 2023. The necessary financial resources are earmarked as co-financing funds within the framework of the funding project.

Since no CO₂ savings will be achieved directly in 2023, this is a preparatory but urgently needed measure that cannot be postponed. In subsequent years, the forest conversion measures will be implemented subject to the approval of the municipal council.

Implementation of measures in cooperation with the Rhine-Neckar Skilled Workers Alliance (€ 150,000, FB 80, TOP measure 7.4.4.3 Qualification offensive, p. 84)

Both from a scientific point of view and in all participation rounds with the stakeholders in the KSAP process, the central importance of overcoming the shortage of skilled workers was underlined.

Specifically, the following building blocks are to be implemented:

- Study on the need for skilled workers and qualifications among companies and recording of offers in the training, higher education and further education sectors in the region on the topic of "professions for sustainable development".
- Qualification offensive in the skilled crafts sector: Qualification measures that cannot be funded through other funding sources (in cooperation with the Chamber of Skilled Crafts and Small Businesses and the Federal Employment Agency).
- Project to recruit international skilled workers (in cooperation with the Federal Employment Agency, HWK, IHK, Welcome Center Rhein-Neckar, etc.).

Project management, documentation / success monitoring (10,000 €/ 0.5 FTE, FB 67).

The city-wide coordination of the measures, both in terms of content and the corresponding management of funds, as well as the corresponding success control and CO₂ balancing, cannot be represented with the necessary staffing within the Climate Protection Department. In addition, the staff to be deployed should also already prepare the concept for the year 2024 onwards in terms of programme and budget. For this purpose, 0.5 staff are required.



5.2 Module C-2 Social and Other Innovation Interventions

NOTE: At this point, we would also like to point out that the **corresponding data**, also the **social innovation activities for all measures are already stored** in the Climate Action Plan KSAP. It would be disproportionately time-consuming to read them all out again individually for this table. We ask you to take this into account and **refer here to Table B 2.2.**

C.2.1: Enabling social innovation interventions					
Intervention name	Description	Responsible entity/ dept./ person	Involved stakeholder	Enabling impact	Co-benefits
(indicate name of intervention)	(describe the substance of the intervention)	(indicate responsible)	(list all stakeholder involved and affected)	(describe how intervention enables climate neutrality)	(indicate how intervention helps achieve impact listed in Module B-1)
...

C-2.2: Description of social innovation interventions – textual and visual elements

Mannheim as social innovation city, experienced through many Living Labs – next CoLAB:

For the Climate City Contract, CoLAB will drive the co-design of the Commitment with local actors and seek the support of regional and national levels of government, as well as develop a statement of support with and for citizens. To this end, CoLAB will analyse the existing co-creation spaces run by local actors in the city and the already tested participation and stakeholder platforms, and co-design the transformation platform "House of Change" with local actors. By identifying actions in the SECAP that target and support stakeholders, the CCC Action Plan section will be co-created. In order to engage more citizens in sustainable and climate action, CoLAB analyses behaviours for sustainable living based on research results from system innovations on civic engagement and initial results from R&I projects, Living Labs, conducted in cities. CoLAB aims to develop a shared vision together with the urban ecosystem and to disseminate this vision as a common approach through the communication package and to make local action visible in the transformation platform success spaces. CoLAB organises public events for stakeholders and citizens as well as competitions and innovation contests. The design of the Climate City Contracts as a co-production between Transition Team, stakeholders and citizens in a Local Green Deal approach is one of the main outcomes of the Houses of Change. CoLAB builds on the engagement of local actors and is guided by the principles of inclusivity, transparency and equity. Activities in the House of Change, especially access to services such as the 2030 Agency or the Digital Tool to support climate-friendly behaviour, will be barrier-free and easily accessible for all, enabling own action, especially to avoid energy and transport poverty. The digital interface of the House of Change will bundle all measures and actors to shape the climate city contract, make the existing projects and success stories and places of change visible on a local level and network them for more effectiveness. CoLAB will analyse the effectiveness of the pilot activities and create new elements to turn ideas into action faster.

The 100CNC cities Mannheim, Aachen, Muenster want to rapidly expand their climate city contracts with CoLAB, based on inclusive governance with strong stakeholder involvement and citizen participation. CoLAB cities bring insights from experimental Living Labs (EU dimensions) directly into pilot activities, e.g. on systemic approaches to governance, energy/climate policy, participation, social innovation, and have built up a wealth of knowledge on peer learning, transformation skills and capacities. CoLAB cities have identified consumption-related emissions from energy, mobility, land use, waste as the overarching, most difficult challenge to solve for achieving climate goals. CoLAB aims to test new effective solutions for individual climate neutral action, combining multiple levers of change such as social innovation, governance/policy, democracy/participation, learning/skills at the same time, to enable a real transformation of urban society, with interactions between top-down and bottom-up actions. To bridge the barriers, CoLAB is developing innovative services for CO2-related behaviour change and linking them to the new governance model of the Transition Team, which breaks down silo thinking and anchors the integrative approach of a sustainable, climate-neutral city, not only in the city administration but also in the city's ecosystem, where so far more individual but



less collective community action takes place. The CoLAB logic is the interplay of the integrative structure and the impact on the city society, so that a person-centred approach creates more ownership and self-efficacy for action. The pilot centre is the transformative House of Change model that inspires and mobilises for real, sustainable action in everyday life, supported by the establishment of a 2030 Agency and a digital tool for climate-friendly citizen decision-making to overcome complex barriers to sustainable behaviour change. CoLAB creates new causal chains between innovative governance and new offers to activate urban society to promote collective local climate action. CoLAB comprises a set of coordinated activities that require stakeholder collaboration and generates engaging, effective long-term impacts and co-benefits for a climate neutral and sustainable, healthy and green city. CoLAB embodies system innovation by addressing the complexities of capacity, capability, culture, participation and social innovation, and governance, policy/ regulation for climate neutrality.

5.3 Module C-3 Financing of Action Portfolio

NOTE: At this point, we would also like to point out that the **corresponding data**, also the **financing possibilities for all measures are already stored** in the Climate Action Plan KSAP. It would be disproportionately time-consuming to read them all out again individually for this table. We ask you to take this into account and **refer here to Table B 2.2. It is really disproportionate to transfer the data here again individually into the various tables. We ask for your understanding.**

C-3.1: Summary of interventions with cost implication (to be unpacked in Investment Plan)					
Action/ intervention name	Responsible entity and person	Start/end date	Field of action	Impact	Total cost estimated
(list action portfolios and interventions from Modules B-2, C-1 and C-2, which have a cost implication)	(indicate responsible entity and person)	(indicate start and end date of the activity)	(indicate the field of action the interventions belongs to)	(indicate impact - i.e. the GHG reduction/ co-benefit)	(indicate the total costs in €, estimated for the intervention)
Mannheim Layout Climate Action Plan – 34 Measures see Table B 2.2					

The **City of Mannheim and its municipal companies for energy, housing and public transport**, have a wide range of experience with investor involvement and the use of capital market instruments to finance and develop large-scale projects: In the past, the governance structure facilitated the attraction of private investors, the establishment of joint ventures and the search for co-partners, especially in the area of green, sustainable, inclusive and smart city. The funding rounds are designed to also use commercial banks, cooperation with other institutions, e.g. the EIB. The design of the urban development programmes aims to mobilise private capital to increase the impact of the city's financial commitment, such as in the "Jungbusch" area. An investment fund of the city administration, supported by EU grants, promotes innovative and environmentally friendly business models together with a community of private investors. In another programme, municipal funds are used to create incentives for private households to invest in decentralised energy generation through photovoltaics. The city and its public transport company were selected by the state government to work out new financing options for public transport ("third-party user financing") and to assess the necessary legal changes. The CCC would accelerate, systematise and more fully integrate our approaches. The development of a comprehensive, investment-ready project pipeline helps to optimally design and use and use financing



Seed Financing City Budget 2023 – TOP Measures

Annex 1: 3 million € start-up financing implementation KSAP in the financial year 2023

Ongoing No.	TOP measure	Field of action	Measures-description	Implementation modules	Material resources	Staff (VK)	Total	Coping Energy crisis
1	PV offensive	Energy production	PV offensive on municipal	Accelerated PV expansion schools (from Project pipeline sMART City GmbH)	750.000	-	750.000 €	X
2	Promotion for the conversion of the heat supply	Energy production	Tackling the energy crisis - benefits for climate protection	a) Oil/gas scrapping incentive programme (400,000) b) Citizens' information "District heating in priority areas / heat supply in areas without connection prospects". (50,000)	450.000	1,5*	600.000 €	X
3	Qualification offensive	Trade, commerce, services	Qualification offensive for crafts / trades	Implementation of measures in cooperation with the Rhine-Neckar Skilled Workers Alliance (People and competences)	150.000	-	150.000 €	
4	Forest conversion	Land use	Climate-neutral forest conversion / promotion of biodiversity	a) Creation of the personnel prerequisites to accelerate forest conversion (2 VK) b) Preparatory analysis Biodiversity, esp. forest (50,000)	50.000	2,0	200.000 €	
5	Sponge City Mannheim	Green-blue infrastructures	Increasing CO2 sink capacity and climate impact adaptation	a) Unsealing/planting measures in public spaces - accelerated implementation Project pipeline (100,000) b) Schoolyard Unsealing Programme - Project pipeline available (50,000)	150.000	-	150.000 €	
6	Shift MIV to public transport	Mobility	Promote the attractiveness of public transport - range of services expand	Expansion of the FIPS offer	250.000	-	250.000 €	X
7	Redevelopment open	Private households	Forcing leverage through funding programmes	a) Increase: PV funding, energy refurbishment (300,000); b) NEW: Tenant subsidies - balcony PV; scrapping premium refrigerators for low-income earners (120,000+50,000).	470.000	1,0*	550.000 €	X
8	Climate protection management in the Quarter	Municipal administration	Raising funds for renovation offensive	Energetic refurbishment in the neighbourhood - doubling of areas	220.000	1,0	300.000 €	X
9	Project Management		Coordination / Monitoring / Documentation	Project management, documentation, performance review / evaluation	10.000	0,5	50.000 €	

ESTIMATION OF INVESTMENTS – STARTING POINT FOR 100CNC

Breakdown per funding/financing source for the municipal share:

Municipal share – breakdown (Million €)	Total (100%)	Own funds (15%)	Funding programmes (30%)	National financing (55%)
Total	4,358	654	1,307	2,397
Electricity	667	100	200	367
Buildings (heat)	2,321	348	696	1,276
Industry	20	3	6	11
Transport	1,340	201	402	737
CO ₂ -removal	10	2	3	6

The calculations assume an investment requirement for the entire **municipal sector of € 4.358 billion**. Of this, **€ 653.7 million** is to be borne by the municipality itself (approx. 15 %) as **own funds** (see table in 100CNC), **85%** comes **from funding programmes (30%)** and **national financing (55%)**. The role of the municipality as well as a further differentiation of the possible financing of the costs are presented in the report (Climate City Plan).



6 Outlook and next steps

Plans for next CCC and Action Plan iteration – textual elements

With the completion and resolution of the KSAP, the ambition for climate neutrality 2030 has been defined, the theoretical model for climate neutrality has been calculated, and the measures and responsibilities for TOP measures have been identified. The conception phase is immediately followed by the implementation phase, in which the details of the content are further refined, concrete deals in the LGD are negotiated with different actors, the financing of the implementation of measures is concretised and impact monitoring is established.

To implement the mission statement, further strategies and programmes have been and are being developed for the individual strategic goals and their thematic areas. They describe more concretely the path of implementation.










Through the Local Green Deal Mannheim, we bring together all strategies and goals in an integrated way. This is the Mannheim approach to improving urban strategies. We also want to further develop the multi-level governance approach and involve the regional and national level even more and better in order to improve the regulatory and financial framework conditions.

The 9 German EU Mission Cities work together on this and strengthen relations with the national level in a steering forum in which all federal ministries are involved.

Next CCC progress the City of Mannheim attempts to provide in September 2023, next submission phase. Then we will have completed the Climate View Monitoring and can provide all actions connected with investments. This a huge workload to do next months with Climate IOS.

7 Annexes

Add any textual or visual material to the 2030 Climate Neutrality Action Plan in the ANNEX as necessary.

-  2_A_City Council resolution_SECAP2030_text part_en-GB.pdf
-  2_B_Broschure_Climate Action Plan 2030_SECAP_en-GB.pdf
-  2_C_confidential_Work Paper_100CNC DE Städte_en-GB.pdf
-  2_D_Enabling Top Measures Climate Action Plan en-GB.pdf
-  2_E_EOI 100CNC Mannheim Survey.pdf
-  2_F_KSAP_TOP Measures_impacts_en-GB.pdf
-  2_G_V679_2022_Anlage_1_ifeu_CO2_Inventory_2020_Mannheim en-GB.pdf
-  2_H_V679_2022_Informatio CO2 Bilanz 2020_Mannheim en-GB.pdf
-  2_I_CoLaB Impact Framework data v2.xlsx



Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments
of the
City of Mannheim

STADT MANNHEIM²





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1 Introduction

Motivation to join the EU Mission “100 climate-neutral and smart cities by 2030” Present commitments to climate action Aims of Mannheim Climate City Contract (1. Version)

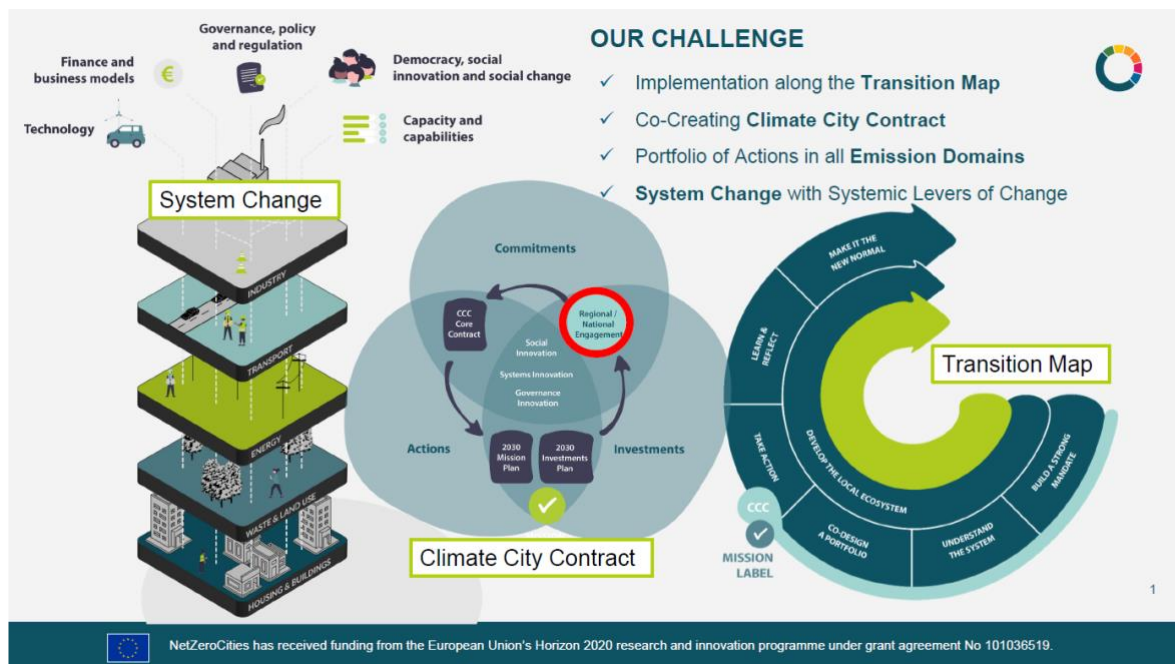
The City of Mannheim approaches the EU-Mission “100 climate-neutral and smart cities by 2030” with deep motivation based on the systemic and political changes outlined in the “Mannheim Message” (need of Local Green Deals). The municipal council's decision to develop the **Climate Action Plan 2030** with the targeted orientation towards the EU-Mission made the goal of a climate-friendly, climate-resilient and climate-neutral city, which is a role model for environmentally conscious action, a top political priority. Mannheim is using the integrated approach of the LGD to reach its goal of climate neutrality by 2030. As a **Local Green Deal pilot city**, it combines and concretises the sustainability and climate goals set by the “Mannheim 2030” **Mission Statement**, focuses on a socially just transformation of a highly industrialized city, makes targeted use of funding and financing opportunities and integrates international commitments and networks in the process. The entire urban system is being developed towards this ambitious goal with the intention of improving quality of life in the city at the same time. Mannheim has an innovative governance approach for localising the 17 SDGs based on the city's strategic goal and management system, which contributes to transparent, inclusive, responsive and effective decision-making for the climate-neutral vision. Mannheim aligns all projects with the city's sustainability and climate goals and links them to the budget. A new **governance structure for the EU-Mission** that started as an LGD project has since been transformed into a permanent matrix structure directly under the leadership of the Mayors Conference - the **100CNC/LGD transition team**, which is driving the process to concretise the vision.

To accelerate progress towards the climate neutrality target, the city relies on very **concrete agreements within the Local Green Deal “iDEAL for Mannheim”**. As a major industrial city with the largest coal-fired power plant in Germany, Mannheim places a special focus on projects that transform industry as well as energy production as part of a socially just transformation. Mannheim also prides itself in being a city of citizen participation. We think of the enormous challenge of the energy, heat and mobility transition as a joint task, which we must take on together. Mannheim sees a social-ecological path to climate neutrality, leaving no one behind and ensuring a broader resonance in civil society. For deep structural change, the city is building bridges with the LGD between the sectoral priorities of biodiversity, sustainable food systems, sustainable agriculture, clean energy, sustainable industry, construction and renovation, sustainable mobility, pollution abatement and climate protection; always linked to innovation, knowledge transfer and the comprehensive involvement of all stakeholders, as well as the strengthening of co-creative civic engagement. We anticipate that all projects and plans of the city and the city-owned companies will be developed with co-creative participation.

Mannheim developed the **Climate City Contract** impact-oriented based on multi-level governance, multi-stakeholder and bottom-up approach, through many co-creation and participation processes. Mannheim has **designed its Climate Action Plan as a SECAP with all stakeholders** of the city society, from citizens to utilities, housing and business. The key deals (interventions) to achieve carbon neutrality are already on track. These are the central factors for the city's climate neutral ambition. To achieve climate neutrality, Mannheim must consistently exploit all opportunities and implement ambitious measures. This cannot be accomplished alone. Mannheim is aware that this bold vision needs to be developed in a fact-based way with stakeholders from across the city and beyond at the regional, national and European level within the Climate City Contract. With the decision of the municipal council to develop the Climate Action Plan 2030 with a targeted focus on the EU mission, the goal of a climate-friendly, climate-resilient and climate-neutral city, that is a role model for environmentally conscious action, became a top political priority.



Consistently following this decision, the city has since adopted a **Climate Action Plan 2030** based on the **NetZeroCities transition map** in November 2022. This decision was preceded by an intensive 1.5-year participation process.



The result is a climate action plan that was developed together with many stakeholders of the city society and is **based on science-based targets** towards a climate-neutral city in 2030. Just recently, the city of Mannheim (together with Muenster and Aachen) was rewarded for its ambitious efforts to implement the transition map by winning the **Pilot Cities Call** with the **CoLAB project – Committed to Local Climate Action Building**. The CoLAB cities develop their SECAP and related SUMP and SUDP plans along the ambition and in cooperation with the citizens. The Local Green Deal pilot city of Mannheim already brings a vision of a liveable city to CoLAB with "IDEAL for Mannheim", and with it the goal of a climate-friendly, climate-smart and climate-neutral city that is a role model for environmentally conscious action. The CoLAB cities with Mannheim as Lead, see their overall vision strengthened by an **impact-oriented development of the Climate City Contract** based on multi-level governance, multi-stakeholder and bottom-up approaches. The focus is on transforming urban society and making full use of all technical and also non-technical, as well as financial innovations and opportunities.

The **first version of the Mannheim Climate City Contract** shows the **current status** of the adopted measures on the way to a climate-neutral city 2030, their contribution to the goal and which financing strategies have already been developed for implementation, as well as the agreements and approvals already made by the stakeholders. The CCC will be **further developed** with the Pilot Cities project **CoLAB** in order to more **widely share and deepen the shared vision** with the urban community. Mannheim would therefore like to submit the **second version of the Climate City Contract** in **September 2023**. This will contain a further concretisation of the measures from the action plan in particular and suitable financing options. To this end, the monitoring system **Climate View**, which the city uses and in which all measures from the Climate Action Plan have already been transferred, will further expand concrete conversion paths to climate neutrality and impact indicators. Further commitments from businesses, organisations and citizens in the form of pledges, contracts and deals will be developed and mapped in the **second version of our Climate City Contract**.



2 Goal: Climate neutrality by 2030

2030 climate neutrality ambition (Eol) ambition and commitment to a 2030 horizon as a whole city co-benefits towards the climate neutrality goal, like well-being, health, equity, justice, financial savings

Attachment : Climate Action Plan 2030_SECAP_EN

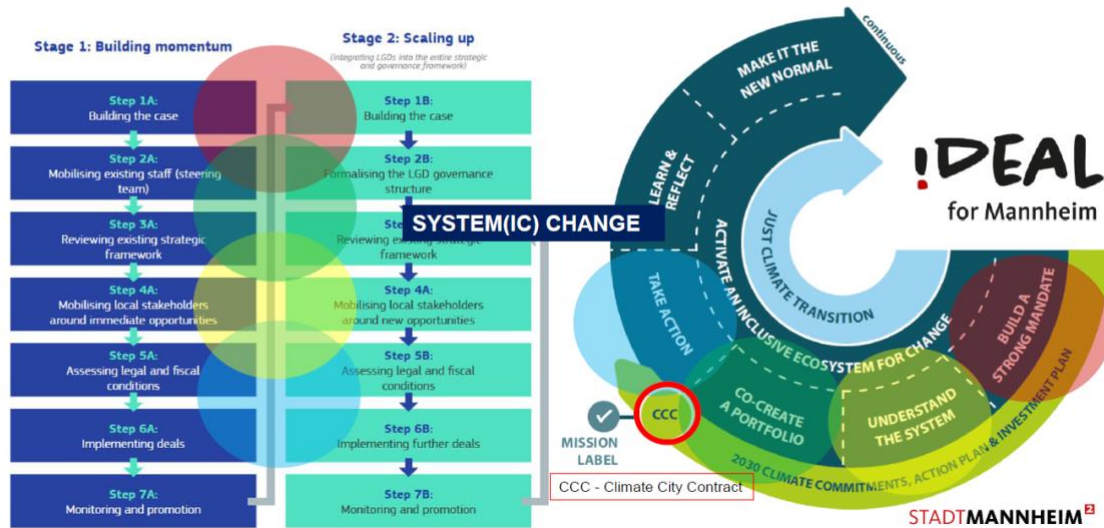
Adopted Climate Action Plan Mannheim (City Council Decision in November 2022)

The heatwave summers, forest fires, floods and dramatic inundations that have occurred in recent years have increased sensitivity to the consequences of climate change; the COVID-19 pandemic highlighted the vulnerability of global interdependencies of action and has influenced and changed mobility, production and working methods. With the decision of the Federal Constitutional Court in spring 2021 that the target of the national climate protection law was insufficient, the federal government has amended the climate protection targets for Germany and is now aiming for climate neutrality by 2045 (instead of 2050), while at the same time a whole series of cities in Germany have set themselves even more ambitious targets and have set climate neutrality by 2040, 2035 or - like the city of Mannheim - by 2030. With Russia's war of aggression on Ukraine at the beginning of 2022 and the associated supply bottlenecks of energy sources, first and foremost gas from Russia, energy consumption, energy saving, the expansion of renewable energies in Germany and securing the energy supply in the approaching winter have been topics of special attention for months. In these dynamic times, the **City of Mannheim** has commissioned the Wuppertal Institute to develop a **Climate Action Plan (KSAP)** with **which it can actively shape and support the achievement of its set goal to make Mannheim climate neutral by 2030**. The development took place in a **broad participation process** involving various administrative units, associations and a large number of stakeholders and accompanying public participation. The KSAP comprises a total of 81 measures, of which 33 were selected as measures in the process with special priority (TOP measures) and one with the highest priority (TOP priority measure). Thus, **among them are the measures that were also identified in the city's successful application to the European Union's call for support for "100 Climate Neutral Cities" (100 CNC)**. The KSAP is also **embedded in the city's Local Green Deal (LGD) process**, which develops responses to the challenges of climate change **and socio-ecological transformation with the whole city community, pursuing the goals of a climate-neutral, sustainable, inclusive city with a high quality of life**. The Climate Action Plan (hereinafter referred to as KSAP) is a substrategy in interaction with the Local Green Deal, the mobility strategy and the application in the European competition "100 climate neutral cities 2030" to achieve climate neutrality in Mannheim.

As a **Local Green Deal Pilot City** we are following along the « Blueprint of Action » and connect this approach with the transition map to make the most of co-benefits towards the climate neutrality goal, like well-being, health, equity, justice, financial savings. Together we want to shape a climate neutral, healthy, clean, green and just city. All the measure in the action plan therefore consider the possible social, environmental and economical indirect impacts. Together with the municipal owned companies (Mannheim Group) we are aware of job losses because of breaking up with the coal power plant and attempt to create new job opportunities in the crafts market, where it is urgently needed or jobs for consultancy and PV installations.



MANNHEIM'S INTEGRATED APPROACH AS LOCAL GREEN DEAL PILOT CITY AND EU MISSION CITY „100 CLIMATE NEUTRAL AND SMART CITIES BY 2030“



This Climate Action Plan 2030 for the City of Mannheim **describes measures and reduction paths** for reducing greenhouse gas emissions on **Mannheim's city territory** in order to achieve climate neutrality in 2030. The basis for this is the energy and CO₂ balance sheet from 2020 (ifeu 2020). This is referred to as the end-energy-based **territorial principle** within the **boundaries of the municipality** (whole **city territory** – no area is excluded).



Balance sheet boundaries of a municipality - green frame (source: ifeu 2022)

In a first step, **possible reduction paths** in the **different sectors** and a definition for the term climate neutrality were discussed with the **scientific monitoring group**. In the next step, eight fields of action were **defined with the steering committee**, for which measures were developed in **individual strategy groups**. Further suggestions came from the **accompanying public participation**. This broad-based participation process ultimately resulted in **81 measures in eight thematic fields of action**, 34 of which were defined as measures of special priority.

The reduction paths are to be understood as theoretical development paths. They do not map the effects of the package of measures, since without **significantly changed framework conditions at higher political levels**, achieving the goal of climate neutrality in 2030 is not achievable through municipal activities alone. Rather, the calculations show what a **high level of ambition is required at all levels** - from the EU to the federal government, the state and the municipality to local businesses and civil society and a **more active implementation of measures** in the city society (companies, organisations, civil society). The savings potential of the quantifiable measures



from the Climate Action Plan therefore do not add up to the total amount of greenhouse gases to be reduced that is needed for climate neutrality in Mannheim.

The Climate Action Plan 2030 (KSAP) concretises the goal of climate neutrality from the mission statement and the emergency plan (Mannheim's Urgent Plan to Accelerate Climate Neutrality 2019). It shows the necessity of the ambitious goal of achieving climate neutrality already by 2030 and how the implementation of corresponding measures can be accelerated.

Since April 2022, the development towards a climate-neutral city of Mannheim has been additionally supported by the European Commission's mission "100 climate-neutral cities by 2030". For this, the City of Mannheim had submitted an ambitious and convincing application at the beginning of 2022 with an overview of the current situation, ongoing work and future plans with regard to climate neutrality.

The KSAP not only pursues the goal of climate neutrality, but also fulfils the function of a so-called integrated climate protection concept (**SECAP - Sustainable Energy and Climate Action Plan**), which is also a central building block in the EU mission and a commitment made by Mannheim with the signing of the Covenant of Mayors. A SECAP must be consistent with the EU's medium- and long-term climate protection goals or formulate more ambitious goals until 2030 and describe the planned measures. A local **emissions balance sheet** and a **vulnerability analysis** are used as a basis for developing measures. With the concept "**Adaptation to Climate Change in Mannheim**" (City Council resolution V117/2019), an important building block of the SECAP was already adopted in 2019. The Climate Action Plan 2030 completes the requirements for a SECAP.

It should be noted at this point that the City of Mannheim's aspiration to quickly achieve climate neutrality is very ambitious and requires a high degree of stringency and consistency across the board from local government, businesses, associations, initiatives and citizens.

Nevertheless, the **transparency of this concept** also includes the fact that in science and practice, no "blueprint" has yet been developed on the path to municipal climate neutrality and that the path to climate neutrality is so multi-faceted that not all parameters and future scenarios can already develop a depth and sharpness. The achievement of the goal of climate neutrality by the year 2030 is by no means certain for the areas within the sphere of influence of the City of Mannheim. Nevertheless, the **measures** are intended **to guide action**. They represent an image of the possible canon of measures, especially for the initial conditions in 2022, of the City of Mannheim. Necessary adjustments may be required in the future.

The calculations carried out within the framework of the project make it clear that a city like Mannheim **cannot achieve the goal alone**: It also **needs changed framework conditions at European, federal and state level as well as the active participation of all Mannheim companies, stakeholders, initiatives and associations** as well as the population and their **acceptance of corresponding measures**.

Against this background, it is important to understand the present **strategy as a flexible concept** that can react accordingly to **changing conditions**. The KSAP is a developed basis and, as a "**living object**", is to **be permanently reviewed, refined, supplemented and adapted**. This may mean that some of the measures developed here are redundant in the future, but also that windows of **opportunity or framework conditions arise that enable or require new or different measures**. For successful climate protection in Mannheim, it is therefore not a matter of just "working through" the measures, but of **establishing processes and structures** that allow for flexible action and reaction.



3 Key priorities and strategic interventions

summarise at least **3 or 4 systemic strategic priorities** that need to be implemented for your city to **become climate neutral by 2030** = meaningful changes that will have a profound impact on reducing GHG emissions in your city, **like decarbonising the heating system** in the city or **generating 100% energy from renewables**.

The individual commitments between your city and other stakeholders should address these key priorities and contribute to reaching them. The annexed 2030 Climate Neutrality Action Plan should describe the all interventions, including those to reach your priorities as well as all further actions, in detail and describe how your city plans to implement them

TOP PRIORITY MEASURES

→ Source: Climate Action Plan (KSAP) Chapter 6.3.: Measures and Activities

The focus of the measures in the KSAP is **on measures spatially located in Mannheim** or those that lie **within the sphere of influence of the City of Mannheim**. In addition, supra-regional or intercommunal climate protection measures also have a high potential for achieving the goals, but these are not part of the KSAP. The supra-regional potentials must be examined during implementation.

From the total of 81 measures, a **total of 33 priority measures (TOP measures)** were selected in all fields of action, which are marked separately and described in more detail. In addition, an **overarching TOP measure on energy saving** was added against the background of the Ukraine conflict and the resulting uncertainty of energy supply (so we have 34 TOP Measures). These are of central importance for Mannheim on the way to climate neutrality. They were **selected according to the following criteria**:

- **CO2-saving potentials**
- Important preparatory, **supporting measures** for acceleration ("**enablers**")
- All ten core measures from the application as one of the "100 climate neutral cities" = **100CNC interventions**
- At least one measure per field of action
- **Measures for all stakeholder groups** in urban society (local administration, citizens, businesses)
- **Assessment of the services** for relevance, chances of implementation and speed

These **TOP measures** are prepared as follows and marked symbolically (★):

- Brief description and the objective of the measures as well as activities that a measure includes
- Time horizon of the implementation
- **If possible, the reduction potentials of the measures are quantified** or a **qualitative assessment** / evaluation of the contribution to achieving climate neutrality is formulated.
- **Responsibility** for the implementation
- **Financial expenditure**, funding/financing possibilities if applicable
- **Monitoring / Indicators**
- **Conflicting goals and synergies**
- **Good practice examples**



The following table shows all **34 TOP measures**  and assigns them to their corresponding fields of action and building blocks:

Field of action	Module	TOP measure	100 CNC Intervention	
Overarching TOP priority-Measure		Offensive for Energy Saving in the City of Mannheim		
Energy production	Power generation	PV Offensive		
	Smart grids	Development and expansion of intelligent energy control and smart grids	x	
	Decarbonisation of the Heat supply		District and local heating	x
			Geothermal energy	
			Promotion for the conversion of the heat supply	
	Hydrogen	Hydrogen strategy		
	Concrete and overarching Measures	Energy self-sufficient sewage treatment plant	x	
Industry	Energetic Measures in Operation	Use and expansion of renewable energies		
	Establish and expand the circular economy in industry	Network "Resource Efficiency & Circular Economy"		
Trade, commerce, services	Develop and expand the circular economy in expand	Circular economy in the Construction		
	Overarching Measures	Economic and Structural Promotion		
		Qualification offensive		
Land use	Land consumption reduce	Open space preservation and Open space development (planning principle)		
		Land-saving Urban development (planning principle)		
	Green, forest and agricultural areas	Forest areas		



Green-blue Infrastructures	Green and Unsealing in public space	Unsealing of surfaces	
	Water in the city	Sponge City Mannheim	
Mobility	Avoid motorised traffic	Dismantling the privileges of motorised Individual transport (MIV)	
		Reduce the need to be (car)mobile	
	Shift motorised traffic	MIV to public transport shift	x
		Shift MIV to cycling and walking	x
		Inner city with few cars Mannheim (Liveable City Centre Mannheim)	x
Making motorised transport more efficient	New drive concepts promote		
Private households	Residential building	Optimised use of living space and areas	
		Renovation offensive	x
	Climate-friendly Nutrition and Consumption	Avoid waste, Recycling improve	
Municipal Administration	Climate neutral Properties	Rehabilitation of municipal Buildings	x
		Climate neutrality in new construction	x
		Optimised use of Buildings	
	Climate protection in Public spaces	Operational Mobility Management in the administration	
		Reduction of Energy consumption in public space	x
	Administrative structures and -processes	Strengthening integrated administrative action	
	Overarching Measures	Climate protection management in the neighbourhood	

Overview of the TOP measures and their classification in fields of action and building blocks with reference to the measures of the application for "100 climate neutral Cities"



→ Source: Climate Action Plan (KSAP) Chapter 7: Measures

Overarching Strategic Measure:

- **Offensive for energy saving** In order to achieve the nationwide savings target of 20 % compared to the same period of the previous year, it will be necessary to avoid unnecessary energy consumption, to shift necessary energy consumption to more efficient and sustainable energy sources where possible, or to handle it in a way that is as climate- and social-friendly as possible. Energy savings can be achieved through different measures and by different actors. Due to these various possibilities to achieve the savings target, there are many links to the other measures described in the KSAP. In particular, the renovation offensives in the building sector and measures to increase energy efficiency and sufficiency.

A transformation of this magnitude is **only feasible with a variety of different hard and soft measures**. Hard measures are usually **infrastructural** as well as **legally binding measures**. Hard measures are, for example, **concrete regulations or the construction** of a district heating pipeline. These measures have a **direct impact on CO2 emissions**. In contrast, **advisory or communicative measures** are classified as **soft**. Overall, **a good mix of hard and soft measures** is important. The better soft measures work, the more effective and better hard measures unfold.

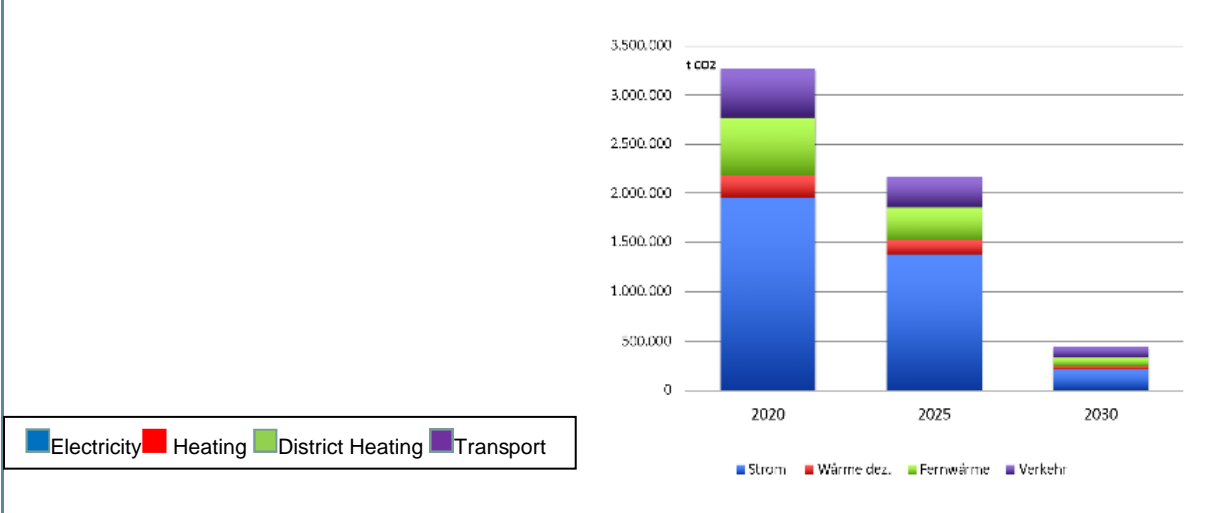
→ Source: Climate Action Plan (KSAP) Chapter 9: Results of the target scenarios and budget calculations

In order to be able to **understand the systemic strategic priority interventions** a profound **impact on reducing GHG emissions** to become climate neutral by 2030, the KSAP refers to the results of the target scenarios and CO2 budget calculations.

In scenario path 1, CO2 emissions fall to around 446,100 t CO2 in 2030, from 3,280,700 t CO2 in 2020. This represents a reduction of around 86% compared to 2020.

Mannheim's energy generation is currently dominated by the coal-based large power plant in Mannheim. In 2018, it generated around 6.9 TWh of electricity and 2.3 TWh of district heating in three power plant units. The GKM thus provides both electricity and heat in excess of the city's needs, but is also one of the largest emitters in the region. The - premature - shutdown of the GKM is therefore the greatest lever for reducing emissions, but is outside the direct sphere of influence of the city of Mannheim.

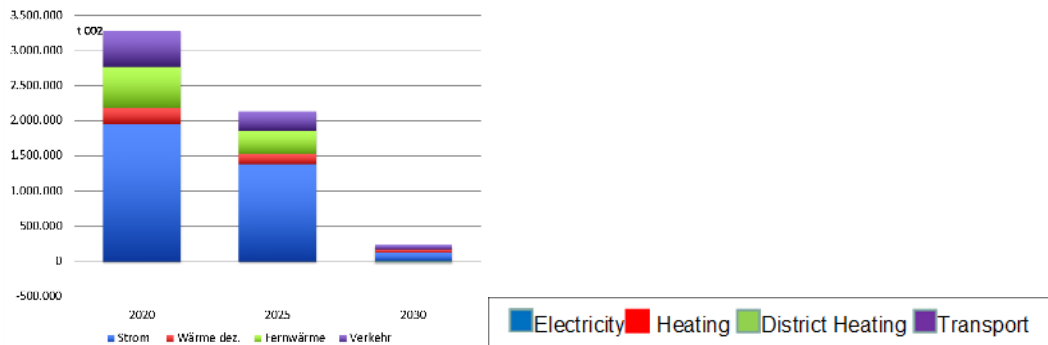
The development of Pathway 1 towards climate neutrality is detailed across **all consumption sectors** in the following sections.





Emissions by consumption sector in pathway 1. (Source: Own calculation and presentation, Wuppertal Institute)

Pathways 1 and 2 differ mainly in the application of CCUS and a bundle of measures in the transport sector. Due to these, the residual emissions in path 2 are almost halved to around 224,700 t CO₂ compared to path 1, which corresponds to a reduction of around 93 % compared to 2020. Due to the sink achieved by CCUS at the waste treatment site, there are no more residual emissions in the heat supply. Accordingly, transport continues to be a major emitter, although most emissions are still caused in the electricity sector.



Emissions by consumption sector in pathway 2. (Source: Own calculation and presentation, Wuppertal Institute)

Power sector

Due to the importance of the GKM beyond the city limits, it is relevant for the balance and its interpretation to consider the electricity production divided according to consumption.

According to (Arnold et al., 2021), a total of around 6 million tonnes of CO₂ were emitted in the electricity sector in 2018. Of these, 32 % (corresponding to 1.9 million tonnes of CO₂) are attributable to the consumption of electricity within the Mannheim territory; around 4.1 million tonnes of CO₂ are additionally generated by electricity production for consumers outside Mannheim.

When the GKM is switched off, this relationship is reversed and Mannheim becomes an "importer" of electricity from the surrounding area or from the German grid. This electricity purchase is charged in each case with the emissions that were determined after the adjustment of the dena lead study to the advanced schedule (referred to as "balance adjustment" in the figure).

Renewable energies for electricity production on Mannheim city territory are photovoltaics, wind, and to a limited extent biomass (in the form of wood in the CHP plant). The main contribution is made by PV, whereby in addition to the roof area, additional potential is being tapped on open spaces, but also on façades.

The maximum potentials used as a basis here correspond to those determined in the Energy Framework Study in the "KliMa" scenario and also applied there - again with the decisive difference that there is twenty years less time for the complete development of these potentials, i.e. only until 2030 instead of 2050. In the case of photovoltaics in particular, this requires a significantly increased speed of expansion. An ambitious pace of expansion has already been set in the Energy Framework Study, but it is still within the experience horizon of other large cities. In order to achieve the expansion target by 2030, around 300 MW would have to be newly installed in Mannheim per year. This challenge is hardly conceivable without significant political intervention. The contribution of the city of Mannheim is therefore described in part 7.2. 7.2 of the KSAP as a corresponding measure (cf. measure 7.2.1.1)



Path 2: The generation and consumption structure of path 2 does not differ from that in path 1. Lower emissions in the target year are only due to the fact that a sink of around 13,000 t CO₂ is achieved due to CO₂ capture at the **thermal waste treatment plant (TAB)**. However, this is overcompensated by the other electricity producers, so that in the electricity sector a total of 123,000 t CO₂ (instead of around 206,000 t) are emitted in the target year.

On the other hand, the demand for electricity increases over time, as new consumers arise from the transport sector, but also from the provision of heat. These more than compensate for savings due to efficiency improvements (in industry, trade and services, households and city administration).

Heat sector

In the area of building heat, the main influencing factor is renovation and the resulting reduction in energy demand. The following assumptions are taken from the national average (Kobiela et al., 2020). According to this, about 60 % of the building stock has not yet been renovated in terms of energy efficiency. In order to refurbish this proportion by the target year 2030, 6 % of the building stock (here reference: energy demand) would have to be refurbished per year by 2030. This value again exceeds the value of 4 %/a, which is the highest rate that has been mentioned in the literature so far (Kobiela et al., 2020). For this reason, 4 %/a was initially assumed here as well. For the energy demand, an average value of around 180 kWh/m² *a has been assumed, which is to be reduced to 40 kWh/m² *a, i.e. corresponding to a factor of 4.5. Figure 17 illustrates the influence of renovation rate and renovation depth by showing the resulting energy demand in each case. The higher effect is thus achieved by the number of renovated buildings (renovation rate) than by the improvement per building (renovation depth).

However, it is also clear that energy savings due to renovation are not sufficient to make the building stock climate neutral, as there is still a considerable energy demand to be met. In addition to the necessary renovation, a technology change away from conventional heat generation methods must also be implemented.

The time span for implementing the climate neutrality targets by 2030 is extremely short. Therefore, in the transformation of technologies for building heat, the usual lifetimes or depreciation periods and technology change rates can no longer be maintained in this model. There would have to be a forced replacement. This is a methodological difference to the ERS energy framework study, in which the technology change was assumed to be similar, but significantly slower in the period up to 2050.

In order to achieve emissions as close to zero as possible, Pathway 1 relies primarily on electricity-based heating (largely heat pumps) and renewable heat. The share of electricity-based individual heating is increased by a factor of 4; solar thermal (starting from a relatively low level) by a factor of 10 and biomass (pellets) by a factor of 2-3. In this way, it is possible to remove conventional individual heating from the system by 2030. As shown above, this is a system upheaval, as these heaters will not all have reached the end of their service life by 2030 and would therefore have to be replaced prematurely. Political inter-vention ("promotion and coercion") will most likely be necessary here.

Even despite this far-reaching conversion, a residual emissions base of around 100,000 t CO₂ remains in 2030 (see Figure 18). The figure also shows the great importance of district heating in Mannheim. The large share has grown historically and will also remain very relevant in the future, so that this area is shown separately again. District heating supplies large parts of the residential building stock as well as the "trade, commerce, services" sector and industry.

Until 2019 / 2020, district heating in Mannheim was fed from the heat extraction of the large power plant in Mannheim (GKM) and is therefore based exclusively on the combustion of coal. At the time of the preparation of the ERS, the connection of the heat extraction from the thermal waste treatment (TAB) was to be created, which is to provide significant parts of the district heating in the outlook. Further options have been investigated in detail in the energy framework study by (Arnold et al., 2021). Due to its favourable geographical location, Mannheim has relevant geothermal



potentials for heat supply, which can be used via deep geothermal energy as well as via river heat pumps. In addition, biomass (in the form of wood via an already installed wood-fired CHP plant and possible further expansions) and, at the peak, gas are used. De-coupled waste heat from industrial settlements in the city needs to be investigated in more detail, but could also make a smaller contribution.

A possible development for path 1 is shown in Figure 19 is shown. Emissions are dominated by the GKM until it is shut down; emissions from the TAB are accounted for as half "biogenic in origin and thus climate neutral" according to common assumptions. From district heating alone, a base of emissions of around 76,000 t CO₂ remains in 2030 if path 1 is applied. Since district heating and the previously shown building heat supply form an intersection, the residual emissions from the entire heating sector in path 1 are around 110,000 t CO₂.

Path 2: In **district heating** a relevant lever for emission reduction is available with the option of capturing the emissions generated at the waste treatment plant. From the same supply structure, this results in a sink in emissions that has a **general effect on district heating**: with -23,000 t CO₂ from TAB, district heating achieves a total of around -5,400 t CO₂ in 2030.

Transport Sector

The transport sector has been divided into three areas: motorised private transport (MIV), freight transport (GV) and public passenger transport (ÖPNV).

All three known instruments - avoid, shift, improve - have been applied. In the case of private transport, a decrease in transport performance has been assumed in order to take into account the high ambition of climate neutrality by 2030. For detailed information on the transport sector, please refer to the Energy Framework Study; as described above, the development there has been adjusted to the target year 2030. In Figure 20 summarises the emissions from all three sectors by energy source. As not all conventional fuels have been replaced by 2030 despite ambitious changes in the fleet composition, they account for the largest share of the remaining emissions of around 120,000 t CO₂.

Figure 21 shows how the fleet composition must change in each of the three transport sectors in order to achieve the targets set. These are adapted and adopted in the familiar procedure from the dena lead study (Bründlinger et al., 2018).

Particularly in the MIV and GV sectors, the far greater number of options for propulsion and fuel systems makes it clear that here, as in the building sector, a system change is imminent that must be implemented within a short period of time. The number of options is expanded by using hybrid vehicle concepts, as also envisaged in (Bründlinger et al., 2018). In the modified path 2 of this present work, the hybrids are replaced by other solutions and the emissions are reduced even further in this way (see section 9.2.3). Public transport in Mannheim benefits from the high relevance of the tram, which, by the way, is already operated with green electricity according to the operator, Rhein-Neckar-Verkehrs GmbH. Thus, only the bus operation in this area needs to be converted from diesel to electric drive, which seems quite feasible within the set time frame.

In pathway 2, the residual emissions in the transport sector fall to around 62,500 t CO₂ in 2030, corresponding to about half of those in pathway 1. In 2030, about one third of these come from residual conventional fuels (such as LNG in shipping), from the provision of electricity for propulsion systems, and from the provision of hydrogen or other synthetic fuels (syndiesel and syngas). In section 8.2.2 the additional measures in transport are described in contrast to path 1. On the one hand, there is an adjustment in the fleet composition, which deviates at this point from the templates from (Bründlinger et al., 2018). In contrast to these, the focus is now no longer on hybrid vehicles in MIV (petrol, diesel and methane hybrid), as they are used in the lead study to a high share of around 40 % in the target year (adjusted here: 2030). Instead, this share is now switched to battery-electric vehicles and assessed on the emissions side with the emission factor for electricity in 2030 (adjusted: 2040 value). This already achieves a reduction of 16,500 t CO₂ compared to path 1.



Another effect of this measure is that the fleet composition in MIV becomes less diverse than is the case in path 1 - as Figure 27 in contrast to Figure 21 shows. In 2020, there is already a small share of petrol-hybrid vehicles in the fleet; however, this will not be expanded but, on the contrary, decommissioned. For consumers, this means that in the target year 2030 there will also be more options than is the case today, but the majority of vehicles will have a battery-electric drive. In addition, there are still natural gas vehicles and hydrogen fuel cell vehicles in the fleet, whereby the natural gas vehicles in path 2 are fuelled with a mixture of synthetic gas and biomethane from waste. There have been no changes in public transport compared to path 1. The composition of the energy sources and drives in freight transport is unchanged (see Figure 27), but the provision of fuels has been assumed to be more ambitious. Thus, a higher share of synthetic diesel is required, namely 75 % in 2030 (compared to 30 % in Path 1). For methane, it is assumed that in 2030 one third of it is formed from waste-derived biomethane and synthetic gas, i.e. that it no longer has any fossil components.

These very ambitious targets can save around 40,200 t CO₂ in freight transport in addition to the reductions already achieved in path 1.

4 Principles and process

Highlight the key principles that will guide your city as it implements its Climate City Contract, like accountability, transparency, or an open attitude to new approaches. The process should encompass principles like co-creation, innovation, multi-actor and citizen engagement, and should be systemic and demand-driven in nature. It should also be based on monitoring and joint learning. The Commitments Guidance document provides more specific guidance on how integrate these principles into your own process.

key principle 1: bases on strategic goals

The City of Mannheim approaches the EU-Mission "100 climate-neutral and smart cities by 2030" with deep motivation based on the systemic and political changes outlined in the "Mannheim Message" (need of Local Green Deals). The municipal council's decision to develop the Climate Action Plan 2030 with the targeted orientation towards the EU-Mission made the goal of a climate-friendly, climate-resilient and climate-neutral city, which is a role model for environmentally conscious action, a top political priority. Mannheim is using the integrated approach of the LGD to reach its goal of climate neutrality by 2030. As a Local Green Deal pilot city, it combines and concretises the sustainability and climate goals set by the "Mannheim 2030" Mission Statement, focuses on a socially just transformation of a highly industrialized city, makes targeted use of funding and financing opportunities and integrates international commitments and networks in the process. The entire urban system is being developed towards this ambitious goal with the intention of improving quality of life in the city at the same time. Mannheim has an innovative governance approach for localising the 17 SDGs based on the city's strategic goal and management system, which contributes to transparent, inclusive, responsive and effective decision-making for the climate-neutral vision. Mannheim aligns all projects with the city's sustainability and climate goals and links them to the budget. A new governance structure for the EU-Mission that started as an LGD project has since been transformed into a permanent matrix structure directly under the leadership of the Mayors Conference - the 100CNC/LGD transition team, which is driving the process to concretise the vision.

key principle 2: co-creation, innovation, multi-actor and citizen engagement

Mannheim developed the Climate City Contract impact-oriented based on multi-level governance, multi-stakeholder and bottom-up approach, through many co-creation and participation processes. Mannheim has designed its Climate Action Plan as a SECAP with all stakeholders of the city society, from citizens to utilities, housing and business.



As a City of co-Creation (awarded as “Cooperative City” in 2022) our approach to citizen participation includes all groups of citizens, also with particular barriers to participation. For Example in the Horizon2020 project SONNET “Social Innovation in Energy Transition”, Mannheim has tested innovative formats to engage citizens in a deprived district of Mannheim, the Neckarstadt-West, where many families with low income, mostly with migration backgrounds, live. Together with the nationally funded refurbishment team (Climate Action Agency as lead) have built up special local funding opportunities addressing energy savings in such households, giving to them costfree consultance and low cost insentives to start on their own energy transition. The Climate Action Agency provides special funding in all districts for families (social family bonus), that all citizens can be part of the climate neutrality track. In 2023 within the PV Offensive the Agency has started a new PV programme for installations on balconies, especially for tenants, who do not have other possibilities to produce their own renewable energy. And we started again a funding programme to exchange old refrigerators into new energy efficient appliances in low income households.

The key deals (interventions) to achieve carbon neutrality are already on track. These are the central factors for the city's climate neutral ambition. To achieve climate neutrality, Mannheim must consistently exploit all opportunities and implement ambitious measures. This cannot be accomplished alone. Mannheim is aware that this bold vision needs to be developed in a fact-based way with stakeholders from across the city and beyond at the regional, national and European level within the Climate City Contract. With the decision of the municipal council to develop the Climate Action Plan 2030 with a targeted focus on the EU mission, the goal of a climate-friendly, climate-resilient and climate-neutral city, that is a role model for environmentally conscious action, became a top political priority.

The calculations carried out within the framework of the project make it clear that a city like Mannheim cannot achieve the goal alone: It also needs changed framework conditions at European, federal and state level as well as the active participation of all Mannheim companies, stakeholders, initiatives and associations as well as the population and their acceptance of corresponding measures.

As per the comments in the check list below, there are a few points where your approach to citizen participation could be strengthened or at least made more explicit e.g. in the Commitments document with regards to including groups with particular barriers to participation.

key principle 3: monitoring and joint learning

Nevertheless, the transparency of the Climate Action Plan includes the fact that in science and practice, no "blueprint" has yet been developed on the path to municipal climate neutrality and that the path to climate neutrality is so multi-faceted that not all parameters and future scenarios can already develop a depth and sharpness. The achievement of the goal of climate neutrality by the year 2030 is by no means certain for the areas within the sphere of influence of the City of Mannheim. Nevertheless, the measures are intended to guide action. They represent an image of the possible canon of measures, especially for the initial conditions in 2022, of the City of Mannheim. Necessary adjustments may be required in the future.

Against this background, it is important to understand the present **strategy as a flexible concept** that can react accordingly to changing conditions. The KSAP is a developed basis and, as a "living object", is to be **permanently reviewed, refined, supplemented and adapted**. This may mean that some of the measures developed here are redundant in the future, but also that windows of opportunity or framework conditions arise that enable or require new or different measures. For successful climate protection in Mannheim, it is therefore not a matter of just "working through" the measures, but of **establishing processes and structures that allow for flexible action and reaction**.

key principle 4: Transition along the levers of/for change for carbon neutrality

The 100CNC city Mannheim wants to rapidly expand its Climate City Contracts with Pilot Cities Project CoLAB – Committed to Local Climate Action Building, based on **inclusive governance** with



strong stakeholder involvement and citizen participation. Mannheim brings insights from experimental Living Labs (EU dimensions) directly into pilot activities, e.g. on **systemic approaches to governance, energy/climate policy, participation, social innovation**, and have built up a wealth of knowledge on peer learning, transformation skills and capacities. The City has identified consumption-related emissions from energy, mobility, land use, waste as the overarching, most difficult challenge to solve for achieving climate goals. Mannheim aims to test **new effective solutions for individual climate neutral action**, combining multiple levers of change such as **social innovation, governance/policy, democracy/participation, learning/skills** at the same time, to enable a real transformation of urban society, with **interactions between top-down and bottom-up actions**. To bridge the barriers, CoLAB is developing innovative services for CO₂-related behaviour change and linking them to the new governance model of the Transition Team, which breaks down silo thinking and anchors the integrative approach of a sustainable, climate-neutral city, not only in the city administration but also in the city's ecosystem, where so far more individual but less collective community action takes place. The CoLAB logic is the interplay of the integrative structure and the impact on the city society, so that a person-centred approach creates more ownership and self-efficacy for action. The pilot centre is the transformative House of Change model that inspires and mobilises for real, sustainable action in everyday life, supported by the establishment of a 2030 Agency and a digital tool for climate-friendly citizen decision-making to overcome complex barriers to sustainable behaviour change. CoLAB creates new causal chains between innovative governance and new offers to activate urban society to promote collective local climate action. CoLAB comprises a set of coordinated activities that require stakeholder collaboration and generates engaging, effective long-term impacts and **co-benefits for a climate neutral and sustainable, healthy and green city**. CoLAB embodies **system innovation** by addressing the complexities of capacity, capability, culture, participation and social innovation, and governance, policy/ regulation for climate neutrality.



5 Signatories

(Current) **List of stakeholders** who have **committed** to help your city achieve its goal to reach climate neutrality by 2030. **Detailed commitments** and **agreements** between individuals or groups of stakeholders are **appended** to this Commitments document. This list will increase over time.

Name of the institution	Sector/Area	Legal form	Name of the responsible person	Position of the responsible person
<p>COMMITMENTS TO THE CLIMATE ACTION PLAN DURING THE PROCESS – CITY COMMITMENTS (APPENDED TO THIS COMMITMENTS DOCUMENT)</p> <p>The KSAP 2030 was developed in a broad-based participation process over a period of 1.5 years. A scientific advisory board with experts, a steering committee, eight strategy groups and the public were involved in this process. A total of nine different participation formats were offered. The upcoming transformation process requires the involvement of the entire city society from politics, initiatives, associations, science, business, citizens and city administration. The joint development of the Climate Action Plan 2030 ensured that the process and the results are supported by all participants and that implementation can begin together. Based on the scientific discussion, the steering committee legitimised the goal of climate neutrality 2030 and determined CO2 reduction paths for the fields of action as a work assignment for the further process. Furthermore, it structured the fields of action thematically and in terms of personnel (strategy groups) and decided on the participation process. After the strategy group meetings, the steering committee reflected on the work from the workshops and the results of the citizens' council and public participation. It compared the measures developed with the goals set, checked their feasibility and prioritised the measures. It was possible to identify possible synergies and conflicts of objectives that could arise between individual fields of action or also with other topics and sustainability dimensions. At the last meeting of the steering committee in July 2022, comments and suggestions were again taken on board and the draft of the KSAP was recommended for further political consultation. This broad participation process aimed to generate the largest possible number of ideas worth pursuing and to ensure maximum acceptance of the process and measures, thus strengthening the democratic processes on the ground. In total, more than 300 ideas were submitted. The results of the entire process were processed by the Wuppertal Institute and integrated into the strategy presented here. In a second round, the draft strategy was submitted to the participants of the process for comments and revised accordingly. The result is the now available KSAP 2030 with the strategy section, which is the process (cf. chapter 4), the structure of the strategy and recommendations for action (cf. chapter 6) with a detailed description of the measures developed (cf. Chapter 7) as well as the modelling of pathways towards climate neutrality (cf. Chapter 8 and 9).</p>				
<p>Municipal Administration Reconciliation of departments</p> <p>Department Climate, Nature, Environment</p>		<p>Local Authority</p>	<p>Dr. Katharina Rensing</p>	<p>Head of the Department</p>



<p>Steering Committee Mayor and Deputy Mayors</p> <p>Mayor's Department OB Department V - Citizen</p> <p>Service, Climate and Environmental Protection, Technical Operations</p> <p>Department I - Finance, Investment Assets, IT, Security and Order</p> <p>Department. II - Economy, Labour, Social Affairs, Culture</p> <p>Department III - Education, Youth, Health</p> <p>Department IV - Building, Planning, Transport, Sport</p>	<p>As an important body that accompanies and steers the entire KSAP process, the steering committee was appointed by the municipal council (resolution V332/2021). The members of the steering committee, consisting of representatives from politics, city administration, associations and civil society organisations, were made up of full members (with weighted voting rights) and associate advisory members (without voting rights)</p>	<p>High-level political representatives of the city administration</p>	<p>Dr. Peter Kurz</p> <p>Prof. Diana Pretzell</p> <p>Christian Specht</p> <p>Michael Grötsch</p> <p>Dirk Grunert</p> <p>Ralf Eisenhauer</p>	<p>Chair of the Steering Committee - Mayor</p> <p>Vice Chair of the Steering Committee - Deputy Mayor</p> <p>Steering Committee Member - Deputy Mayor</p> <p>Steering Committee Member - Deputy Mayor</p> <p>Steering Committee Member - Deputy Mayor</p> <p>Steering Committee Member - Deputy Mayor</p>
<p>Steering Committee City Council Mannheim</p> <p>Group GREENS</p> <p>SPD Group</p> <p>CDU Group</p> <p>Group LI.PAR.Tie.</p> <p>AfD Group</p>	<p>As an important body that accompanies and steers the entire KSAP process, the steering committee was appointed by the municipal council (resolution V332/2021). The members of the steering committee, consisting of representatives from politics, city administration, associations and civil society organisations, were made up</p>	<p>representatives from the City Council</p>		



<p>FDP / MfM Group Free Voters / ML Group</p>	<p>of full members (with weighted voting rights) and associate advisory members (without voting rights)</p>			
<p>Steering Committee Associations and Initiatives member associations Environmental Forum Mannheim coal-free Mannheim Zero Fridays for Future Mannheim Chamber of Commerce and Industry Chamber of Crafts Trade union Mieterverein Mannheim e.V. Haus & Grund Mannheim Citizens' Council Climate Protection 2030</p>	<p>As an important body that accompanies and steers the entire KSAP process, the steering committee was appointed by the municipal council (resolution V332/2021). The members of the steering committee, consisting of representatives from politics, city administration, associations and civil society organisations, were made up of full members (with weighted voting rights) and associate advisory members (without voting rights)</p>	<p>representatives from associations and civil society organisations</p>		
<p>Citizens' Council Climate Protection 2030 committee of 24 randomly selected Mannheim residents</p>	<p>The Citizens' Council "Climate Protection 2030" represented as much of Mannheim's society as possible - in terms of age,</p>	<p>representatives from citizens</p>		



	<p>gender and place of residence. The citizens' council discussed the results of the citizens' participation in three meetings, was able to contribute its own ideas to the process and discuss the proposals of the strategy groups. Members of the citizens' council were represented in the steering committee and in the strategy groups.</p>			
<p>Steering Committee Associate advisory members</p> <p>FB Democracy and Strategy (15)</p> <p>FB Construction and Real Estate Management (25)</p> <p>FB Education (40)</p> <p>FB Geoinformation and Urban Planning (61)</p> <p>FB Climate, Nature, Environment (67)</p> <p>FB Economic and Structural Development (80)</p> <p>EB Urban Space Service (76)</p>	<p>As an important body that accompanies and steers the entire KSAP process, the steering committee was appointed by the municipal council (resolution V332/2021). The members of the steering committee, consisting of representatives from politics, city administration, associations and civil society organisations, were made up of full members (with weighted voting rights) and associate advisory members (without voting rights)</p>	<p>representatives from city administration</p>		



<p>Local Green Deal (LGD) office</p> <p>Climate Action Agency Mannheim gGmbH (KSA)</p> <p>MVV Energie AG</p>		<p>representatives from Local Green Deal Mannheim (Office under the Mayor)</p> <p>representatives from Climate Action Agency non-profit organisation</p> <p>representatives from the municipal energy utility MVV (50.1 % city owned)</p>		
<p>Scientific Advisory Board</p> <p>Wuppertal Institute</p> <p>Fraunhofer Institute for Energy Economics and Energy System Technology (IEE)</p> <p>Mannheim coal-free/BUND Heidelberg</p> <p>Institute for Energy and Environmental Research Heidelberg (ifeu)</p> <p>Engineering Office for Traffic Facilities and Systems (IVAS)</p> <p>MVV Energie AG</p> <p>sMArt City GmbH</p>	<p>Accompanying the scientific preparation of the Climate Action Plan 2030</p> <p>The group of participants consisting of recognised experts discussed the possibilities and potentials for achieving climate neutrality well before the year 2050 and discussed targets and reduction paths in various fields of action up to the year 2030.</p> <p>In addition, a definition of the term "climate neutrality" was formulated in this circle, which formed the basis of the further process as a common understanding</p>	<p>Research and scientific institutions and institutions/organisations that have carried out a relevant research or feasibility study</p>		



Leibniz Centre for European
Economic Research (ZEW)
German Energy Agency
(dena)

**OTHER DETAILED COMMITMENTS AND AGREEMENTS BETWEEN INDIVIDUALS OR GROUPS OF STAKEHOLDERS
(APPENDED TO THIS COMMITMENTS DOCUMENT)**

CLIMATE ALLIANCE OF COMPANIES MANNHEIM – LOCAL COMMITMENT

Founded in 2015, the Climate Alliance is an alliance of **Mannheim companies** with the **City of Mannheim**. Since then, the number of companies that have joined has been growing steadily. The **aim is to win over industrial companies, small and medium-sized enterprises as well as the city's own enterprises** for **strong environmental and climate protection** and **to make the commitment of the active companies** visible. By signing the certificate, the **companies commit themselves to responsibly contribute to the city-wide goal of climate neutrality as part of the Local Green Deal Mannheim**. This is at the same time a **contribution to the Climate Action Plan 2030**. Some of the companies were active in the KSAP strategy groups as well as in the steering committee.

Commitment Text of the signed Certificate of the Climate Alliance of Companies:



*Attached are all **signed commitments** of the companies.*

Text: The Climate Alliance of companies has set itself the task of being an alliance of Mannheim companies with the city of Mannheim:

- to participate responsibly in the city-wide goal of being **climate-neutral** by well before 2050 **towards 2030** as part of the **Local Green Deal Mannheim**; to create a platform of active companies that make their **own contribution to climate protection and climate impact adaptation**, energy efficiency and resource conservation; and to **ensure networking of stakeholders and transparency of greenhouse gas emissions and energy consumption data**.



The XY company **is** as partner of the Mannheim Climate Alliance **committed**:

- to set climate goals with the city of Mannheim as an economic and location factor
- to implement energy-saving, resource-conserving and environmentally friendly take CO₂-reducing measures in the sense of the Local Green Deal,
- to draw up an internal CO₂ balance sheet (alternatively energy consumption balance sheet) with concrete reduction targets,
- to report annually on the activities and the status of target achievement,
- to participate in actions, events and competitions of the Climate Alliance with their own projects.

Mannheim, has created a cross-departments Local Green Deal Team reporting directly to the Mayor, and signed **19 deal contracts** with **local industry and businesses**, committing to implement and support the Local Green Deal „ideal for Mannheim“, for example:

- **MVV Energy utility** decarbonises district heating completely by 2030 in the network, which supplies 65% of the city.
- **The housing association GBG** will refurbish about 500 flats from its existing stock every year, with a target of about 4000 flats by 2030.
- **The public transport association RNV Rhein-Neckar Verkehrsbetriebe** will convert its entire vehicle fleet to alternative drives by 2032.
- **At Roche company**, all interim areas are planted with wildflowers for more biodiversity.
- **Smart City company** makes all city-owned buildings climate-neutral in terms of electricity supply by 2027 by installing 40MWp solar panels.

Additionally the **green innovation ecosystem**, supported by the largest companies (ABB, Daimler, Essity, John Deere) and research institutions, has joined forces with the city, chambers of commerce and trade unions to **form a network to drive forward the climate-neutral transformation of industry** through concrete projects (e.g. hydrogen, circular economy), to address site protection, jobs, environmental and cross-industry approaches, and to ensure the transfer of knowledge on climate and resource protection.

As a city of innovation, Mannheim maintains numerous **cooperations with the University, the Technical University, and the Baden-Württemberg Cooperative State University** on energy, environment, climate and mobility issues, as well as social science and business administration. As a member of the corporate climate alliance, the University has committed itself to the city's climate goal. The city works with the university and student initiatives (infinity, enactus) on sustainable lifestyles. The economic development agency offers an innovation-friendly environment for creative start-ups and strengthens future technologies with the Green Tech Innovation Center and the SMART Production 4.0. cluster network. Projects on climateneutral cities are being worked on with many research institutions such as the Fraunhofer Institute (SMARTilience, SONNET). The Wuppertal Institute and ifeu Institute Heidelberg accompany the city among others with the ZEW - Leibniz Centre for European Economic Research in the scientific support group of the SECAP2030 preparation and the CO₂ scenarios. The city is a supporter of the new course of studies Climate Change Management & Engineering at the SRH Heidelberg (2 students are employed). Research is being conducted with other universities on neighborhood-level projects. As part of the Bloomberg Harvard City Leadership Initiative, the administration is working on cross-sectoral Local Green Deal implementation in the neighborhood Neckarstadt-West.



MOBILISING LOCAL STAKEHOLDERS AND IMPLEMENTING DEALS

MVV Energy AG: decarbonisation of the heating network



GBG housing company: grey water reuse in buildings



GBG housing company: refurbishment of 4000 flats



SMART City GMBH: PV for Municipal Buildings



ROCHE: Wildflower meadow as interim use



Second-hand shop of the inclusion enterprise Markthaus gGmbH



FDT Flachdach Technologie: sustainable membranes for green roofs



RNV: Alternative drives for the vehicle fleet by 2032



SV Waldhof: wild flower strips, insect hotels



GEHR Kunststoffwerke: Use of sustainable plastics



DAIMLER Truck AG: 300 kWp PV on the new multi-storey car park



SIEMENS: Meeting Point Optimizer



University Mannheim: Sustainability Tracking APP

MVV Energy AG: Steam supply with cocoa remains



(Quelle: Olam Food Ingredients)

FUCHS Schmierstoffe GmbH: Sustainable use of the waste condensate



Evangelical Church: Sustainable food in the nursery school



STADTMANNHEIM ²




<p>Climate Alliance of Companies Mannheim</p> <p>MVV Energie AG</p> <p>John Deere GmbH & Co. KG</p> <p>GBG - Mannheimer Wohnungsbaugesellschaft mbH</p> <p>FDT FlachdachTechnologie GmbH & Co. KG</p> <p>Rhein-Neckar-Verkehr GmbH</p> <p>Roche Diagnostics GmbH</p> <p>m:con – mannheim:congress GmbH</p> <p>Stadtpark Mannheim gGmbH</p> <p>Daimler Buses EvoBus GmbH</p>	<p>Commitment to the climate Neutrality target 2030 and to the Local Green Deal</p> <p>All sectors : Industry Commerce, Trade, Services Transport Buildings Circular Economy</p>	<p>Energy Utility Public limited company</p> <p>Industrial Company Ltd</p> <p>Housing Association Ltd.</p> <p>Industrial Company Ltd.</p> <p>Public Transport Ltd.</p> <p>Industrial Company Ltd.</p> <p>Congress center Ltd.</p> <p>City Park non-profit Ltd.</p> <p>Industrial Company Ltd.</p>	<p>The signatures on the contracts have been executed by the directors, managers of the companies : Names see the signatures on the contracts</p> <p>Example: MVV Energy Ralf Klöpfer</p>  <p>All other signatures see attached contracts</p>	<p>directors, managers of the companies</p> <p>Example MVV Energy Board Member</p>
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ABB AG		Industrial Company Public Ltd.		
Universität Mannheim		University		
Stadtmobil Rhein-Neckar AG		CarSharing company Public Ltd.		
Daimler AG Motorenwerk Mannheim		Industrial Company Public Ltd.		
MAG – Mannheimer Ausstellungs-GmbH		Exhibition company Ltd.		
Evangelische Kirche Mannheim		Church association		
SV Waldhof Mannheim 07 Spielbetriebs GmbH		Sports club Ltd.		
Siemens AG		Industrial Company Public Ltd.		
Gehr-Kunststoffwerk GmbH & Co. KG		SME Ltd.		
FUCHS SCHMIERSTOFFE GmbH		Industrial Company Ltd.		

OTHER DETAILED COMMITMENTS AND AGREEMENTS BETWEEN INDIVIDUALS OR GROUPS OF STAKEHOLDERS (APPENDED TO THIS COMMITMENTS DOCUMENT)

CLIMATE PACT BADEN-WUERTEMBERG – REGIONAL COMMITMENT

The municipalities, cities and districts play a key role in climate protection. For this reason, the state government and the municipal state associations concluded the "Baden-Württemberg Climate Protection Pact" at the end of 2015. In the Climate Protection Pact, the parties commit to the exemplary role of



the public sector in climate protection and to the goals of the Climate Protection Act. With the Climate Protection Pact, the state and the municipal state associations are implementing the legal mandate of the Baden-Württemberg Climate Protection Act, according to which the state supports the municipalities in implementing their exemplary function. The Climate Protection Pact was initially agreed for the years 2016 and 2017 and updated for the years 2018 and 2019. With the current update of the climate protection pact for the years 2020 and 2021, **the state government and the state associations of municipalities have agreed on new funding opportunities and significantly increased the funding for municipal climate protection measures compared to previous years.** The climate protection pact includes a planned volume of **around 27 million euros** for the years 2020 and 2021. To strengthen the impact of the pact, municipalities, cities and districts can support the climate protection pact with a declaration. So far, Mannheim among other 490 municipalities have joined the **Climate Protection Pact**. In doing so, they make it clear that they are active in climate protection and that they also want to develop these activities further. Municipalities that wish to support the Climate Protection Pact can submit the necessary so-called **supporting declaration to the Ministry of the Environment. Municipalities that submit a declaration of support also have the opportunity to receive an increased funding quota** under the funding programmes.

With the support of the state government, the City of Mannheim would like to expand its commitment to climate protection. In 2017, the **City of Mannheim therefore signed the 1st Climate Protection Pact of the State of Baden-Württemberg**, as well as submitting the declarations for the **3rd Climate Protection Pact**, thus continuing its commitment to strong climate protection activities.

With the climate protection pact of the state of Baden-Württemberg, Mannheim **receives more funds for the implementation** of its exemplary function. The state climate protection agency KEA supports Mannheim with **access to tools and competencies such as the climate protection planner, offers training** on energy management and CO2 reporting, and assists in recording energy consumption and creating a heat plan. In the network of municipal climate protection managers, the city receives technical and strategic support for SECAP. Mannheim **receives state and federal funding for climate staff and projects.** The state working group "Bicycle-Friendly Communities" supports its mobility strategy. Mannheim actively uses the federal research area's funding opportunities and regionally supported structural EU funds for its smart city strategy and climate resilience (see R&I projects). Annual state and national competitions such as (see Awards) provide Mannheim with the opportunity to compete and learn from each other.

Climate Pact Baden-Wuerttemberg				
City of Mannheim	Climate Neutrality Target – all sectors	Local Authority	Declaration for the City of Mannheim signed by : Dr. Peter Kurz	Mayor of the City of Mannheim
State of Baden-Wuerttemberg - Ministry of the Environment	Climate Neutrality Target – all sectors	Regional Authority	Climate Pact signed by : Franz Untersteller	Minister of the Ministry of the Environment, State of Baden-Wuerttemberg
Association of Towns and Municipalities Baden-Wuerttemberg	Climate Neutrality Target – all sectors	Registered association, regional municipal leading organisation	Climate Pact signed by : Dr. Peter Kurz	In the position as Chair of the Association of Towns and Municipalities Baden-Wuerttemberg



OTHER DETAILED COMMITMENTS AND AGREEMENTS BETWEEN INDIVIDUALS OR GROUPS OF STAKEHOLDERS (APPENDED TO THIS COMMITMENTS DOCUMENT)

STEERING FORUM (LENKUNGSFORUM) OF THE NATIONAL GOVERNMENT FOR THE EU MISSION “100CN” – NATIONAL COMMITMENT

National monitoring process: The Federal Ministry of Housing, Urban Development and Building and the Federal Ministry of Education and Research share the lead for the national monitoring process of the Urban Mission. In principle, this is divided between the focal points of research and implementation. The goal is to support cities on their way to climate neutrality. At the national level, a steering forum is being set up in which relevant federal ministries and other stakeholders are represented in order to support the cities with instruments, funding programmes, knowledge, networks and other measures. The City of Mannheim and the City of Aachen were appointed by the Working Group of the 9 EU Mission Cities as representatives and spokespersons to the national level. A working paper of the cities with the challenges to achieve climate neutrality by 2030 in the cities has already been handed over to the Steering Forum with the request for support. A meeting of the Steering Forum to hand over the paper and discuss the involvement of the national level in the process of developing the Climate City Contracts will take place in Berlin on 29.03.2023.

The national service and competence center SK:KK provides Mannheim with up-to-date information on financial advisory services and support for mobilizing resources in outreach, awareness raising, and effective communication about climate impacts. The new federal government is currently raising energy standards for climate-neutral buildings, and a new emergency climate protection program has been announced to provide cities with a framework for achieving climate neutrality.



On 29 September 2021, the European Commission launched the EU mission "100 Climate Neutral and Smart Cities". It is a new format under the Horizon Europe research programme. The goal is to make 100 cities in Europe climate neutral by 2030. This involves, for example, questions of land-saving and compact settlement development, integrated urban development concepts, sustainable and active mobility or energy efficiency at neighbourhood level. The currently visible climate crisis intensifies the urgency of climate neutrality.

In the arena, the European Commission will explain the new instrument of EU missions and in particular the city mission. In addition, three European cities will present their experiences to date as well as their strategies, measures and plans. At the same time, the arena will mark the start of the national accompanying process of the EU mission to support the selected German cities. The arena will focus on linking the EU mission with the New Leipzig Charter's orientation towards the common good. ICLEI - Local Governments for Sustainability will present the results of a study on sustainability management and the common good.

EU mission "100 climate-neutral and smart cities"

The EU missions are a new instrument of EU research policy to address research, innovation and implementation in key global issues. The mission "100 climate-neutral and smart cities" turns the selected cities into experimentation and innovation hubs in order to make all European cities climate-neutral and smart.

in a position to become climate neutral by 2050. Nine cities from Germany were selected for the mission.



selected. The missions aim at new forms of governance and cooperation, especially in the participation of citizens. For the implementation, funds from the Horizon Europe programme are available in the area of research and innovation, but other funds must also be mobilised.

National monitoring process

The Federal Ministry of Housing, Urban Development and Building and the Federal Ministry of Education and Research share the lead for the national monitoring process of the Urban Mission. In principle, this is divided between the focal points of research and implementation. The goal is to support cities on their way to climate neutrality. At the national level, a steering forum is being set up in which relevant federal ministries and other stakeholders are represented in order to support the cities with instruments, funding programmes, knowledge, networks and other measures. Comparable processes are also being developed in other EU countries, which is why there will also be a European exchange of experience in implementation.



FUTURE STRATEGY FOR RESEARCH AND INNOVATION – THE NATIONAL COMMITMENT FOR SUPPORTING THE EU MISSION CITIES (ATTACHED)

The Federal Government is realigning its research and innovation policy. With the "Future Strategy for Research and Innovation" it wants to dare more progress in order to strengthen Germany's innovative power and secure Europe's technological sovereignty.

Germany was and is a country of progress and innovation. To ensure that this remains the case in the future, the Federal Government, under the leadership of the Federal Ministry of Education and Research (BMBWF), has developed the "Future Strategy for Research and Innovation" across all ministries. With this strategy, the Federal Government defines the goals, milestones and priorities of its research and innovation policy for the coming years. It creates the framework conditions for an innovation system that contributes to protecting the natural foundations of life, securing Germany's international competitiveness, strengthening the resilience of society and expanding economic strength. With this strategy, the Federal Government is daring to make more progress in line with the coalition agreement and is addressing the major social and global challenges of our time: climate change, the biodiversity crisis, environmental pollution, poverty reduction and sustainable development. In doing so, the policy also decisively assumes responsibility towards future generations.

Our goals to achieve the mission

- We want to further promote the transformation towards more sustainable mobility in the different modes of transport and at different spatial levels. In this context, we will, among other things, significantly strengthen transformation research in order to advance technological and social innovation processes in the mobility system more quickly and support new, socially just mobility concepts through reallabs and experimentation clauses.
- We support the implementation of climate neutrality of cities by 2030 and the strengthening of resilience against the consequences of climate change.
- We want to decarbonise the heat supply for buildings quickly and sustainably.
- **Through our active contribution, we want to make the EU mission "100 climate-neutral and smart cities" a success and optimally support the selected nine German cities.**
- We want to establish regional innovation spaces as large-scale research and application hubs for an sustainable urban and regional development, especially in the area of sustainable mobility.
- We strengthen the research and transfer of social innovations for climate-neutral and sustainable cities and regions.
- We want to use digitalisation for sustainable energy supply and mobility of the future and achieve broad diffusion and social co-design of digital energy and mobility innovations through citizen participation. Suitable (legal) framework conditions must also be clarified in order to avoid possible rebound effects.
- We want to secure the value chains for emission-free mobility concepts.
- We invest in the development of secure, high-performance, energy- and resource-efficient and resilient ICT infrastructures in order to comprehensively digitally network energy supply, industry, mobility, urban and rural development.
- We will seize the opportunities of the transformation towards sustainability by using safe and explainable artificial intelligence and intelligent networking in communication systems such as, in perspective, 6G, and thus contribute to a more resource-efficient production and logistics as well as the mobility and energy transition.





<p>▪ We want to increase the efficiency of transport and promote the development of autonomous transport through the further development of digital technologies and artificial intelligence. In this context, we take social acceptance into account and avoid possible rebound effects. We promote relevant studies and create the necessary framework conditions.</p>				
<p>National Steering Forum</p>	<p>Climate Neutrality Target – all sectors</p>	<p>National Government</p>	<p>Representatives from Ministries of the national government</p> <p>Christian Alecke</p> <p>Tilman Bucholz Dominique Breier</p>	<p>Federal Ministry of Research and Education</p> <p>Federal Ministry of Housing, Urban Development and Construction</p>
<p>Working Group German EU Mission Cities</p> <p>Mannheim Aachen Münster München Dortmund Leipzig Dresden Heidelberg Frankfurt</p>	<p>Climate Neutrality Target – all sectors</p>	<p>Local Authority – representatives of the 9 German EU-Mission city</p>	<p>Associated members of the Steering Forum</p> <p>Agnes Schönfelder (Mannheim)</p> <p>Michael Schmitz (Aachen)</p>	<p>spokespersons to the national level</p> <p>100CNC contact point and Spokesperson Local Green Deal, EU Climate Policy Advisor – Mayors Department</p> <p>Climate Policy Advisor - Deputy Mayors Department for Climate and Environment</p>




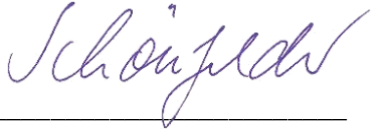
6 Contract with signatures

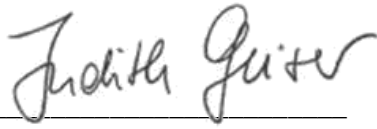
We, the undersigned, hereby commit to help make the City of Mannheim climate neutral by 2030. We agree with the common goals and commitments as formulated in the Climate City Contract of the City of Mannheim and as elaborated in the Climate Action Plan 2030 (Klimaschutz-Aktionsplan 2030) adopted by the City Council together with the city administration and the city society. Together with the stakeholders of the entire city, we want to shape the Climate City Contract with concrete implementations of these commitments within the framework of the Local Green Deal "iDEAL for Mannheim". We thus actively support the goal of a climate-neutral, sustainable, resilient and inclusive, socially just city.

<i>Date of signature</i>	<i>Name</i>	<i>Signature</i>
Mannheim, 14.03.2023	Dr. Peter Kurz Mayor City of Mannheim	

Mannheim, 14.03.2023	Christian Specht First Deputy Mayor City of Mannheim Finance, Shareholdings, Security and Order, IT	
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Mannheim, 14.03.2023	Prof. Dr. Diana Pretzell Deputy Mayor City of Mannheim Environment, Climate Technical and Citizen Services	
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Mannheim, 14.03.2023	Agnes Schönfelder Managing Director Climate Action Agency Mannheim	
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Mannheim, 14.03.2023	Judith Geiser Executive Management Local Green Deal Office Mannheim	
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Appendix: Individual Signatory Commitments

-  A_City Council resolution_SECAP2030_text part_en-GB.pdf
-  B_Res. V376_2021_Local Green Deal_DE en-GB.pdf
-  C_Climate Action Steering Committee_Protocol Approval.pdf
-  D1_contracts Climate Alliance_15 companies.pdf
-  D2_contracts Climate Alliance_3 new Companies.pdf
-  E_Climate Alliance Businesses 2021_certificate_en-GB.pdf
-  F_Climate Pact Declaration BW Mannheim_2020 en-GB.pdf
-  G_Future Strategy Research and Innovatio_National Commitment_en.pdf