NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

City of Rotterdam

Gemeente Rotterdam

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Abbreviations and acronyms

Abbreviations and acronyms	Definition
AVR	Waste processing organisation of Rotterdam
DCMR	Central environmental management service in region Rijnmond
TNO	Dutch organisation for applied scientific research
e-mjv's	Webapplication for organisations to report on their (industrial) emissions
VvE's	Houseowner associations
KAR	Climate Actionplan Rotterdam

Summary

The City Climate contract (CCC) is set up as a way for Cities to identify pathways towards climate neutrality and backing them up with the necessary actions *(part B-2*), (financial) means (Investment Plan) and the necessary commitments from our local stakeholders (Commitments part). Its format is designed to address all aspects which are needed to be successful; current emissions (module A-1) forecasting (A-2.5), systemic barriers and opportunities (A-3) monitoring and learning (B-3), and strategizing the next steps (module C)

In 2019 we identified and established the **pathways** (*current policies, Module A-2*) for the main emission domains (Energy, Build Environment, Mobility and Port & Industry) and creating a **portfolio of actions** (*Annex 1, 2*) with our **local stakeholders** (*Commitments section*) which resulted in the Rotterdam Climate agreement (Rotterdams Klimaatakkoord). The aim was to have an impact which would contribute sufficiently to reduce our CO2-emission in 2030 with 49% compared to 1990 and become climate neutral in 2050. In 2022 this goal was raised to -55% in and in 2023 we created our first a **climate action plan** (Klimaatactieplan Rotterdam) to monitor progress.

An important part of our portfolio is the result of **multilevel cooperation** (A-2), specifically the actions that were the result of the **national Climate Agreement (2019)**. This is almost mandatory, because municipalities in the Netherlands are currently insufficiently (A-3.2, 3.5) in a position to decide on their own on the necessary regulatory and financial (fiscal, lending and spending) means to ensure the necessary actions can be executed. We are dependent on other state actors, especially the Dutch government, in creating the necessary enabling conditions for actions to be locally executed. This means we are continuously prone to negotiate on the basis of subsidiarity and proportionality who can, must and is in the best position to act.

Forecasting annually the impact of our actions, has ever since shown (Module A 2.5) we are not on track yet towards the 2030 goal. Beside focusing on getting the current portfolio executed, addressing the barriers we encountered along the way, we continuously look for new ways and possible actions to bridge the **gap.** Introducing **innovative ways** (A 3.3.) to update our portfolio of actions locally with our **citizens** and other stakeholders. But the impact of actions we can decide upon on our own, is limited compared to what can be done when working together with other state actors.

But the reality is that many **barriers** (A-3) still need to be addressed, for which the national government and EU are in the best position. On top, **new barriers** have presented themselves (grid congestion, investment stop heating companies), which **endangers the execution of our current actions**.

This makes it very difficult to envisage a scenario which leads towards bridging the gap in 2030, let alone state a more ambitious feasible target, as has been assessed when we applied for this mission in March 2022 (Expression of Interest). Because for enabling the scaling and speeding up some of our main impactful actions, the **same barriers** have to be addressed which threaten our current actions. While we do wat we can within our sphere of influence, there are not many other ways available to address certain emissions, especially those aimed at the built environment.

Faced with this reality we are starting to look **beyond 2030.** We use the moment of the submission of this CCC (module C) as a start for the preparations for the next administration, which will be installed after the elections March 2026. This means for this year we focus on ensuring that our current portfolio of actions will be executed, and the barriers are addressed so the next administration is able to assess 1) what can still be done towards 2030, 2) which intermediate goals to set after 2030, and 3) offer them a portfolio of possible actions and 4) an investment plan to back it up. The introduction will show this has been our practice since 2018.

Another reason for this course of action are the **multilevel processes** we are dependent upon to determine a feasible pathway and/or shape our portfolio: the preparation of new national measures by the national government to (still) reach the national goal in 2030, as well establishing a goal for 2035 as obligated to do by the national Climate Law. Also, the negotiations on the proposed EU target of -90% in 2040 will have its impact to be reckoned with.

Because of this multilevel dependency we express the wish to use this mission to the fullest for our preparations, utilising the support of the European Commission as well as that of the national support structure (A3, C). Our submission is therefore a confirmation of our dedication, with the support of our local stakeholders (commitments), towards the overall goal of achieving climate neutral cities, being aware (A-2,3) that none of us can achieve it on its own (B-3? Energy, stakeholder analysis).

The way in which the European Commission has set up this mission and the way of reporting, informed and supported by NetZeroCities consortium, to achieve a baseline for bridging the gap between local Climate action and the European Union (part B), leads us to believe and asses this mission can give cities such as Rotterdam the chance to address the structural and systemic barriers (part A-3), in which the EU has a chance to act, which are prevent us in achieving the goal (introduction, A-3) to become a climate neutral city on time.

Only together we can make a climate neutral city happen!

Introduction

Rotterdam is a city with 600.000 inhabitants. That's makes us the second largest city in the Netherlands. It is a multi-cultural city with inhabitants from 172 different nationalities. On average we also have the poorest inhabitants compared to the other big cities, which makes an inclusive and affordable energy transition for us of the utmost importance.

Within our municipal boundaries is located the Port of Rotterdam, the biggest port in Europe. The industry and energy sector located there is responsible for roughly 20% of the national CO2-emissions and 80% of the Rotterdam emissions (both scope 1). If we also take in consideration the vast amount goods produced there or passing through, the port plays a large role in emissions produced elsewhere. 13% of all energy consumed in Europe passes through the port and indirect emissions (scope3) amount to almost 3,5 times of the total emissions of the Netherlands. The transformation of the port towards a clean energy and sustainable resource hub is therefore of strategic importance for the future of our city, the Netherlands and Europe as a whole.

Rotterdam is a dense urban area with a negligible amount of farming land. This has several consequences. First, there are but a few areas where large scale wind- or solar farms can be developed. This makes us almost completely dependent, currently and in the future, of the development of sustainable electricity sources beyond our city borders. Next, while there is potential for the development and utilising of local heat sources, for a large part we are dependent on residual heat from industrial processes in the Port of Rotterdam. Emphasizing the strategic importance of this transition for the city area. Third, the extra space required for the energy transition, because of all the extra assets required, causes many issues with other challenges which also demand space, like greening the city, housing, etc.

Multi-level cooperation on different scales (regional, national, European and international) is therefore of vital essence in reaching our ambitions on climate neutrality. Depending on our sphere of influence we fulfil different roles and responsibilities in the many transitions that are taking place in our city borders.

Figure 1 Rotterdam territory.

The EU Mission "100 Climate Neutral and Smart Cities by 2030" aims to support the transformation of cities to accelerate the implementation of the Paris Agreement, and to be both a catalyst and driver for the implementation of the European Green Deal, as well as a demonstrator that it is possible to achieve climate neutrality by 2050. Rotterdam shares this ambition, convinced that only multi-level cooperation and coordination, between different layers of governments and stakeholders, is crucial to reach a climate neutral society on time AND to open up new/smart possibilities for the much-needed acceleration. Because the reality unfortunately is that we are still not on track to reach the goal of the Paris Climate Agreement to keep the rise of global temperature at 1,5% C at the end of his century. As a low-lying city in the Dutch river delta, vulnerable to the effects of climate change, this is almost an existential problem.

We believe cities, where most people live and work who will face the effect of climate change and climate policies, must become more involved in the shaping of policies and actions by the EU and national governments. We see ourselves as crucial actors in informing them to achieve better policies, better regulations, better spending, and better execution of climate action. Because of our focus on learning-by-doing in an integral (holistic) way, we can give valuable insights into the challenges and barriers to address so to have a bigger and quicker impact on climate change. In a way that is also sensible to all the other public challenges cities face.

The Mission Implementation Plan foresees that each of the 100 selected cities will develop a City Climate Contract (CCC) adapted to its own reality, through a process of co-creation and in close collaboration with the whole of civil society and citizens, detailing the strategy for the deployment and monitoring of innovative and digital solutions to achieve climate neutrality; and enabling other cities to follow their example by 2050. The CCC consist of three elements: a Climate Neutrality Action Plan, an Investment Plan and a Commitments document expressing the necessary support of all the local stakeholders for the previous. Rotterdam can by experience state that these are crucial elements for reaching one's goals, having worked on variations of them and all the necessary elements it has to contain, for at least the last five years.

Since we set our first target of -49% CO2-reduction for 2030 in 2019, and drafted the first plans to achieve it, the focus for Rotterdam has been on getting the desired results. We took a step-by-step approach, learning while doing approach, since so many things had to be done for the first time with no prior experience. Innovation is therefore a key element. We perceive this as the only way to discover the effectiveness of our actions; learning which preconditions are needed for scaling them up to the point a feasible pathway towards the 2030 goal and beyond can be established.

In essence, our climate policy has slowly been shifting, from what can be done within the existing context to have the biggest CO2-reduction on the short and intermediate term, towards what in the end is needed to become a climate neutral city. This practically means, that no matter how big or how small the emissions are, for every person or business a viable pathway must be created towards NetZero. Which leads to the necessity of more structural changes of which we are beginning to experience the signs.

Rotterdam has been engaging on many ways in different networks for the last decades to share our experiences and stimulate further collaboration, especially between cities globally and within the European Union. We are happy to observe that so many of the selected cities, especially also the ones in the Netherlands, have already submitted their CCC's, which unlocks a huge amount of useful information. With the mission we hope we can transcend beyond sharing only experiences and opinions toward real collaboration and collective multi-level action.

We are confident this document shows a clear political commitment, to the European Commission and national, regional and local authorities, towards the goal of climate neutrality. It secondly demonstrates that our common mission cannot succeed without being firmly anchored in the local community and garnering broad support, for which municipalities are the best equipped to organise. But thirdly, it clearly demonstrates that cities like Rotterdam,

especially in the Dutch context, cannot reach this tremendous task on its own and strengthening our multi-level cooperation is indispensable. And for last, we are arguing that constantly pressing innovation (specially digitalisation), learning-while-doing, should be at the centre of that cooperation so to be able to scale and speed up this transition towards climate neutral cities.

The Rotterdam City Climate Contract

In this section we provide an overview of all the prior steps we have taken (not exhaustingly) and how they relate towards this CCC.

Rotterdam has been taking the steps advocated by this mission prior to the launch of the EU-mission in terms of understanding the system, building a mandate, shaping the right policies and actions, increase our capacity to (imp)act and learning, evaluating, reassessing our course of action. Rotterdam and the mission therefore seemed to us a clear fit when it was announced in 2021.

Since the Rotterdam Climate Agreement (RKA, 2019) and our first and forecasting, assessing the impact of our climate actions, we have been going through many phases of learning, evaluating, and adapting our approach with our stakeholders, which we see as one of the key elements of this mission.

We will first give an overview of the steps taken prior to creating this CCC, our lessons learned, after which we will elaborate on the current situation, to end with an overview of the consequences for the different parts and sections of the CCC.

Prior steps

In **2018**, at the start of the new administrative period when the new City Council was installed, the following actions were taken:

- *Scenarios and pathways*: We did our first backcasting of possible pathways towards climate neutrality (Nieuwe Energie voor Rotterdam, Drift). Giving us insight towards which pathways and actions should and/or could be established.
- *Investments*: Our first assessment was made (Meerjarenperspectief Energietransitie) of the necessary investments and expenditures until 2030 (see Investment Plan).
- *Budget and funding:* an Energy Transition Budget (ETB) was set up to finance the necessary actions and an Energy Transition Fund (ETF) was set-up for providing low-interest loans.
- *Goals:* The newly installed City Council officially adopted the goal of reaching climate neutrality in 2050 and reducing the emissions within its boundaries in 2030 by 49%. This was agreed upon with the Council Agreement on Energy Transition (Raadsakkoord Energietransitie, 2019). It identified 5 'transition pathways' to succeed in towards climate neutrality (Port & Industry, Built Environment, Mobility, Energy-production, and the Economic transition).
- *Commitments:* We established our first Rotterdam Climate Agreement (RKA) in 2019 were local stakeholders endorsed the overall climate goals and agreed upon 49 climate deals to reach those goals. An important part was also to implement the tasks set out in the National Climate agreement (2019). More than 50 meetings were held with the participation of more than 100 compagnies and organisations and over 1000 citizens. The climate deals touched on a variety of issues, big and small, not limited to CO2-reducton but also on for example consumption/circularity and the labour market. So called 'Climate tables' were established for the various emission domains to monitor progress and inspire new actions.
- *Monitoring and Forecasting:* Besides keeping track of our CO2-emissions, we started with forecasting annually the CO2-impact of our actions, so to be able to track progress and identify the emission-gap to be targeted with new measures and actions. The first forecast showed we were (and still do) not on track and had an emission-gap in 2030 based on the city-wide goal of -49%. In addition, we classified the status of our actions in degrees of certainty, reflecting the progress of actions and giving us insight into additional actions needed to assure more certainty.

- *Governance:* the Department of Sustainability was set up to coordinate and instigate sustainability in the centre of our municipal organisation.

In **2022**, when the current administrative period started, the following changes have since occurred:

- *Scenario's, and investments*: An analysis was performed of the available (policy) options and cost to reduce the 'emission gap', with a baseline of -55% in 2030 (see investment plan)
- *Goals:* The new administration adopted a goal of -55% CO2 (scope 1) in 2030 as well as setting a more specific goal for the urban area (excluding the port) because based on the analysis there the municipality has (more) ways for action. Concretely this was set at -25% (scope 1+2) in 2026, which marks the end of the current administrative period.
- *Commitments*: the set-up of the governance of the Rotterdam Climate Agreement with five 'Climatetables' was changed. This was because many collaborations with local stakeholders had evolved into more sector-specific agreements and action plans and business-as-usual practises (see Commitments). We followed-up with installing 'Climateboosters' (Klimaataanjagers), local persons who's task is to build upon the networks established since the RKA, focussing on those areas were we perceived a gap and chances for strengthening stakeholder collaboration.
- *Budget and Funding*: the ETB was followed up by the Sustainability Transition Budget (DTB) to allow more actions to be funded than those focussed solely on the energy transition.
- *Democracy and participation*: to get our citizens more involved into the decision-making processes on climate action, the step was taken to assemble a Citizens Council on Climate (Burgerberaad Klimaat) which consist of randomly selected citizens who reflect the Rotterdam population. After working half a year, their advice on further climate action is now ready to be debated by the City Council. In addition, 37 Neighbourhood Councils were established so to involve our citizens on a more local scale in matters which are a concern to them, including climate action.
- *Pathways and actions*: we started working on our first Climate Action Plan (Klimaatactieplan Rotterdam, KAR) which was adopted (by the City Council in April 2023. Our focus was first of all to create a digital, user-friendly tool to monitor our overall progress towards climate neutrality and assess and discuss with our City Council and local stakeholders, further actions needed to reach our goals as well as the related barriers. It created the first comprehensive overview of all the goals, pathways, progress, and barriers from the different policies contributing to climate action.

Current situation: from start-up to scale-up

We are experiencing the transition from the start-up to a scale-up phase in various ways, being confronted with systemic barriers which are too large to be overcome by Rotterdam alone and require multi-level stakeholder cooperation on many fronts. Some of the barriers have a huge impact in the feasibility of current policies and plans.

The most pressing barriers on the short and intermediate term are:

- Grid congestion: due to the quicker than expected electrification due to the gas crisis, the capacity of the electricity grid is insufficient to allow new users, in first instance big electricity users. Due to the time it takes to upgrade it, this problem will not be solved before 2030, while congestion management and other measures can only partly compensate.
- District Heating: the current two private owned compagnies who are responsible for the district heating network in Rotterdam have stopped investing because the

national government has eventually decided that district heating (or other collective heating systems) must (eventually) be exploited by publicly owned compagnies. This had not only led to a delay in the planned expansion of district heating but also prevents us from discussing and preparing with them new ambitious plans. Since the law is still not decided upon by the parliament, there is currently a lot of uncertainty about how exactly to proceed with our current plans for expanding the network.
- Labour shortages: while scaling up measures and actions, increasingly we are observing at our stakeholders they are having problems in finding at time the right specialized staff. When we are trying to scale-up our ambitions and actions, we expect this to be an increasing bottleneck for drawing up and executing plans.

The short conclusion is that we are forced to reassess and adapt our current plans and actions, since these barriers affect almost all the planning of actions in our current portfolio which depend on the energy system.

Fulfilling of the CCC-requirements

Creating a CCC is meant to be supportive of our local needs, going through different phases, learning adapting, updating and shaped by local experiences. The CCC the mission stimulates cities to assess their current impact, learn from other cities, and strategies with their local stakeholders how to bridge the gap towards climate neutrality by new actions. This should lead to a portfolio of actions which are backed up by an investment plan and the necessary commitments. Reflecting on that ambition and approach we have the following remarks.

On the ambition of accelerating towards net zero:

- Since 2019 we have adopted a resilient, flexible, no regret approach (see section A-3). Reduction measures taken here and now are assessed and determined by looking at the desired outcomes for a climate neutral city, by 2050. Because the amount of money needed, we also try to prevent having investments done on the short term, which are redundant or cause an undesirable lock-in at the long term (see A-3 Energy), preventing unnecessary cost. If we all are pressed to accelerate, which is a possibility, we should address this issue. And achieving the goal via unorthodox measures (e.g. compensation with carbon credits), also questions whether we will be a feasible example for other cities.
- When the mission was launched, we stated in our expression of interest that the ask to become climate neutral in 2030 was not feasible for Rotterdam. Being conscious already of our impact and progress towards 2030, we could assess that the goal of climate neutrality, even with unlimited resources, many other barriers (socio-economic, technological, organisational, environmental etc) cannot be overcome/changed in such a very short timeframe. For some sectors, like the built environment, it will already be a challenge to reach 2050 on time, because of the labour intensity and operational complexity. Innovation is therefore a necessary part of our mission, to create new possibilities to accelerate and overcome barriers.
- On the other hand, our experiences and insights do stress the utmost importance and need of strengthening multilevel cooperation AND coordination to be able to tackle the barriers we face. So, we decided to join with the focus on creating new means to accelerate this transition towards climate neutrality.
- We see ourselves as a frontrunner in taking risk and changes, going through the first experiences, paying our tuition fee, and experience at fists hand what's needed for the tasks ahead, being insightful for other cities and government bodies before they are confronted with these tasks.

Coherence and completeness:

Building upon our locale experiences, over time, when climate action is proliferating across multiple stakeholders and policies, as we are experiencing, it will be very difficult to establish one moment, as submitting this CCC, in which all the elements can be complete, coherent and also up to date. This is due to several factors:

- Climate Neutrality effects almost all (policy) areas: It takes time to integrate and establish a meaningful relationship between all the different elements. Awareness of the links between multiple areas/systems and naming them in policies is one thing, but to act upon them is another one. Since the impact of climate action and the awareness of its effect upon others is increasing with a tremendous speed, the learning curve is steep and established policies and actions are quickly outdated.
- Purpose in place and time: most of the products (analyses, visions, policies, actions, etc) are established at a specific phase and time when the situation demanded it. It depends also on the subject matter; infrastructural change has a longer timespan than social ones. Also, most of the time one product is a stepping stone to progress towards the next step. Currently it is also labour intensive and sometimes requires external expertise to update some of the elements requested in the CCC. This is an important reason why we invest so much in digitalisation and data, so it becomes easier to keep them up to date and ensure that relationships are not broken or overlooked.
- Unpredictable and unforeseen factors: the geopolitical situation like the war in the Ukraine and its effect on energy prices & strategy, the global COVID-epidemic, are a few recent examples with a big impact which forced us to adapt, re-strategies and act upon. Other not to foreseen developments, like the recent occurrence of grid congestion (insufficient capacity of the electricity network), causes us to readjust the planning of a numerous actions which were contributing to our current established pathways.
- UN, EU, Regional Government(s): the establishment of new goals/targets and the actions/measures taken by other multilevel governmental stakeholders have a huge impact on how our local policies are shaped. Especially the intermediate goals that are set for CO2-reduction for the different emission domains and the policies to reach them. This arises partly from the huge dependency of municipalities in the Netherlands on the national government in terms of having enough regulatory power and/or funding. Consequently, we sometimes have to wait before it becomes clear which policies and actions we locally can and must take. Although we try to anticipate upon them, this brings uncertainties and risk we must manage.
- Elections: all of our citizens have the right to periodically express their political priorities, which can impact earlier established goals, policies, plans and budget. Apart from the effect of other governmental elections (for example the recent decisions by the new government to build extra nuclear power plants, or not set through the plan to obligate hybrid heath pumps) we have the custom (see Prior Steps) to decide on new goals and ambitions, which also require extra budget, at the beginning of each new administrative period.

The content of the previous sections has led us to make the following considerations and choices for the purpose of this CCC:

- Scope: we decided to focus in the CCC on the energy transition in the city, excluding targeting the emissions of the Port of Rotterdam area where the industry and the (fossil) energy sector is present. Observing the progress so far and being conscious of the limited influence of the municipality compared to the leading role of the national government and role of the EU, it's questionable whether the mission in its current approach and set-up is the right vehicle for change. We also do not include circular (scope3), biodiversity or climate adaptation goals and policies, unless in relationship with the energy transition. While they are of utmost importance, we are choosing to go for coherence instead of being overly complete for the purpose of this CCC and the mission in general. This can

change in the future in relationship to the establishment and/or progress of other missions.

- Goals: for 2030 no intermediate goal has yet been set specific for the city, besides the overall -55% for the whole city. Regarding climate neutrality, these has been one set for mobility for 2040 and for the rest, mainly the Built environment in 2050. The moment of submitting this CCC coincides with
    - a) the preparation of the incoming administration in 2026
    - b) the preparation of new national measures by the national government to (still) reach the national goal in 2030, as well establishing a goal for 2035 as obligated to do by the national Climate Law, and
    - c) the negotiations on the proposed EU target of -90% in 2040.
    - This al has led us to the conclusion it is prudent to use the CCC as a starting point of preparation for the new administration, giving them the opportunity to establish an ambitious but feasible target with the further support this mission offers. To prepare, it's in our situation of utmost importance we can take these multilevel developments into consideration when we strategies what is wise. As we did in preparation for the current and previous administration, we are starting now to prepare new scenario's, policy options and an estimate of the needed investments. For this CCC, we still maintain the -55% as a benchmark to define the 'emission gap'.
    - In addition, many of the current policies and associated action plans are set to contribute towards a target set for 2030, while some even stop in 2026. As a consequence, policies targeting the emissions beyond, for a big part are in the middle in the process of being updated, which are essential in complementing our portfolio of actions for the periods beyond. The earlier mentioned barriers on the short term also forces us to reevaluate and update certain policies.
- Pathways: Since the admission of the CCC is for a part meant as an evaluation moment, an analysis has taken place to identify which pathways were not addressed in our KAR (as shown in section B). We performed a 'gap analysis', identifying the consistency between our policies, identified pathways and actions. On basis of the results, we have realigned our current pathways and added new ones as input for the policy shaping process. This will guide us further into updating our KAR (with new pathways, establishing intermediate and end goals, actions, stakeholder engagement and investments) in preparation for the incoming administration.
- Portfolio of actions: our current portfolio of actions is part of the baseline. Therefore, we did not (yet) classify them in terms of levers of change and represent them in B-2, but as part of our current Climate Action Plan Rotterdam (KAR, Annex 1). As stated earlier, we are still dealing with a gap in 2030 based on the effect of our current portfolio of actions. We did not present a portfolio of actions capable of targeting this gap, since the only available options concerns scaling up current ones, where barriers prevent them now.
- Based on the gap analysis we did encounter established pathways without established actions, which need further exploring before they can be established as part of our portfolio of actions, as listed the KAR.
- For the purpose of giving insight on how we determined our effect in 2030, we provided the project list in Annex 2.

To summarise, this means this version Climate Neutrality Action Plan now consist of an:

- Evaluation of our current KAR and ways to improve its monitoring of current pathways
- Supplementing the missing information not included in the KAR such as the forecast, policies and barriers.
- The beginning of a process to create a comprehensive portfolio of actions which addresses the remaining city's urban emissions in preparation for the next administration, starting next year.

For the Investment Plan this means that no extensive portfolio of new actions in this version can be provided to build upon which are directed towards CO2-impact.

Lastly, we would very much want to explore ways to make the process of CCC more digital so to allow more automated updates. We ourselves are continuously improving the KAR in this way so to digitally integrate more working process. For the purpose for this CCC we now had to deconstruct it to a document version (Annex 1). At this moment we are using digital tools and are developing them (e.g. apps for programme and project leaders) to allow more integral and automatic updated, generated and/or real-time information on the development and progress of the various policies, pathways and actions. A working group of the city Council is also involved and thinking about ways to align our KAR with the budget and investment monitoring and planning. At the end we think digitalisation is vital for quicker and more effective climate action, by contributing to multi-level stakeholder cooperation and coordination. Let's get digital!

Reading guide

In part A we present

- An overview and assessment of the current and historic development of our emissions, which have been monitored since 2007. It covers the emissions of the whole city (scope 1) and is specific for the urban area (scope 1+2). It will provide insight into the sphere of influence we as a city have related to the need for multi-level cooperation and action.
- An overview of our current Climate (mitigating) policies and their relationship with the policies and actions of European, national and regional governments. We first of all use this part to provide insight into which local pathways and actions were established and instigated by others, and which are a result of engagement locally, in addition and/or needed for an effective implementation. Second, we sum up the main upcoming changes and updates of multilevel policies which will impact or upon which we are dependent for updating our current policies.
- An overview and analyses of the impact and therefore changes the transition towards a climate neutral city demands from various sectors/functions/systems which are part of our city. We will highlight the most perceived opportunities and barriers. To conclude with mentioning the enablers for climate action and the perceived opportunities and barriers.
- The forecast of the projected impact of our current policies and actions on the emission in 2030.

In part B we provide:

1) An analysis and overview of our current established pathways and related actions as part of our KAR and Budget's Planning & Control cycle.
2) The current key indicators used to measure progress

In part C we:

Explain how cities and the national government are innovating in their collaboration.

Part A – Current State of Climate Action

Part A "Current State of Climate Action" describes our current point of departure towards climate neutrality, and how with local stakeholders we progressed so far, which informs the subsequent modules and the outlined pathways to accelerated climate action.

We will first touch on our current CO2-emissions and offer an analysis of the factors responsible for its development. In the second module we present our current policies and those of other layers of government and show its forecasted effect in 2030. To end this section with the third module in which we analyse the main barriers and opportunities to address so to achieve a climate neutral city on time.

[these are also regularly updated and reported via the C40/CDP network and in order to annualy update the Climate Action Plan, but not with the extensive analysis.]

Module A-1 Greenhouse Gas Emissions Baseline Inventory

A-1.1. Methodology

Scopes and approach

The scope of emissions includes all direct CO2 emissions (scope 1 of the internationally used calculation for greenhouse gas emissions, the GHG Protocol) and, in addition, indirect CO2 emissions (scope 2) for the urban environment. Chain effects (scope 3) are disregarded on this moment.

Rotterdam has committed to the national climate goal of reducing CO2 emissions by 55 percent in 2030 compared to 1990. And ultimately Rotterdam wants to be climate neutral by 2050. Rotterdam therefore wants to monitor the total CO2 emissions in Rotterdam, i.e. both city and port. This only concerns scope 1, conform the national target for emissions.

Rotterdam wants more focus on the urban environment in reducing CO2 emissions. The (vice-) mayors have has established a CO2 target minus 25% CO2 reduction by 2025 for the urban area, measured against 1990.

The two goals set by Rotterdam require different approaches:

- The source approach for the target for total city and port emissions. The source approach is similar to scope 1. It includes emissions from fossil combustion from all sources within the municipal boundaries, such as gas consumption in a home or business, or gasoline use from a car.
- The user approach for the mayors target, which covers only the urban part of the municipality. The user approach includes scope 1 and scope 2. Scope 2 refers to the use of delivered electricity or heat in this area. The CO2 emissions associated with the production and use of that electricity and heat are allocated to the user. Examples include an office using the heat grid, or electricity use by the subway or an electric car.

Classification into sectors

The breakdown by sectors and subsectors follows the classification used by the national Regional Climate Monitor. The sectors are built environment, mobility, industry, energy and agriculture. Trends by sector are added in graph form for the period 2014-2023.

The focus in is mainly on the urban area, because the municipality has more opportunities to influence emissions there and a mayors target has been set for this purpose.

Other greenhouse gases

The other greenhouse gases (methane, nitrous oxide and fluorinated gases) are not considered here. Data on these are of limited reliability at the local level and the contribution of such greenhouse gases is expected to be limited in Rotterdam.

Data sources and reliability of figures

The total figure for 2023 is a preliminary figure. The figures for industry and the energy sector come from the electronic annual environmental reports of the individual companies. Corrections for emissions were made for some companies that use biogenic raw materials as fuels or for combustion in processes, in accordance with international agreements on calculating CO2 emissions. The emissions of the companies can be considered final; they are rarely adjusted afterwards. They comprise about 90% of Rotterdam's total CO2 emissions.

Road traffic emissions are based on local data on numbers of vehicles and kilometers driven on the various parts of the Rotterdam road network and national emission factors for different types of vehicles and speeds.

The other figures come from the Regional Climate Monitor (RKM) of the Directorate-General for Public Works and Water Management and from the Emissions Registration (ER). There is a delay of one (RKM) to sometimes two (ER) years in the availability of these figures. Estimates for the last year are therefore based on key figures, national trends or provisionally equal to those of the previous year.

For ER figures for mobile sources, such as shipping, relatively large retrospective corrections can be made. Such figures are based on models that are regularly adjusted (improved). For this reason, the total figure for 2023 will be adjusted in the coming year. This normally involves corrections of at most 1-2% of total emissions in Rotterdam. Figures from models from the national ER, such as for shipping and agriculture, can be changed up to five years later.

To avoid the suggestion of high accuracy, figures are preferably expressed in megatons (Mton). For smaller numbers, the text is rounded to tens of kilotons (kton) of CO2. In tables, the "exact" number in kton is given

A-1.2. Analysis of current and historic emissions

This section contains an explanation of Rotterdam's CO2 emissions for 2023, the extent of emissions from the various sectors and sources, the differences with emissions in 2022 and an estimate of emissions in 2024. The emissions are tested against the two Rotterdam climate targets.

Emissions urban area

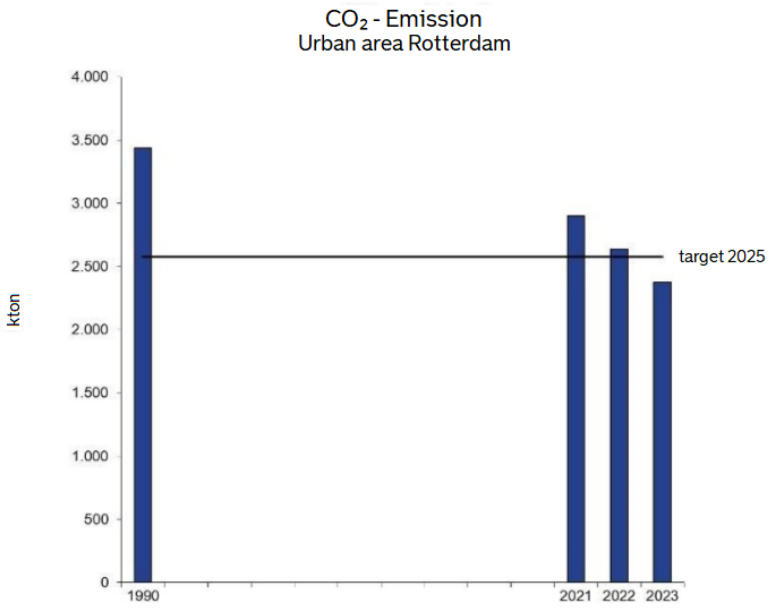


Figure 2 Emissions for the urban part of Rotterdam compared to the 2025 target.

The city's CO2 emissions in 2023 are 2.37 Mton. This includes both scope 1 and scope. It covers all emissions from the built environment and the urban part of mobility. Emissions in 2023 are 31% lower than emissions in 1990. In 2025, emissions may still reach a maximum of 2.58 Mton to achieve the mayors target of 25% in 2025. With the 2023 emissions, the city's target would already be achieved.

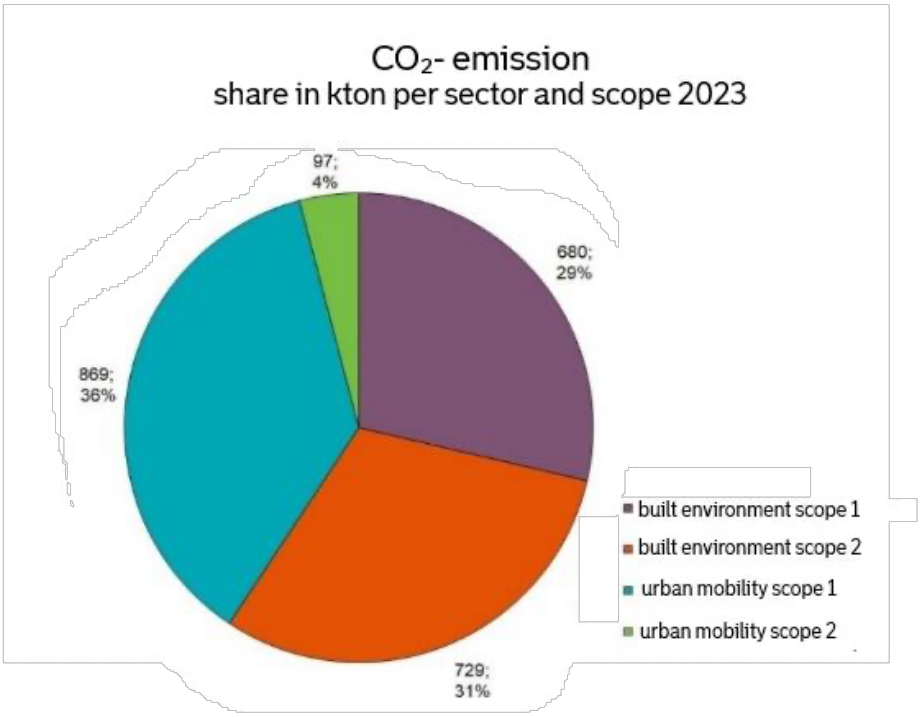


Figure 3 Share for urban sectors, built environment and mobility, by scope.

The share of urban mobility in scope 2 is limited; the other three sectors are similar in order of magnitude.

By 2023, total CO2 emissions will be 23.1 Mton, falling below 1990 levels (23.7 Mton). The goal is a reduction of at least 55% compared to 1990 emissions and thus a maximum of 10.7 Mton in 2030. The distance to the goal be carries 12.4 Mton.

Emissions in 2023 of 23.1 Mton represent 2.4 Mton (9%) lower emissions than in 2022. CO2 emissions in the Netherlands in 2023 are 123.2 Mt. Thus, emissions in Rotterdam are 19% of national emissions.

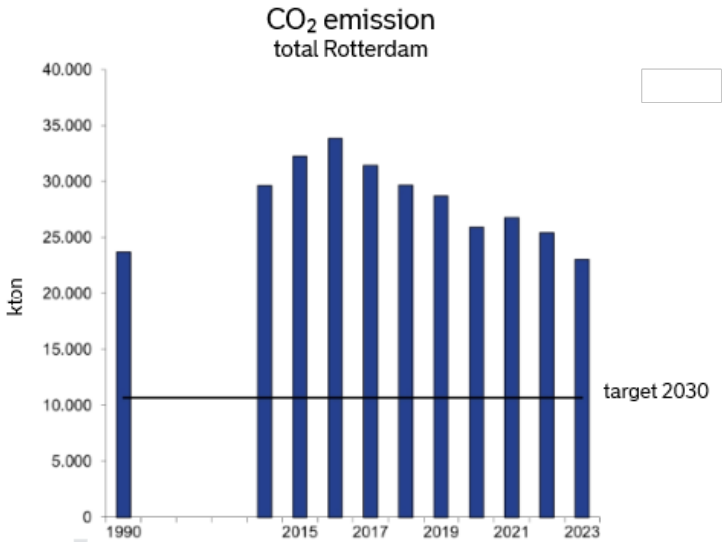


Figure 4. Trend scope 1 CO2 emission Rotterdam.

Figure 4 shows the trend of CO2 emissions in Rotterdam for the period 2014 - 2023. The increases and decreases in this period are mainly determined by the fossil energy sector; the opening and closing of coal-fired power plants, changing gas and coal prices, and prolonged outages have a major impact on CO2 emissions. Economic developments are also important: they influence the activities of industry, mobility and SMEs (part of the built environment). This thus has an effect for CO2 emissions. Finally, Covid and higher energy prices due to the war in Ukraine also affected emissions.

Table 1 CO2 emissions by sector in 2023 compared to 2022.

Sector [kton $_{CO2}$]	***2022***	***2023***
Industry	13.159	13.075
Energy sector	9.577	7.381
Mobility	1.905	1.875
Built environment	755	680
Agriculture	41	44
Total	**25.436**	**23.055**

Rotterdam's CO2 emissions will be 2.4 Mton lower in 2023 than in 2022 (Table 1). The decrease is mainly visible in the energy sector (-2.2 Mton); in industry and built environment there is a small decrease (-0.1 Mton) while in mobility and agriculture emissions remained more or less the same.

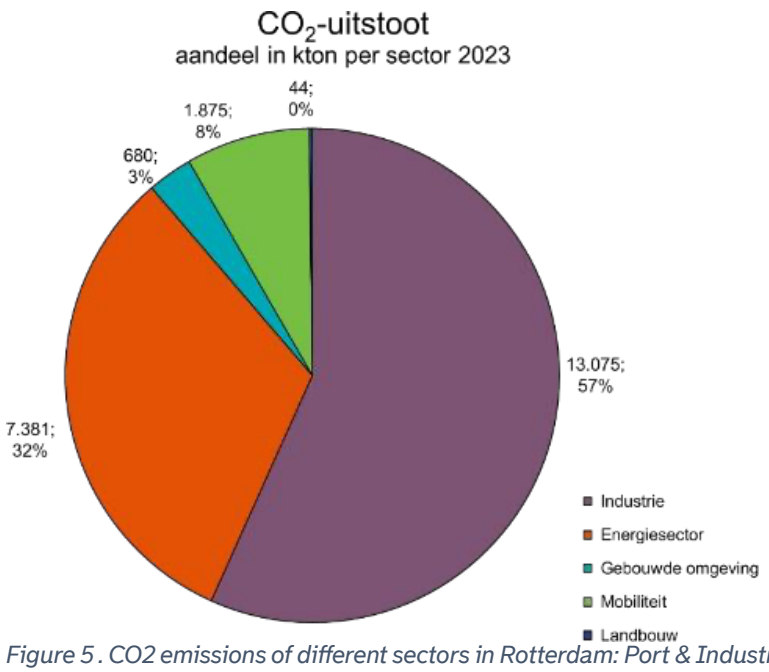


Figure 5 . CO2 emissions of different sectors in Rotterdam: Port & Industry, Energy sector, Built environment, Mobility and Agriculture

Figure 5 shows that industry and the energy sector, located in the Port of Rotterdam area, together account for 89% of Rotterdam's CO2 emissions.

Forecast for 2024

CO2 emissions in 2024 are difficult to predict. The war in Ukraine is ongoing however, the effect on energy prices, especially gas prices is now (mid-2024) less than in 2022. Nevertheless, gas prices are still higher than before the war and production at chemicals and "other industries" does not yet seem to be recovering. Emissions from refineries are likely to remain at the same level. The AVR, the local waste facility, largely idled by the fire in the fall of 2023, is not expected to return to full operation until the end of 2024. Sustainability in industry has been curtailed and is also expected to have little effect on emissions in 2024. For the energy sector, emissions are expected to be similar to 2023 or slightly lower. The volume of road traffic is increasing, but the electric share is also growing. All in all, emissions in 2024 are likely to be somewhat lower than in 2023.

Built Environment

Residential energy consumption figures are available through the RKM. About 2023, these consumption figures at the local level are not available now (July 2024). At the national level they are. Based on the national change in emissions from the built environment in 2023 (scope 1) and the changed emission factor for the electricity grid2 (scope 2), a preliminary estimate has therefore been made for all components of the built environment.

Figures on heat use (via local heat grid) are available for residential, but not for commercial and public services

Table 2 Built environment emissions 2023 by subsector, scope 1 (direct emissions) and scope 2 (indirect emissions).

Subsector	Scope 1 [kton CO_2]	Scope 2 [kton CO_2]	Comments
Housing	335	167	Scope 2 consists of 18 kton due to heat and 149 kton by electricity use.
Commercial services	165	442	
Public service	69	102	
Construction	2	7	
Wastewater treatment plants	109	11	
Total	**680**	**729**	

Difference from 2022

The figures for 2023 are therefore estimated. For scope 1 CO2 emissions from the built environment, the decrease is 10% cf. the national trend. This has been maintained for all subsectors. The national decrease is due to lower natural gas consumption. The winters of 2023 and 2022 were comparable in terms of temperature, but the price of natural gas for domestic use was still relatively high, especially in the first half of 2023.

For scope 2 emissions, the estimated decrease is 19% based on the changed emission factor of electricity. Meanwhile, the number of homes connected to heat has been steadily increasing for years, causing a slight shift in emissions from scope 1 to scope 2.

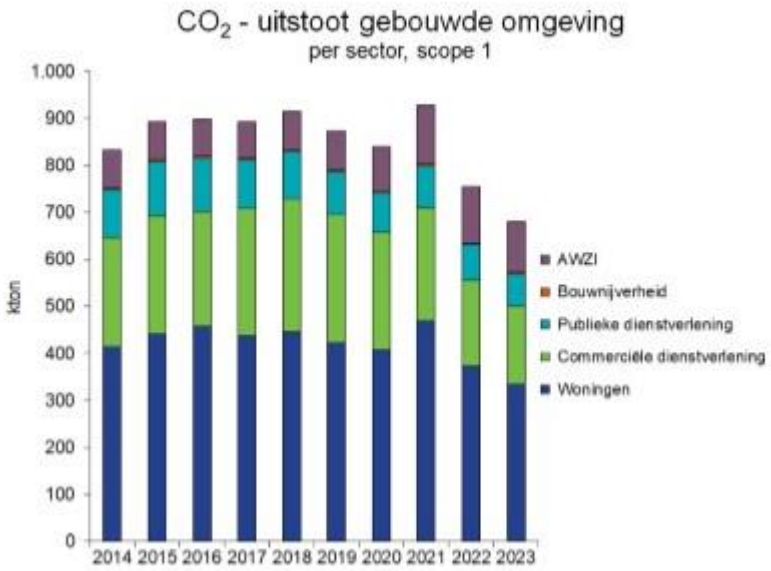


Figure 6 Trend in CO2 emissions scope 1 for the subsectors in the built environment: Wastewater (AWZI), Construction (bouwnijverheid), Public services, commercial services, residential).

Scope 1

The fluctuations in residential emissions (Figure 6 & figure 7) are mainly due to heating behavior during harsh or appropriately mild winters. The overall trend is that direct CO2 emissions in the built environment are slowly decreasing as buildings are becoming better insulated and winters become, on average, somewhat milder. In the last two years, this decrease has been reinforced by the higher gas price resulting in less gas being used.

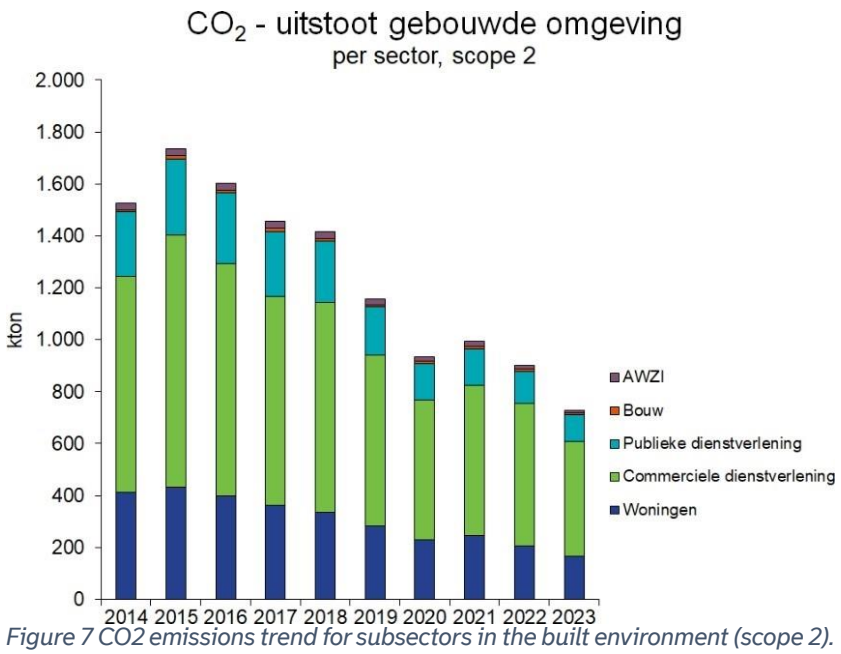


Figure 7 CO2 emissions trend for subsectors in the built environment (scope 2).

Scope 2

For indirect CO2 emissions (Figure X), electricity use in commercial services (SMEs) makes the largest contribution. The trend is largely part determined by the emission factor for electricity. That emission factor has more than halved since 2015. This is due to a growing share of renewable sources (mainly solar and wind) and a changing mix of fossil sources (coal and gas). This is partly driven by Rotterdam electricity producers. The coal sector is strongly represented in Rotterdam and co-firing of biomass in coal-fired power plants may be considered renewable. The volume of energy from solar and wind also continues to grow in Rotterdam.

Forecast for 2024

For 2024, scope 1 emissions are expected to be comparable to 2023 or slightly lower. The winter (first half of 2024) was relatively mild. The gas price has dropped somewhat compared to the beginning of 2023, which may raise the thermostat knob a bit again. Due to the renovation and insulation of homes, more connections to the heat grid and an increase in the use of heat pumps, scope 1 emissions will decrease. Scope 2 emissions are likely to continue to decline due to a further decreasing emission factor from the electricity grid. This will be partly offset by an increase in electricity use due to the use of heat pumps and an increase in heat use due to a steady increase in the number of connections to the heat grid.

Mobility

Road traffic figures come from the various road authorities (state, province and municipality) within the municipal boundaries. These numbers are updated annually with a distinction by type of vehicle (freight and passenger traffic) and speed. DCMR collects these figures. The conversion to CO2 emissions is done by using nationally determined emission factors for road traffic. These were available from CBS for the years up to and including 2018. TNO has determined new emission factors for 2023.

Scope 1

The figures for rail traffic and mobile machinery are from the RKM; the most recent are for 2022. The figures for shipping and aviation are from the ER. The most recent figures for these sources are also for 2022. For shipping and aviation, these have been translated to 2023 by extrapolation based on respectively:

- the number of seagoing and inland vessels in 2023 (Source: HbR 'Nautical Annual Figures Rotterdam Port 2023')

- the growth of the number of so-called overland movements at Rotterdam- The Hague Airport in 2023 (source: CBS).

For rail traffic and mobile equipment, emissions in 2023 are the same as in 2022. NOTE. For rail traffic, only emissions from diesel locomotives at the port are concerned.
Electric rail traffic (train, subway and streetcar) is part of scope 2.

Table 3 Mobility emissions in 2023 by mode, scope 1.

Subsector	***Total [kton $_{CO2}$]***	***City* [kton $_{CO2}$]***	***Comments***
Road traffic, people	541	541	Incl. busses
Road traffic, freight	378	181	'Total' includes vans and middle heavy and heavy trucks
Marine	677		
Inland Navigation	91	91	
Rail traffic	6		Diesel locomotives harbour railroad
Aviation	16		
Mobile equipment	166	55	For "total," includes container sector in the HIC
Total	**1.875**	**869**	

For the mobility target, only the urban portion of mobility is involved. Heavy road traffic (heavy trucks), maritime shipping, rail traffic (port rail line), and the port related portion (estimated two-thirds) of mobile work vehicles then do not count. Aviation is also excluded. Emissions from the urban share in 2023 are 869 kton.

Difference from 2022

The calculated emissions in 2023 are slightly lower than the (estimated) emissions in 2022. There is a 4% increase in road traffic mileage in 2023. At the same time, the vehicle fleet has been gradually getting cleaner for years, partly due to a growing share of electric vehicles. For the subsectors other than road traffic, these are estimates based on 2022 figures.

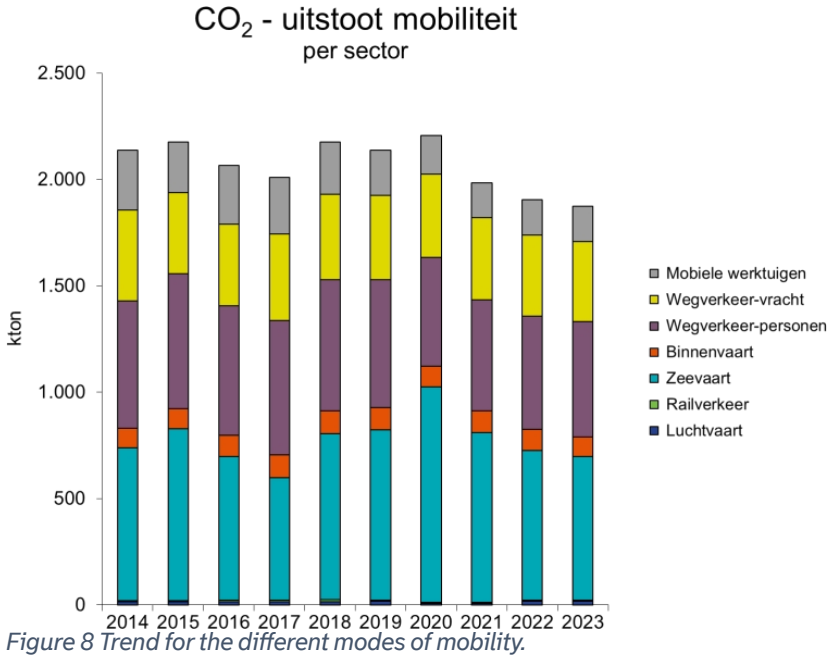


Figure 8 Trend for the different modes of mobility.

Emissions from the mobility sector are fairly stable. The changes depend mainly on the economic climate and also on policy and technical developments.

Scope 2

For 2023, an estimate was made based on a (one-time) calculation for indirect CO2 emissions from electricity use from mobility in 2005. At the time, this included only rail traffic (subway, streetcar and train). It now also includes road traffic and mobile machinery, although the share is limited. Based on the national trend for electricity use by mobility and the modified emission factor of electricity, the indirect emissions from mobility in 2023 in Rotterdam are estimated at 97 kton.

Forecast for 2024

Based on national trends for the first quarter, mobility due to less road traffic is expected to see a slight decrease in emissions by 2024. This will be reinforced by a steady increase in electric vehicles. This may lead to a slight increase in scope 2, although this is likely to be offset by a decreasing emission factor for electricity.

Industry

With the exception of the figures for the subsector "Other Industry," the figures are taken from the electronic environmental annual reports (e-ARs) that companies are required to submit to the competent authority. Statements in the e-Annual Environmental Reports are assessed by the competent authority, adjusted by the companies if necessary, and finally determined. Some corrections are made to these figures in order to comply with the international GHG protocol. This involves the use of biogenic substances, which may be regarded as 0 emissions. It concerns in particular the correction for the incineration of biogenic waste at the AVR waste incineration plant.

Table 4 Industry emissions by subsector in 2023.

Subsector	***Emissions [kton $_{CO2}$].***	***Comments***
Refineries	9.372	
Chemistry	2.840	After correction (-4 kton)
Waste incineration	602	After correction (- 612 kton) for incineration of biogenic (50.4%) waste
Other industry*	261	Refers to estimate based on growth/contraction of chemistry, as most comparable industry, in 2022-2023.
Total	**13.075**	

*Such as storage and handling, food industry

Difference from 2022

Emissions from the industry sector decreased by 0.1 Mton in 2023 compared to 2022. For refineries, there is an increase of 0.2 Mton. At the company level, there are differences that may amount to several hundred kilotons. These are due to annual fluctuations in throughput, the use of other fuels or (major) maintenance. In chemistry, emissions remained the same, as well as the estimated emissions from "Other industry. In waste incineration, the decrease is 0.3 Mton due to a fire in September 2023 at AVR that shut down much of the plant.

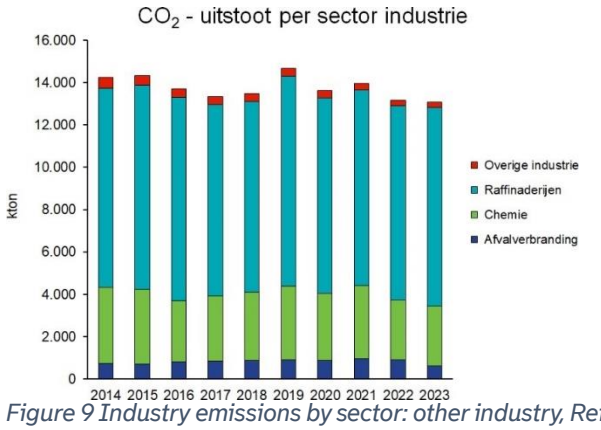


Figure 9 Industry emissions by sector: other industry, Refineries, Chemical, Waste Incineration.

Over the past ten years, emissions from industry have not changed significantly.

Fluctuations at refineries arise from annual changes in throughput or maintenance. Economic fluctuations, especially in chemistry and "other industry," affect production and thus emissions. The corona- pandemic outbreak caused a small dip in 2020. The high price of natural gas in 2022 led to lower production especially in the chemical industry and provided an impetus for energy savings throughout the industry.

Forecast for 2024

Industry emissions in 2024 are expected to remain at similar levels to 2023. An exception is emissions from waste incineration; AVR is not expected to be fully operational again until the end of 2024. This means lower emissions for Rotterdam. The energy transition has not yet had a significant effect on emissions, and the energy saving obligation introduced at the end of 2023 for industry and also the nationwide customized approach for the largest emitters will hardly lead to relevant CO2 reductions in 2024.

Energy sector

For the energy sector, the figures come from the e-mjv's. For the co-firing of biomass at the Maasvlakte coal-fired power plants (it concerns in particular the Uniper plant), a correction has been applied in accordance with the GHG protocol.

Table 5 Energy sector emissions by subsector.

Subsector	***Emissions [kton $_{CO2}$].***	***Comments***
Coal plants	3.779	After correction (-418 kton) for biomass co-firing
Gas Power Station	139	
CHP[10]	3.463	
Total	**7.381**	

Difference from 2022

Total emissions from the energy sector decreased by 2.2 Mton in 2023 compared to 2022. Because more electricity was generated by wind and solar power, less electricity from fossil sources was needed. The decrease is mainly visible at coal-fired power plants; at gas-fired power plants, emissions remained more or less at the same level.

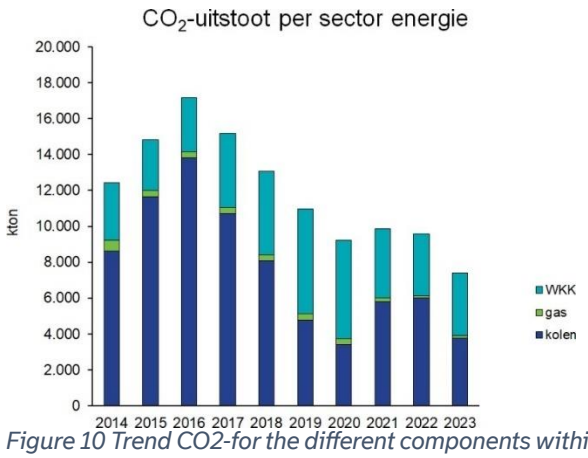


Figure 10 Trend CO2-for the different components within the energy sector (hydroelectric power (WKK), gas & coal.

Figure 10 shows the trend of the power sector over the period 2014-2023. The changes in emissions are mainly visible at coal-fired power plants. Two new coal-fired power plants started up in 2013 and 2014, and an old plant was closed in mid-2017. In addition, a gas power plant (Galilei Street) was closed in 2014. Fluctuations in the price of gas and coal and long-term outages, such as at the Power Plant Rotterdam in 2020 and part of 2021, cause fluctuations in CO2 emissions from the power sector.

Forecast for 2024

Emissions from the energy sector in 2024 are difficult to predict. Energy prices remain at high levels and production by wind and solar is still increasing. All in all, emissions from this sector will, most likely, continue to decline in 2024.

Module A-2 Current Policies and Strategies Assessment

Rotterdam has a long history of taking action to lower our CO2-emmissions. It was in 2007 we first launched the Rotterdam Climate Initiative (2007), with different stakeholders, with the ambition of 50% less CO2 emissions in 2025 compared to 1990 (unfortunately the target was not met, mainly because the national government decided to open two new coal power plants in 2015 and 2016). To reach this ambition a programme was established called 'Investing in sustainable growth', with concrete pathways and list of actions. But lacking at the time was a clear multi-level governmental framework to foster cooperation on these goals between the different layers of government (national, regional, municipal) and with all the relevant stakeholders and our citizens.

This changed after the Paris agreement which has been a watershed moment for many. As a result, the national Climate Agreement (2019) was established, with clear goals and measures for the different sectors (industry, mobility, built environment, energy and agriculture) to reach -49% CO2-reduction in 2030. The municipalities agreed upon performing several tasks and implementing specific measures set out in the agreement, which still make up for most of our current work.

Relation between EU, National, Regional and local policies

Climate action by all stakeholders in the city is affected and influenced by policies on the international, European, national and local level. Not just existing policies: knowledge of upcoming rules and regulations can also heavily influence decisions on timing of actions or investments choices and are important to map.

As stated, the momentum and chance of success of local climate action increased significantly since the Paris Agreement (2015) when as a result a clear multigovernmental framework on the EU-level was established with clear targets, measures, monitoring and division of responsibilities between EU and member states. The Dutch government did the same on the national level, starting with the Climate Agreement of 2019.

The National Energy and Climate Plan (INEK) of the Netherlands, which was presented to the European Commission at the end of 2019, sets out the broad lines of climate and energy policy in the Netherlands for the years 2021-2030, including the policy resulting from European commitments. In 2019, INEK was largely based on the Climate Agreement with the involvement of more than one hundred societal (public and private) parties. This was also the basis for the first Climate Plan, adopted in accordance with the Dutch Climate Law.

Figure 11 Objectives of the Climate Agreement (2019) for all emission domains

In sum the municipalities agreed in the Climate Agreement (2019) upon performing the following main actions:

- Energy: Create a Regional Energy Strategy with neighbouring municipalities (for Rotterdam this coincided with the Metropolitan Area Rotterdam-The Hague, MRDH) with concrete plans for more clean energy production so to contribute to the national goal of 35 terawatt-hour (TWh);
- Mobility: create regional mobility plans, participate in the 'national agenda for charging infrastructure' (NAL), and the largest cities agreed into creating a Zero-emission zone for commercial transport;
- Built environment: establish a Vision on the Heath Transition (Transitievisie Warmte/**TvW,** link leads to English abstract), and decide on which neighbourhoods are selected to become natural-gas-free and/or insulated before 2030 and a pathway beyond towards 2050.

These were the most important ones besides more tradition well established task such as providing information and advice and enforcing certain national laws and regulations which also were included in the Climate Agreement (For us as a municipality it's very relevant whether we have an official task, because it's makes us eligible for national funding and sufficient regulatory power.)

A lot has happened since. A European Climate Law entered into force in 2021, tightening Europe's 2030 climate target from 40 % to at least 55 % compared to 1990. Later that year, the European Commission presented the so-called "Fit-for-55 package", a major legislative package with strengthened 2030 climate and energy policies to implement the new climate target.

As a result, in 2022, the Dutch climate targets were tightened. In order to reach climate neutrality by 2050, the Netherlands raised the 2030 target to at least 55 % of CO2-reduction. In order to achieve this goal, the policies were targeted at 60 % in 2030.

The policy in the Climate Plan was updated in June 2022 with the Climate Policy Programme in response to this increased target. Which in addition to the above-mentioned tasks, also added

an extra responsibility for municipalities, namely, to ensure residential buildings are sufficiently insulated.

In table XX we make visible the impact of EU-regulations, national policies on our local climate action

European Regulation	Implementation in the Netherlands	National Target	Municipal Role	Governance
Effort Sharing Regulation (ESR)	Integrated National Energy and Climate Plan (NECP), Climate Act, Policy Programme Climate	CO_2 emissions reduction of at least 55% by 2030 (compared to 1990 levels).		Administrative Consultation on Climate and Energy (BO K&E).
Energy Performance of Buildings Directive (EPBD)	Environmental Management Act, Building Decree (Bbl)	All buildings must be nearly zero-energy (NZEB) by 2030.	Municipalities realize and enforce natural-gas free neighbourhoods, and stimulate insulation and sustainability requirements for buildings, enforece energielabel C for offices	NPLW (Nationaal Programma Lokale Warmtetransitie)
Renewable Energy Directive (RED III)	SDE++ subsidies, blending obligation, promotion of renewable energy	42.5% of total energy consumption from renewables by 2030.	Municipalities cooperate regionally and facilitate renewable energy projects and permit issuance.	NPRES (Nationaal Programma Regionale Energiestrategieën)
Alternative Fuels Infrastructure Regulation (AFIR)	National Policy Framework for Charging Infrastructure	Deployment of EV charging and hydrogen refueling infrastructure.	Municipalities oversee the development and spatial planning of charging infrastructure.	NAL (National Agenda Charginginfrastructure)

The conclusion is that for a big part local climate action is part of a multi-level framework and plays an important part in implementing and executing European Policies as implemented by the National Government. For our climate action that means a) a large dependency for the most effective parts (in terms of CO2-reduction) is dependent on other multilevel stakeholders. But as we will show, next to ensure effective implementation, we have a track record of anticipating measures and get a head start and find ways to have an additional impact within our own sphere of influence and capacities.

A-2.1. European policies

The effect of European Policies affects climate action in Rotterdam in various ways. Directly when establishing directives which target our citizens, businesses and other and local stakeholders. Of those the European Trading System and its effect on the port of Rotterdam and the ones targeting mobility are the most visible. The effect of the European Taxonomy on finance is also beginning to be noticeable. Indirectly by regulations which are implemented by our national government. Of those the European Climate Law and its effect on setting the national goals has shown to be the most importance. In addition, the Energy Performance of Buildings Directive (EPDB IV) and the Energy Efficiency Directive (EED) have been of importance for municipalities to act on.

Table 6 Overview of relevant European policies

Type	Name & title	Year of publication	Emission domain(s)	Description	Relevance to/impact on local action	Stakeholders	Required action
EU policy	EU Emissions Trading System	2005	All	System based on the 'cap and trade' principle. A cap is a limit set on the total amount of greenhouse gases that can be emitted by the sectors covered by the scheme. The cap is reduced annually in line with the EU's climate target. The scope (which sectors are included) expands over time, with the maritime sector being the latest addition (2024).	Medium relevance/ indirect impact	Large emitters	EU policy to reduce emissions. Link to all missions/actions aimed at CO2 reduction.
EU Policy	EU Emissions Trading System	2005	All	System based on the 'cap and trade' principle. A cap is a limit set on the total amount of greenhouse gases that can be emitted by the sectors covered by the scheme. The cap is reduced annually in line with the EU's climate target. The scope (which sectors are included) expands over time, with the maritime sector being the latest addition (2024).	Medium relevance/ indirect impact	Large emitters	EU policy to reduce emissions. Link to all missions/actions aimed at CO2 reduction.
EU Regulation	TEN-T policy	2013	Mobility	To support the transition to cleaner, greener and smarter mobility, the Commission revised the 2013 TEN-T regulation. The revised TEN-T regulation should put the transport sector on track to reduce its emissions by 90%. It responds to the need to increase connectivity across Europe and shift more passengers and freight to sustainable modes of transport.	Medium relevance/ indirect impact	Local and regional authorities	Establish local SUMP (Sustainable Urban Mobility Plan) and develop indicators.
Treaty	Paris Agreement	2015	All	Treaty signed by 196 UN parties to "keep the increase in global average temperature well below 2°C above pre-industrial levels" and make efforts "to limit the increase in temperature to 1.5°C above pre-industrial levels."	High relevance/indirect impact	All	Framework for underlying climate targets and basis for National Climate Agreement.

EU strategy	European Green Deal	2019	All	Package of policy proposals to reduce net greenhouse gas emissions by at least 55% by 2030.	High relevance/indirect impact	Governments, manufacturing sector, consumers	The European Green Deal (europa.eu). Link to all missions/actions aimed at CO2 reduction.
EU Policy	EU Climate Law	2020	All	European Union commitment to climate neutrality target by 2050 with identified 2030 target and pathway proposals to achieve both targets.	High relevance/indirect impact	All	Making the EU climate neutral by 2050 (europa.eu).
EU action plan	Circular Economy Action Plan	2020	Circular economy	Action plan with measures to produce more sustainable products, reduce waste and promote circularity in the EU. Part of the European Green Deal	High relevance/direct impact	Governments, manufacturing sector, consumers	Link to missions for circular and sustainable inner cities, neighbourhoods and businesses
EU strategy	Eu Biodiversity strategy 2030	2020	Built environment	EU strategy to halt biodiversity decline and help increase biodiversity by 2030. Part of the European Green Deal	Medium relevance/indirect impact	Governments, developers	Link to missions/actions on green and water as the basis.
EU regulation	Alternative fuels infrastructure regulation (AFIR)	2021	Mobility	Implementation targets for 2025-2030 for charging stations and alternative fuel stations (for fossil fuels)	Medium relevance/indirect impact	Energie suppliers, network providers, drivers, transport sector	Placing sufficient truck charging stations, including in urban areas
EU action plan	Zero Pollution Action Plan	2021	All	Action plan to drastically reduce pollution within the EU. Target of zero pollution by 2050 and 25-55% reduction in various types of pollution by 2030	Medium relevance/indirect impact	Governments, industrial polluters, transport sector, EU residents	
EU policy	EU Nature Restoration Law	2023	Built environment, Circular economy	Set of rules to restore biodiversity and ecosystems within the EU, aiming to cover at least 20% of EU land and sea with recovery measures by 2030 and all ecosystems by 2050	Medium relevance/indirect impact	Governments, agricultural sector, heavy industry, EU residents	Link to missions/actions on green and water as the basis
EU regulation	Regulation 2023/851 Actualised CO2 emission standards performance standards for cars and vans	1992-present	Mobility, Built environment	Introduction of stricter CO2 emission targets for cars and vans in line with EU car and van reduction targets of 100% by 2035	High relevance/direct impact	Car and van users (commercial and private)	Link to air quality action plan
EU regulation	Actualised CO2 emission	1992-present	Mobility, Built environment	Introduction of stricter CO2 emission targets for heavy-duty vehicles in line with EU car and van reduction targets of 100% by 2035	High relevance/direct impact	Industry, transport sector	Link to air quality action plan

	standards performance standards for heavy-duty vehicles						
EU regulation	Energy Efficiency Directive (EED)	2012-present	Built environment	Setting rules and obligations for achieving the EU's ambitious energy efficiency targets. The revised Energy Efficiency Directive establishes "energy efficiency first" as a fundamental principle of EU energy policy, giving it legal status for the first time	High relevance/direct impact	All	Mandatory four-yearly audit although we are now certified for the CO2 Performance Ladder, we will be exempt from this as the CO2 Performance Ladder is more stringent in this area.
EU regulation	Clean Vehicles Directive (CVD)	2019-present	mobility	The air of the CVD is to increase the market for clean and energy-efficient vehicles by promoting them through procurement by requiring contracting authorities to have a certain minimum percentage of clean and zero-emission vehicles in their fleet.	High relevance/direct impact	Government	
	EPBD						

A-2.2. National Policies

Hereby we present the main national policies.

Table 7 Overview of relevant national policies

Type	Name & title	Year of publication	Emission domain(s)	Description	Relevance to/impact on local action	Stakeholders	Required action
Action plan	National energy and Climate Plan of the Netherlands	2019	All		High relevance/direct impact	National government, local governments	
Treaty	National Climate Agreement	2019	All		High relevance/direct impact	National government, local governments	Framework for most actions in this list. Also, framework under which municipalities get national funding to implement plans in the National Climate Agreement.
Action plan	National Energy and Climate Plan of the Netherlands – updated concept	2023	All		High relevance/direct impact	National government, local governments	
Action plan	National Insulation Programme	2022	Energy transition	National programme to accelerate household insulation to reduce energy consumption and prepare 2.5 million households for non-fossil heating sources by 2030.	High relevance/direct impact	Governments, housing corporations, homeowners, insulation companies, residents of homes in need of insulation	Link with local missions to accelerate energy saving and insulation. National Insulation Programme.
Policy	Electric vehicle charging infrastructure policy	2022	Sustainable mobility, energy transition	The National Charging Infrastructure Approach aims to make all transport zero-emission by 2050. This can only be achieved through a good, nationwide network.	High relevance/direct impact	Governments, energy suppliers, public transport company, grid operator, logistics companies, drivers	

Vision	Mobility Vision 2050	2023	Mobility	National vision memorandum on the future of mobility.	Medium relevance/indirect impact	All	Framework for mobility policy
Policy	National Performance Agreements	2023	Energy transition, built environment	Agreements stating that housing corporations will phase out EGF labels in all their social housing stock by 2028 at the latest. Further acceleration of efforts is needed to achieve the NPA goals.	High relevance/direct impact	Housing corporations, tenants	Link with local missions to accelerate energy saving and insulation.
Strategy	National approach to mobility transition	Multi-year	Mobility	Accelerating the mobility transition through a joint approach by all governments.	Medium relevance/indirect impact	Ministry of Infrastructure and Water Management, Provinces and municipalities	Measures aimed at structural improvement of mobility. Link to local mobility vision and implementation.
Regulation	Manifesto for Socially Responsible Contracting and Procurement (MVO)	2022	All	Manifesto signed by 90 (semi-)government organisations to promote ambitions social procurement and sustainable procurement. Participation is optional, and still parties join and commit to write an action plan. It is divided into the themes; environment and biodiversity, climate, circularity, International Social Conditions (ISV), diversity and inclusion, and social return	High relevance/direct impact	All	Framework for municipal MVOI action plan
Vision	National energy system plan	2023	Energy, built environment	Draft vision for the national energy system	High relevance/direct impact	Governments, energy suppliers, all building owners	Framework for other integrated approaches to energy infrastructure such as the pMIEK
Regulation	Multi-year Programme Climate Fund 2024	2023	Energy, built environment	The Climate Fund is intended for additional measures that contribute to achieving the reduction targets in the Climate Act, the transition to a climate-neutral energy supply, economy and society and a just climate transition	High relevance/direct impact	All	
Action plan	National Programme Circular Economy 2023-2030	2023	Circular transition	It contains measures to use raw materials more economically in the coming years	High relevance/direct impact	All	
Agreement	National Raw Materials Agreement	2017	Circular transition	Letter of intent to move towards transition agendas for the Circular Economy. The Raw Materials Agreement contains agreements by	High relevance/direct impact	All	

				the central government with other parties on measures to accelerate the transition to the circular economy			
Advice	Space for circular economy	2023	Circular transition	In this report, PBL explores the implications for space demand and design in a fully circular economy using four scenarios. The future images show that the transition – with different developments of social attitudes and with different actors taking the lead – looks different	High relevance/direct impact	All	
Action plan	Delta Programme Climate Adaptation 2024	2023	All	The Spatial Adaptation Delta Plan contains all the projects and measures that will ensure a water-robust and climate-resilient Netherlands by 2050.	High relevance	All	
Vision	North Sea Canal Area Development Perspective (NZKG)	2023	All	In the coming decades, the North Sea Canal Area will be of national importance for realising substantial tasks. Themes such as energy transition, circular economy, housing construction, strong port and industrial areas as well as a healthier living environment are addressed in this document. Climate adaptation, landscape enhancement and ecology are also important themes.	High relevance/direct impact	All	Updated every 4 years
Strategy	Grid operators investment plans	2024	Energy		High relevance/direct impact	All	Updated every 2 years

A-2.3. Regional Policies

Hereby we present the main regional policies.

Table 8 Overview of relevant regional policies

Type	Name & title	Year of publication	Emission domain(s)	Description	Relevance to/impact on local action	Stakeholders	Required action
Strategy	Regional Energy Strategy	2021	Energy sector, built environment	Regional strategy (metropolitan area Rotterdam-The Hague for increased onshore renewable energy production	Medium relevance/ direct impact	Governments (all levels), energy suppliers, housing corporations, residents	Framework for regional cooperation on large-scale energy production, Noord-Holland Zuid (NHZ) region.
Policy proposal	Collective Heating Bill	2022	Energy sector	Proposed bill to facilitate district heating development by designating public parties to develop these networks, giving the public sector more control.	High relevance/direct impact	Governments (all levels), energy suppliers, housing corporations, residents	Framework for the development of district heating
Law	Passenger Transport Act (Wp2000)	2001	Sustainable mobility	Regulations to increase the efficiency and cost effectiveness of local and regional public transport. Also states that public transport operators can allocate resources to shared mobility solutions.	Medium relevance/ indirect impact	Authorities, transport companies	
Action plan	Multi-year infrastructure plan energy and climate (p)MIEK Zuid-Holland	2023	Energy, built environment, mobility	Integral analysis on key projects for a sustainable energy system	High relevance/direct impact	Municipalities, network, operators, province	Framework for energy infrastructure development at provincial level in agreement with municipalities. Is iterated every two years.

				towards 2030 and beyond.			

A-2.4. Municipal Policies

Hereby we present the most important local policies For a full overview please visit our website.

Table 9 Overview of relevant local policies

Type	Name & title	Year of publication	Emission domain(s)	Description	Relevance to/impact on local action	Stakeholders	Required action
Agreement	Rotterdam Climate Agreement	2019	All	49 climate deals with actions drawn up with local entrepreneurs and social organisations	High relevance/high impact	>1000 from the whole Rotterdam population	Reduce CO_2 emissions by 49% by 2030 compared to 1990 levels
Vision	Rotterdam Energy system vision	2021	Energy	Consolidates and reviews our earlier policies, the coherence between them, identifies our interest, the relevant trends, stakeholders and formulates our strategic approach for each of the different parts	High relevance/high impact		No CO_2 emissions during generation, transport, conversion, storage and use of energy
Vision	Vision on Heat Transition	2021	Energy, Built environment	Action programme, in which neighbourhoods are selected to become natural-gas-free and/or insulated before 2030 and a pathway towards 2050.	High relevance/high impact		Climate neutral Rotterdam in 2050
Action plan	Rotterdam Mobility Approach	2020	Mobility, Built environment	Stimulating clean and active mobility (walking and cycling), public transport (including Park and Ride) and shared -electric- mobility. Rotterdam is putting a new Traffic Circulation Plan in place with more space for active mobility and is reducing the speed of cars to 30 km/h in 115 streets	High relevance/high impact	Municipality, entrepreneurs, inhabitants	One of the targets in the Rotterdam Climate Action Plan is the realization of an emission-free urban mobility system in 2040.
Action plan	Approach on Zero Emissions Mobility	2019	Mobility, Built environment	All remaining motorised traffic will be cleaned up from the Approach on Zero Emissions Mobility. This Approach includes an: - Employers Approach (more than 150 companies involved, which together 150.000 employees and represent a third of all companies in Rotterdam), - Zero Emission Zone for vans en trucks in 2025 – 2030, 49km2 in size (collaboration in the community logistiek010 with more than 3000 organizations),			One of the targets in the Rotterdam Climate Action Plan is the realization of an emission-free urban mobility system in 2040.

		- Zero Emission municipal fleet in 2030 (more than half of municipal vehicles are already zero emission), - Zero Emission city busses and taxis in 2030 (almost half are already zero emission),

A-2.5. Forecast 2030

On basis of the measures (projects, actions) agreed upon in the Rotterdam Climate Agreement (RKA) in 2019 and the existing policies, we had our fist forecast of the effect of those measures in 2019. The forecast is done on a yearly basis, informing us of the effect of new measures and actions on reaching our goals. The regional Environmental Protection Agency, DCMR, is responsible for the calculations and validation of the different measures, giving us an insightful and independent view on our progress.

Relation between the KAR and Forecast

The basis of the calculations are all the measures which are included in the KAR project list of the different emission domains, which have all been included in the portfolio of actions.

These measures were also distinguished according to their status: certain, expected and intended.

A large number of measures have been identified within the themes. Some of them have already started, others are foreseen in five to ten years. The expected effect therefore depends on the scope and expected impact of a measure, but also on the degree of (in)certainty that it will be implemented. Measures are therefore divided into four categories that indicate the stage a measure is in and thus how 'hard' the estimated CO2 effect is.

- **Sure**. The measure has already started or is definitely going to start. The measure has been decided on, funding has been arranged and/or the measure is required by law.
- **Expected**. There is agreement on the measure, but the final decision on its implementation has not yet been taken.
- **Intended**. Plans for the measure are in place, its implementation is known in outline, an estimate of the expected impact has been made, but parties do not yet fully agree on its exact details. Financing is also yet to be arranged.
- **Insufficiently concrete**: For these measures, much is still unclear. Sometimes an estimated CO2 effect has been named but it is not clear what it is based on. For such measures, the effect is set to 'zero' (for now).

Summary

Table 10 CO2 emissions in kton and estimated results for 2025 and 2030. Source: 'Effect Klimaataanpak Rotterdam 2023' (DCMR).

	1990	2022	Target 2030	Effect 2025	Effect 2030	Gap 2030
Built environment	1.088	763		35	102	
Mobility	1.166	1.352		223	489	
Harbor & Industry	13.146	13.214		172	4.971	
Energy	7.800	9.577		0	6.008	
Green gas	N/A	N/A		10	92	
Total	**23.200**	**24.905**	**10.440**	**440**	**11.662**	**2.803**

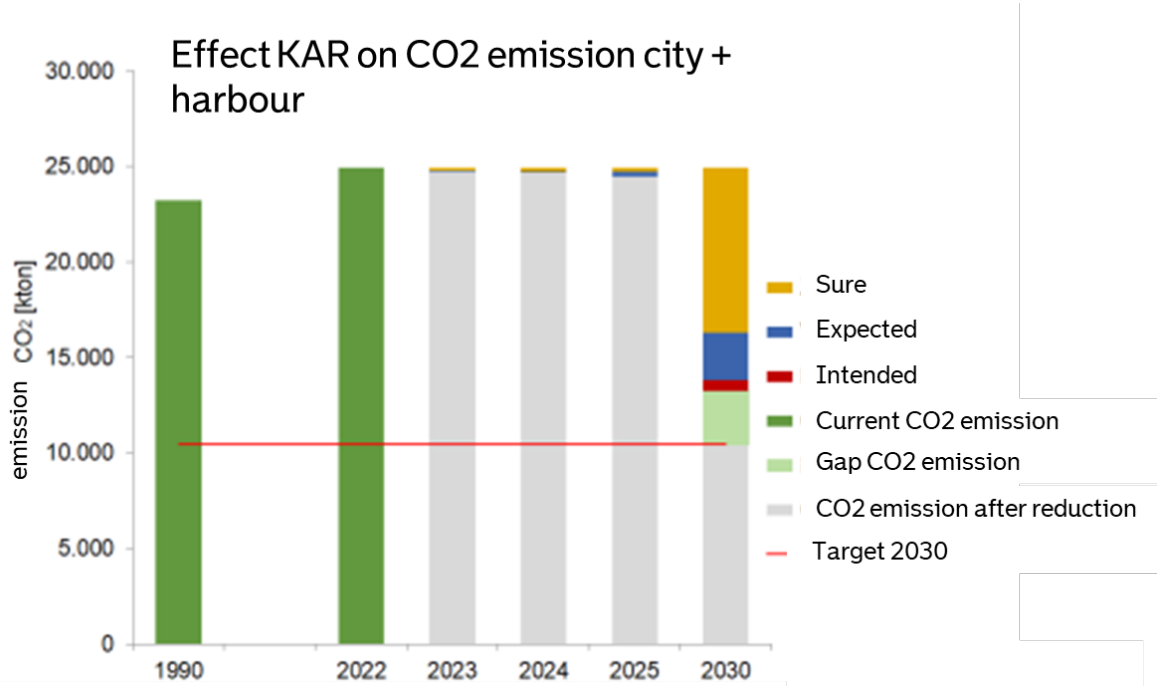


Figure 12 Effect climate actions Rotterdam on CO2 emission.

DCMR has assessed the measures of the KAR in terms of their effect on CO2 emissions in particular in the target years 2025 and 2030. That effect was determined compared to the situation in 2022, the starting point of the current administration. Figure 12 shows the expected effect of the current (January 2024) KAR measure package and of national autonomous developments in the gas mix and electricity mix on Rotterdam's CO2 emissions and indicates the extent to which the targets will be achieved. Where applicable EU-legislation has been taken into account, mainly in the mobility domain.

Mayors target 2025 urban area

The implementation of the current KAR in combination with making the rural electricity grid and the rural gas mix more sustainable will result in a total reduction of 493 kton for the urban area in 2025 compared to current CO2 emissions (which are 2,816 kton in 2022). If all expected and envisaged plans are actually implemented - which depends, among other things, on further implementation, decision-making and financing - this will reduce emissions in the urban area to 2,323 kton. This will meet the mayors target for 2025 (target value is a maximum of 2,578 kton of CO2).

Target 2030 city and port

The KAR leads to a reduction in CO2 emissions by 11,662 kton in 2030 for the total territory of Rotterdam (i.e. incl. port and industry) compared to current emissions (24,905 kton in 2022). The magnitude of the effect is similar to the previous calculation, but because current emissions are lower, the remaining emissions in 2030 are also lower (i.e. 13,243 kton). The target value for 2030 is 10,440 kton. The 2030 target is thus not yet achieved with the current KAR package of measures. The residual target for 2030 is 2,803 kton of CO2. This is less than the 4,449 kton from the previous calculation, but the task remains the same: additional measures are needed to reach the 2030 target. Especially in Port & Industry, there is still some potential.

Description of measures by sector

The measures in the Built Environment mainly concern a continuation of the approach aimed at reducing scope 1 emissions (gas heating). The measure with the greatest CO2 impact

remains disconnecting homes from gas and connecting them to the heat network. This delivers a 70% reduction per dwelling but does mean an increase in scope 2 emissions due to greater heat use. The contributions of the measures are more or less equally divided between 'certain', 'expected' and 'intended'.

For the Mobility sector, it concerns a mix of EU, national and local measures. Local measures such as the introduction of the ZE zone, the modal split approach and the employer approach to sustainable mobility contribute substantially to a reduction of scope 1 emissions in this sector. However, some of the measures also cause an increase in electricity consumption and thus additional scope 2 emissions. Most of the measures are now certain or expected.

At Port & Industry, the effect of the measures has increased compared to the previous calculation due to a large increase in the capacity of the planned electrolysers. In addition, it is important - especially since Port & Industry involves projects with a large CO2 effect - that the status of some large measures has been 'moved up': there is now more certainty about their implementation.

The Clean Energy sector's commitment changes the avoided emissions from planned wind farms and large solar PV projects. Because some projects have now been realised, the expected impact in 2030 of those yet to be implemented is lower than last year. Rotterdam's commitment to wind and solar ensure that less fossil electricity generation is needed, thus contributing to the greening of the national electricity mix. Almost all measures have the status certain or expected.

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

In this module we provide the analysis and assessment of the different sectors and systems prone to change because of the energy transition and the barriers and opportunities we have identified. These are important to address so to enhance the chance of success of reaching climate neutrality in time. Barriers and opportunities, as we will show, can be two sides of the same coin, depending whether they are addressed effectively and on time. This section will also provide insight into the various public interest we have identified and established to guide us on the path towards a climate neutral city.

We start with all the sectoral changes and the changes for the city in a whole to become climate neutral. Because of how they relate to one another and are approached in an integral way, having many of the same stakeholders, to prevent duplication, it should be read as a whole, in this particular order. We will highlight those elements that have a relation with the energy transition, which is already a lot, to prevent presenting a complete overview of all our city-wide policies, actions and stakeholders. With this section we also touch on the main relevant (policy) visions mentioned in the previous section, which for part were written to address.

[N.B. In deviation from the template, where it speaks of technology and infrastructure, we choose a broader term to reflect that the city can be perceived as an ecosystem on itself and a lever for chance. Also allowing a more integral, holistic way in approaching barriers and opportunities and related stakeholders]

A-3.1. City development

A city on itself can be perceived as one ecosystem connected with many other systems: social, economic, technological and environmental. Renewal of the energy system is the most dominant technological factor in achieving on time a climate neutral city and has a systemic impact en relevance for other developments. Because of that dominance, and its relationship towards other domains/systems, we use this as a 'lens' to address other related systemic barriers. We elaborate therefore extensively on the energy system first, the effect for the city development as a whole next, so we can address the others more in brief.

A-3.1.1. The Energy system

The energy system is changing dramatically, becoming more diverse, complex, smart and decentralized. At the same time, we want to ensure that our energy supply is clean, smart, resilient and equitable. We therefore put these public interests at the center.

The Rotterdam energy system must ensure that energy for living, moving and working remains available at the right time, in the right form and for everyone. This is because the system is essential for the 'good growth' that Rotterdam chooses in its Spatial and Environmental vision (see next section). This requires radical adjustments in all parts of the system. At the same time, the transition to a sustainable energy system requires space, making it also a design task.

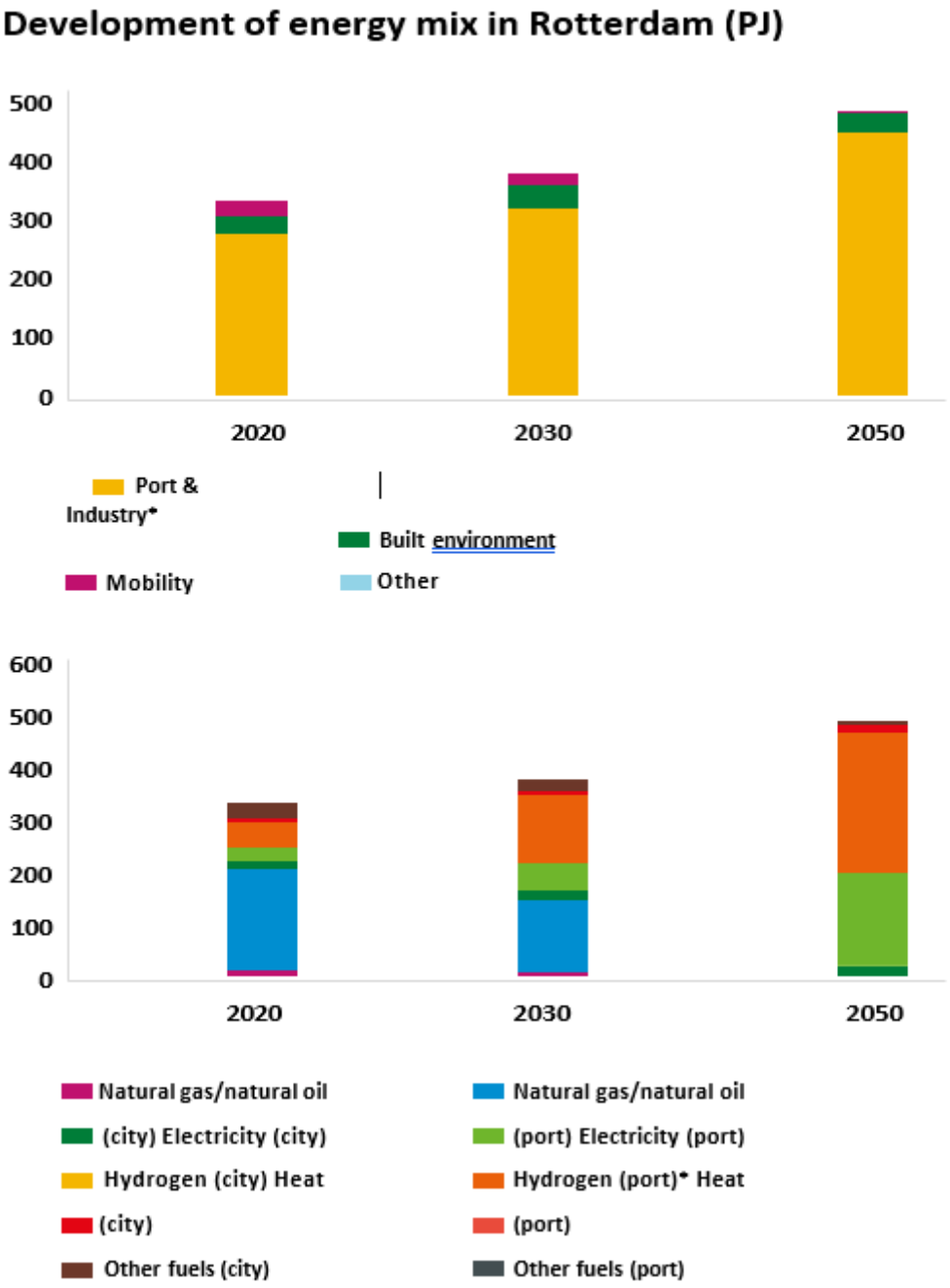


Figure 13 Development of energy mix in Rotterdam.

- The energy mix will change dramatically with more electricity, more collective heating and cooling, a greater role for hydrogen in the port-industrial complex, and less solid and liquid fuels as fossil energy sources are phased out. This affects the capacity and type of infrastructure needed: a heavier electricity network, gas pipelines being removed and the construction of additional heat and cold networks. Infrastructure is also structuring the energy transition: acceleration of electrification and the transition to hydrogen is possible in places where energy networks are present and adequate for this purpose.
- The energy system is becoming a network with local storage, decentralized production and the connection of different sources. Grid stabilization, storage and facilitating two-way traffic are indispensable for this. A flexible energy system can respond to

fluctuations in supply and demand. This requires demand management, energy storage, energy conversion and robust interconnection between different energy infrastructures. During the transition of the Rotterdam energy system, current, temporary and future-fixed energy infrastructures will be used simultaneously alongside each other and require space in both the upper and lower floors. Due to the many dependencies, a clear direction role of the municipality is desirable.

- The future energy system creates visible changes in the city and landscape and requires more space than a fossil system at different scales. There is a constant interaction between issues and solutions at the city and regional level, neighborhoods, districts and in the street. Renewable generation, electricity grid reinforcement and the rollout of heat networks require space and can create more infrastructure in the subsurface and structures above ground. There are energy functions that go well with other functions, but there are also functions that do not go well with other functions. In the first case, you can look for synergy by coordinating in advance with other tasks such as housing, greening and climate adaptation. In another situation, the one excludes the other; this requires a clear consideration process. It is important that developments in the energy system do justice to and are in balance with the use, perception, quality and future of Rotterdam's space.

To flesh out resilience in the Rotterdam energy system, we are working within a Rotterdam Resilience strategy. This is a framework to help assess how resilient an organization and a (future) energy system is. This in relation to challenges ranging from climate change to digital disruption. The framework has three dimensions that can be divided into different goals and indicators:

1. Leadership and strategy: Achieving resilience in the energy system requires effective leadership with a clear, strategic vision supported by effective regulation. This also requires inclusive governance involving government, regulators, planners and grid operators.
2. Economy and society: Achieving resilience in the energy system requires commitment not only from the energy sector, but also from society. The socioeconomic dimension includes the understanding of social needs and the collective approach to cope with critical situations.
3. Infrastructure and ecosystems: Infrastructure includes more than just physical plants, but also production, control systems, operational departments, the interaction between them and the environment. A resilient infrastructure has effectively controlled plants and adequate capacity. A forward-looking approach that takes climate change into account is also important. Solutions should focus on sustainability and offer the transition to alternative energy sources and technologies.

It is fundamental to create a system that can meet the daily needs of homes, businesses, services and governments while smoothly transitioning to a greener, more resilient future. That is why resilience is a foundation of our vision for a future-proof energy system.

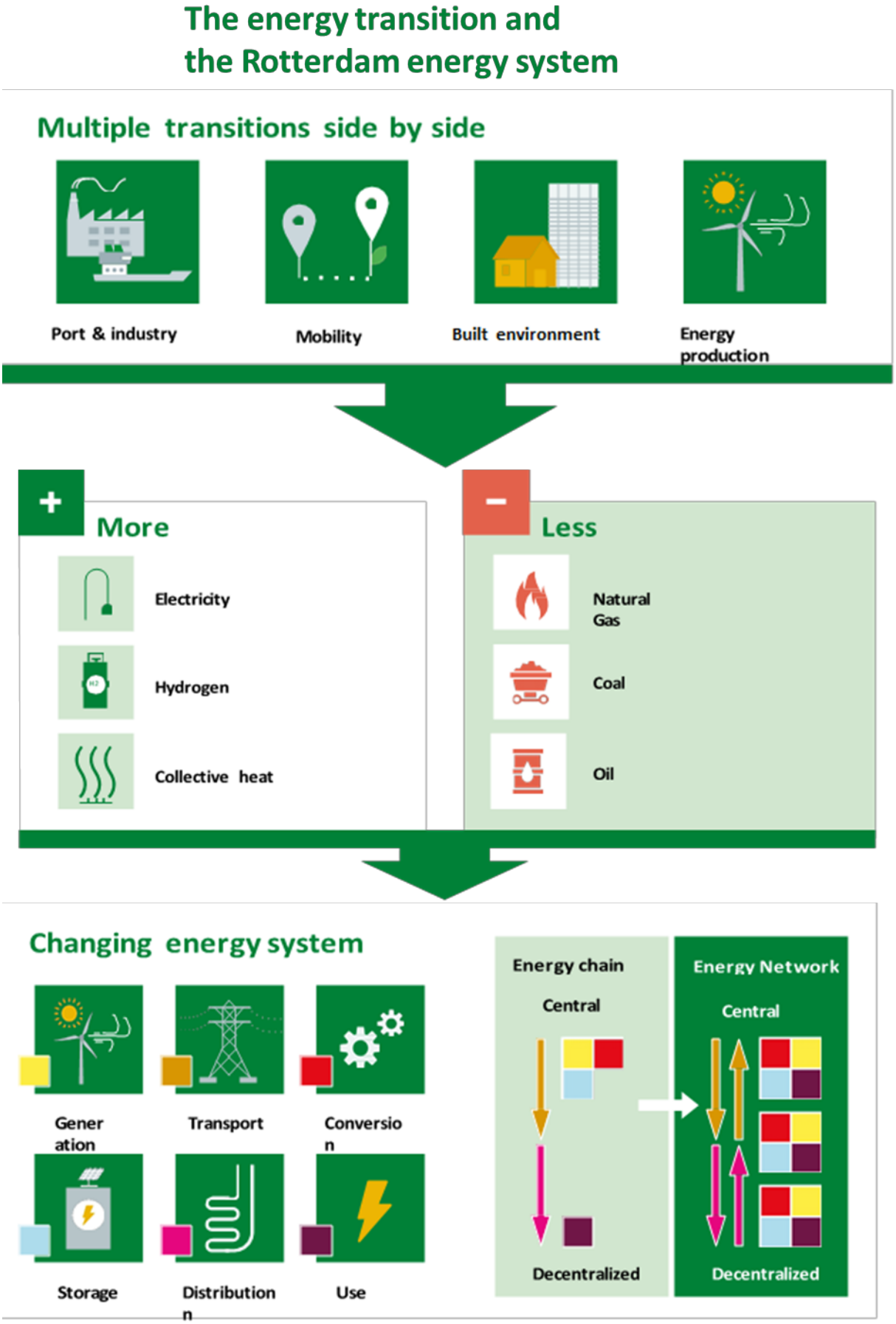


Figure 14 Overview of the energy transition and Rotterdam energy system.

Main barriers and opportunities

A clean energy system is:

- sustainable and circular, efficient, climate neutral, prevents environmental pollution and improves livability.
- With a clean energy system, we take responsibility for the living environment of Rotterdam citizens. By preventing environmental pollution and improving livability, Rotterdam becomes a more attractive and healthier city. A clean energy system also prevents problems being passed on outside the city or to other generations. At the same time, the development of a clean energy system is a transition, so alternatives are not always fully sustainable right away. For example, although the production of electricity and heat is becoming increasingly sustainable, fossil fuels are currently still needed. We ensure that our current choices do not impede a transition to a completely clean energy system in the future.
- A clean energy system is also a circular energy system. The energy transition requires new elements of the energy system for generation, transportation and distribution, conversion, storage and use of energy. For example, to make electricity production more sustainable, more solar panels and wind turbines are being installed, while we are discontinuing coal and gas power plants. In addition, the production of solar energy requires an expansion of the electricity network. How is this done in the most circular way possible? What materials will be released as a result of the energy transition and what will we do with them? And what materials will be used in the new situation?
- When designing the new components, it is important to look at the impact of materials. But also, at the opportunities that exist for flexible and adaptive design and good management, so that the technical lifespan can be optimally utilized, and high-quality reuse is possible. In the coming period, we want to increase our knowledge around promising circular measures in renewable energy technologies.

A smart energy system

- takes full advantage of the opportunities offered by digitalization, ensuring efficient interconnection of supply and demand and exchange between energy systems.
- In a smart energy system, we make optimal use of the opportunities offered by new technologies. We want to ensure that energy is used and deployed optimally by cleverly controlling energy supply and exchanging energy. This requires good monitoring, which makes the commitment to far-reaching digitalization important.
- Working digitally is also necessary to be able to work adaptively and make choices at the right time: based on data we can design smartly, combine smartly, roll out smartly and anticipate smartly.

A resilient system ensures security of energy supply.

- A resilient energy system is reliable and shock-resistant, so that we can count on energy being available at times when it is needed. Even when the system is disrupted or modified or under pressure or stress, such as from cyber- attacks. The system must be robust enough to withstand a crisis situation and adaptive enough to embrace and overcome uncertainties in the energy transition.
- At the same time, energy supply is constantly evolving. Traditional energy supply and substantial redundancy are being replaced by finely tuned, dynamic, increasingly complex, interdependent and interactive systems. These modifications increase the likelihood of failures spreading rapidly through the system. Therefore, energy system resilience must be considered at every step. Resilience takes into account social, technical and organizational factors. Consider physical aspects, but also leadership, policy, stakeholder and social factors.

Smart rollout - We take uncertainties into account by rolling out the policy or strategy step by step

Smart anticipation - We consider whether, for the most extreme scenario and all possible risks, there are sufficient measures, mitigation options, time and money available to still meet policy goals.

Smart combining - We combine tasks as much as possible: through planning to explore and limit costs and inconvenience or by tackling multiple problems at once. This is in line with the integral working method.

Smart design - We design an optimal strategy taking into account smart combinations, potential risks and the costs and effects of available measures, time, money and phasing options.

A just energy system is inclusive and accessible to all.

- It is affordable and ensures a fair distribution of the joys and burdens of the energy transition.
- Inclusiveness is important because it is necessary to prevent some residents from being excluded or disadvantaged by policy. There are many differences among the Rotterdam population in terms of housing situation, lifestyle, culture, nationality, gender, income, level of education and religion. These residents make different choices and express themselves in different behavior. It is important to consider this when making policy. This requires an active process of awareness and deepening, and broadening the network of partners involved.
- Rotterdam has a relatively large group for whom it is more difficult to keep up. In addition, energy prices are expected to continue to rise. Partly for this reason, it is extra important that the energy transition is and remains affordable. That we keep an eye on the affordability of the system and what this means for the energy bill of the Rotterdammer. As a municipality we deploy our resources and instruments in such a way that everyone can participate. What the consequences and necessary interventions are, we investigate, so that we can reduce the causes of energy poverty and improve the affordability of the system and the energy bill. And so that all Rotterdammers now and in the future can (continue to) pay the energy bill and make the necessary investments in and around the home.

To conclude, there are many opportunities and barriers over time which can be managed. But it takes time to ensure all the system, distribution and inclusion issues are addressed properly.

Short term issues

Solar PV's

If we push hard, we will almost reach our contribution to the Rotterdam Den Haag Regional Energy Strategy (3.4 km2 panels in 2030) by 2026. It is wise to get a head start, because the national targets for solar energy are likely to be raised after 2030. Points of interest:

- Circularity of solar panels: solar panels are not easy to recycle now.
- There must be enough space on the congested power grid to dispose of solar power.
- We want a good balance between different purposes on roofs: solar, greening, water storage and housing.

Wind

- Environmentally conscious development of wind energy requires extra municipal effort for the wind farms in procedure and those yet to be developed. In doing so, we are committed to a combination of public participation and communication. The Strekdam in Hoek van Holland is an example of a research location from the Regional Energy Strategy.
- The new national standards for siting wind on land were published in draft form at the end of 2023. Uncertainty remains of their effect on the wind farms under development.
- The realization of a stable electricity grid requires agreements with grid operators, Port Authority and other stakeholders, since most windmills are in the Port of Rotterdam Area.
- Research into repowering existing wind turbines in the port is necessary in order to maintain the target of 350 MW of installed capacity even after 2030.

Energy system - electricity

- Rotterdam faced tightness on the electricity grid in 2022. Demand for electricity rose much faster than expected, especially in the port. High-voltage grid operator TenneT announced in October 2023 that it will definitely not be able to meet the increasing demand until the grid is upgraded. It is TenneT's responsibility to respond properly to electricity demand.
- TenneT is working hard to expand capacity, but that will not provide a structural solution until 2030.
- There are quite a few challenges ahead. Above and below ground there must be sufficient space for transformer stations, pipes and cables. Many and well-trained personnel are needed. Sometimes laws and regulations are a bump in the road. Municipality and grid operators must strengthen and improve their cooperation so that together they can meet the challenges.

A-3.1.2. Urban development

The transition towards a climate neutral city has a direct and indirect impact on almost parts of our city's daily life and functioning. In 2021 we assessed, with the involvement of many stakeholders, how we can turn into a climate neutral city along all other needed developments for our city (Spatial Planning and Environmental Strategy, 'a city in change'). Looking for ways we can use the energy transition as a lever of change for other developments and how to prevent undesired developments.

Our city has a has a number of challenges which effect one another:

The life expectancy of the inhabitants is lower than in other parts of the country and the population is relatively poorly educated. The Rotterdam economy is doing well but many economic sectors need to change in order to become cleaner and become more sustainable and thus to remain (internationally) competitive. Rotterdam is internationally known for its smart handling of the water and benefits from its beautiful location in delta, but at the same time climate change and rising sea level rise are particularly noticeable here.

The migration to the city continues and Rotterdam is also popular. More and more people want to live, work and recreate there. Realizing sufficient housing, employment and facilities is essential to accommodate this migration to the city. At these developments, the attractiveness of the city and region is more important than ever. A biodiverse, healthy and easily accessible landscape in and around the city is a precondition for a pleasant life in living in Rotterdam and the region.

On top of that we are dealing with big changes because of all the major transitions. The energy transition has a major impact on the city and the region, because our industry and logistics still largely use fossil fuels. It is clear that the energy mix in our region will change in the coming years. Also, as a city adapt to climate change and strive for a circular economy. The mobility pattern in cities is changing, there are more and more new forms of transportation. Moreover, is the digitalization of our society progressing.

Multiple tasks causing the city and use of space to dramatically change. These tasks require a clear vision and a clear course.

Main choices and path forward

Rotterdam opts for **good growth**. Growth that contributes to the inhabitants, to a sustainable society and to economic progress. Growth that supports and strengthens Rotterdam's rich heritage and identity, whereby we involve Rotterdammers in the process of change. This is essential to ensure that we are and remain an attractive city for all *Rotterdammers*, because together with we make the city.

This results in five main choices for the long-term development of our city:

Rotterdam is committed to **pleasant living in the delta**. We make Rotterdam a healthy, green and attractive city to live, work and recreate. Our rivers - the Maas, the Schie and the Rotte are our most important green-blue connections. We are creating new parks and greening our boulevards, such as Blaak and Westblaak. We connect green structures for attractive routes and to increase biodiversity. At the same time, by adding greenery we are working to reducing heat stress and collecting water during heavy during heavy rainfall. We make it attractive and easy to exercise outdoors. The car takes a step back and we offer more space to cyclists and pedestrians.

Rotterdam is going to **urbanize & connect.** We are urbanizing within the existing city to strengthen the city. We do this mainly at and around existing or new high-quality public transport. This is the most sustainable way of urbanization. That is why we invest with our partners in, among other things, a new riverbank connection, new stations and more trains on the railroad between Leiden and Dordrecht (Old Line). By adding housing creates a larger support base for amenities. With higher densities, more people live in the close proximity to various amenities. People can reach all their daily amenities on foot or by bike: the city around the corner. By developing a network of complementary urban centers, we make sure that our top locations strengthen each other.

Rotterdam is committed to **vital neighbourhoods**. It should not matter where you grow up to have the same chance of getting a good education a good home and suitable work. In our neighbourhoods a lot many challenges come together: energy transition, climate adaptive and socio-economic challenges. We are tackling these in together to make the neighbourhoods future-proof. In all neighbourhoods we focus on a diverse range of living and working space and the public space is in order. Social facilities grow with the city and are used more intensively.

Rotterdam is putting its shoulders to the wheel for the **energy and resource transition**. In the coming years we will generate energy differently and cleaner, distribute it differently and reduce demand. We will also close material cycles. In the port-industrial complex this means electrification of processes and use of hydrogen as an energy carrier. We use residual heat to provide the urban area with heat and we are making our housing stock. We are also making urban mobility and transport to and in the port.

Rotterdam **renews its earning capacity.** Rotterdam has a strong economic starting position, a world port, an airport, a strong logistics sector and growing manufacturing industry. These sectors will continue to be important for future employment and earning capacity, but they will have to undergo coming years. At the same time, due in part to its excellent (international) accessibility, Rotterdam is a centre of innovation and knowledge-intensive services. We welcome new business models, such as start-ups in the circular economy. Companies that cause nuisance and therefore fall into a high environmental category, we concentrate as much as much as possible at a few locations. Through good networking and interaction creates innovation in the existing and new economy; precisely that is the economic strength of our city.

While acting upon these five main choices, continued attention to **environmental quality and living environment** is needed. Our environmental impact assessment makes clear that, among other things, the combination of densification within the existing city and the effort focusing on the transition of the economy leads to challenges regarding environmental and health issues. By including these issues in the development at an early stage, risks can be limited and negative effects avoided.

Main barriers and opportunities

The future energy system brings a solid additional space claim

Rotterdam continues to grow in every way, in terms of inhabitants, housing, jobs and ambitions. And that demands a lot of space, space that is scarce and has limits. For example, the ambition is to build 50,000 new homes and approximately 70,000 new jobs by 2040. We are also working toward the realization of 15,000 acres of recreational green space by 2030. In addition, we want to make the city with its outdoor space, real estate and gardens water-robust and climate-proof with more greenery, and space is needed for new sustainable activity in the port. These are just a few examples of tasks at hand. The future energy system will also become more complex and require more space and may lead to more structures in the city. It will also require more cables and pipes in the subsurface, which must be well coordinated with the topsoil (trees, water collection, etc.). All the tasks we have as a city increase the pressure on space. The question of how to make the right trade-offs arises more and more often.

How do we coordinate plans and schedules to address the implementation of the various tasks and transitions in the city simultaneously and integrally? There are questions about how to limit the impact of necessary interventions in both the subsoil and the surface. And how to combine tasks intelligently. And how do we ensure that we do justice to the ambitions without compromising the quality of the living environment?

Competing interest and thus the need for aligned visions, policies as well as executing them in an integral way.

It is not easy to achieve the goals from **various policy areas** together in a way they strengthen each other instead of conflicting with one another. To achieve an **integrated** view, we work with five long-term goals that together give direction to the future of the physical living environment. We call these perspectives: compact, productive, sustainable, inclusive and healthy. They form a 'compass' with which we set course. An instrument to achieve **good growth**, where in practice we must always search for the right balance. Because we know that we can never pursue all five perspectives to the same extent. But we do look at each development through all five lenses.

Compact city: We choose to develop Rotterdam as a compact, attractive city by the river (. A hub in an international network, with strong public transportation and plenty of space for

outdoor living. Rotterdam is and will remain an architectural city that dares to experiment and steers for a smart mix of buildings and greenery. A city where proximity is and as many appropriate facilities as possible for everyone within walking and cycling distance. The city around the corner with accessible public transport always nearby. Rotterdam chooses to mix functions where possible and for separating functions where must. Rotterdam deals intensively and inclusively with space and use in time.

Productive city: Rotterdam provides space for the new economy. We are building the port city of the future with a competitive and innovative economy that responds to international trends such as digitization, robotization, 3d-printing, artificial intelligence, energy transition and circularity. Among other things, Rotterdam is making space for innovative manufacturing, circular economy and so-called interaction environments. In addition, Rotterdam is on the connection with education, lifelong learning and innovative and small-scale entrepreneurship. Accessibility of learning and working locations are crucial.

Sustainable city: Rotterdam is growing into a city and port that is showing leadership in the transition to renewable energy, circular processes and a climate-neutral society. Districts become natural gas-free, mobility in steps emission-free and the urban and port economy are making a transition to sustainable and circular. In addition, Rotterdam offers plenty of room for experiments and own initiatives of residents and entrepreneurs. Rotterdam is thus preparing itself for the future and contributing to limiting climate change and renewing the economy. In order to give these major transitions a place Rotterdam, it is also vital to connect the development above the ground as well as underneath it.

Inclusive city: Rotterdam is a city where no one is in the majority is. One city on two shores that is accessible to everyone is, a socially resilient city where people from all layers of the population and of all ages, religions and beliefs participate and meet. Therefore, we are committed to mixed neighbourhoods where people feel connected to, good schools and facilities in every neighbourhood. Safe and accessible routes to work and facilities. An attractive public space that is accessible to everyone, that lends itself for intensive and varied use and for meeting. We approach the urban transitions with an eye for the interests of all stakeholders and we are committed to share the costs fairly and proportionately.

Healthy City: Rotterdam makes healthy living possible for all residents in the city. We do this by health promotion - stimulating healthy behaviour - and health protection - protection against negative external effects, such as poor air quality and noise pollution. Homes have a healthy indoor climate and consist of healthy (building) materials. We aim for a better and healthy life expectancy for Rotterdammers in all areas. Our spatial choices contribute to this. We are committed to cleaner air and a better balance between peace (quiet) and bustle (urbanity and bustle). We are also committed to Rotterdam as a climate proof city in the delta and we protect residents against safety risks. In addition, the physical living environment invites Rotterdammers to a more vital life through more play, exercise and sports. In and around the healthy city there is sufficient biodiversity, we provide diversity and species richness in flora and fauna for healthy living for humans and animals.

The energy transition as well as adaptation leads for big parts of Rotterdam to an accumulation of cost which for most individual homeowners are unbearable.

For tens of thousands of Rotterdam homeowners, especially in vulnerable neighbourhoods, the accumulation of tasks is unaffordable. These homes involve, for instance, foundation repair, overdue maintenance, sustainability and the switch to natural gas-free. This is according to a study on the vitality of 164,000 private homes in Rotterdam. For purpose of that study, the tasks in the housing stock (from foundation repair to sustainability) have been bundled and the financial consequences have been measured against the average disposable income of owner-occupiers. This brings into focus areas where the accumulation of tasks is

enormous, and owner-occupiers often cannot afford necessary investments. This applies to the focus districts in the Charlois and Feijenoord areas and the Lombardijen district in the IJsselmonde area of the National Programme Rotterdam South (NPRZ). There are also a number of vulnerable areas on the north bank.

In total, over three billion euros are needed in Rotterdam to future-proof some 36,000 homes owned by people on a small budget. Without this investment, costs rise and the accumulation of tasks for these Rotterdammers becomes even greater.

Build Environment

Residential buildings

The energy transition in the built environment is a complex and multifaceted challenge that requires systemic solutions and collaborative efforts. Rotterdam will need financial investments, (new) policy frameworks and action across all levels of government and society to address the following barriers:

- **Limited feasibility of district heating:** financial viability is currently a significant challenge. High infrastructure costs combined with current energy prices and insecurity about future energy prices, often render these projects economically unfeasible. This in return affects the public acceptance of district heating and households will turn to heat pumps instead. This in return creates a problem on the electricity network. On top, the government has decided to make private heath compagnies public again. This results in an investment stop from the two major suppliers of district heating in Rotterdam. We have to find a solution for this impasse to reach our current goals in 2030.
- **Multiple challenges in homes:** households face challenges beyond energy efficiency; maintenance, affordability of basic needs, language barriers and dependence on their landlord when wanting to take measures. Competing priorities complicate efforts to focus on energy transition measures.
- **Insulation requirements**: a large portion of the housing stock in Rotterdam requires substantial insulation upgrades to meet energy efficiency standards. The associated costs are an obstacle for both homeowners and housing associations. Furthermore, it is difficult for tenants to insulate as they are often dependent on the (private) landlord.
- **Limited resident capacity for action:** a fair amount of residents lacks financial resources and mental bandwidth to take action. Organizing home improvements, applying for subsidies, and understanding technical options can be overwhelming, particularly for vulnerable populations.
- **Energy poverty**: Energy poverty is a significant barrier to equitable progress. Households with limited financial means are disproportionately affected by rising energy costs and are often unable to invest in energy-saving measures.
- **Inactive Houseowners Association (VvE's)**: many of them not active, have saved insufficiently and are complicated for taking joint investment decisions.

New Buildings

Rotterdam must build 55,000 new homes by 2030 to solve the housing shortage. It is very important that these new homes be sustainable and energy efficient, which is not only comfortable for the residents but also beneficial for the climate. The material use and construction process of the homes are also important, as they have a significant impact on the environment. With current traditional construction methods, CO2 emissions are about 340 kilograms per square meter. To meet the goals of the Paris Agreement, we must drastically

reduce these emissions. For "Paris-proof" construction, CO2 emissions would have to be reduced to:

- 200 kilograms of CO2 per square meter for a single-family home;

- 220 kilograms of CO2 per square meter for a multi-family dwelling.

The municipality will continue to share knowledge and provide advice. It is expected that legal requirements for new construction plans on sustainability will be further tightened in the coming years. *Nationally, the scope for municipalities to set and require sustainability performance is drastically reduced.* Since the statutory sustainability requirements are lower than our sustainability ambitions, we must engage with the goverment to preserve this space or to be able to co-decide on how and where this space could be limited, so that Rotterdam can continue to build future-proof and we maintain perspective to achieve our climate-neutral ambitions for 2030 and 2050. It is becoming increasingly difficult to include sustainable measures in affordable housing given the high cost of construction.

Small and Medium entereprises (SME's) /Business

Entrepreneurs who consume more than 50,000 kilowatt-hours of electricity or 25,000 cubic meters of gas must report once every 4 years what energy-saving measures they are taking. This is the information obligation energy saving. The City of Rotterdam has assigned control of this information obligation to the Rijnmond Environmental Department (DCMR). By early 2023, an estimated 68% of these companies will have fulfilled the information obligation. Many of these companies are now implementing energy measures. About 20% of the total number of companies have implemented all measures. The DCMR checks the reports submitted and can issue fines.

Enforcement is difficult because the DCMR gets no insight from the grid operator into which companies are large consumers and because of a shortage of well-trained inspectors. The municipality and DCMR urge the grid operator to share data on large-scale users so that DCMR can actively write to them.

Mobility

The energy transition in the mobility sector is essential for achieving Rotterdam's sustainability goals and reducing greenhouse gas emissions. However, the implementation of sustainable mobility solutions faces numerous structural and systemic barriers that must be addressed to accelerate progress. Below, we outline barriers:

- **Insufficient Structural Financing for Zero-Emission Zones**: while establishing zero-emission zones is a critical component of the city's energy transition strategy, funding for their development and enforcement is not structurally secured. This lack of consistent financial support jeopardizes long-term planning and the successful implementation of these zones.
- **Uncertainty in Electric Vehicle Availability**: the transition to electric mobility is hindered by uncertainties in the availability of electric vehicles (EVs), especially for heavy-duty transport and specialized vehicles.
- **Insufficient Financing for Charging Infrastructure**: the deployment of charging infrastructure, including public and private charging points, lacks adequate structural funding. This financial gap slows the expansion of a reliable charging network, which is essential for supporting the growing number of EVs.
- **Grid Capacity Constraints**: the energy grid's capacity is not always sufficient to meet the increasing demand for electricity from charging infrastructure. Delays in grid

upgrades and the complexity of connecting charging stations to the grid pose significant barriers.
- **Urban Space Constraints:** Rotterdam's dense urban environment poses logistical challenges for the installation of charging stations and the accommodation of EVs.

Labour Market

The changes in Rotterdam's energy system have an impact on jobs in the city and in the port. Therefore, the municipality wants as many Rotterdammers as possible to benefit from employment opportunities. This is done through collaborations with educational institutions and businesses in the region, but also through small-scale projects at the neighborhood level.

The biggest challenge is getting enough people excited to get started in the energy transition. For years there has not been enough intake in technical education to meet the large demand for labor in all sectors. A large-scale labour market survey presented by the EBZ and the province of Zuid-Holland at the end of 2018, showed that bottlenecks in the Zuid-Holland labour market cost the region some €6 billion. One in five companies could not find enough qualified staff at that time.

At the same time, there was a large unused labour potential: 27,000 people could work (more), compared to the Dutch average. The region can count on additional growth of 3.7% if it tackles labour market bottlenecks from a shared vision and with a common agenda. Also, the major transitions, such as making the economy more sustainable and developing and deploying new technology, can only be carried out if the South Holland labor market improves structurally.

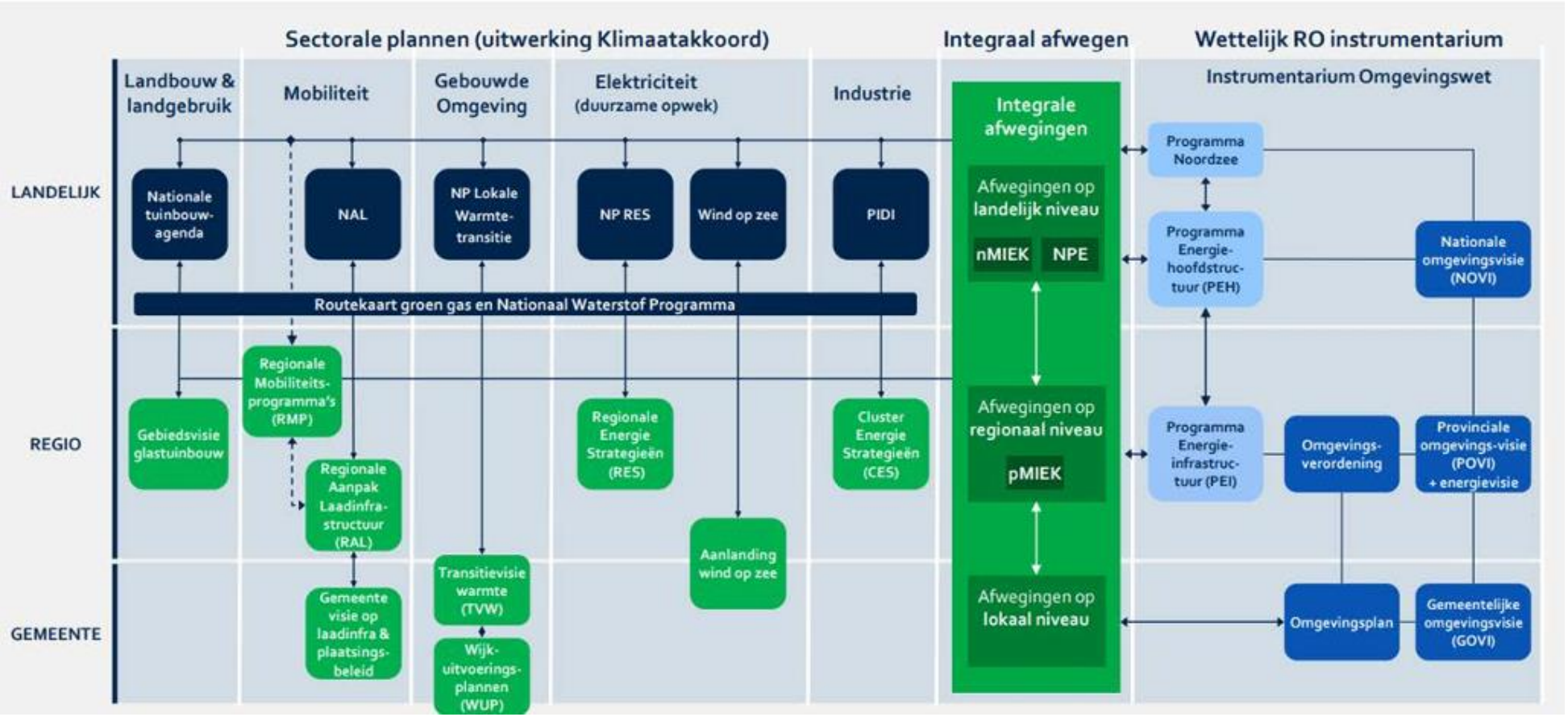
The City of Rotterdam, educational institutions in the region and businesses are therefore not only focusing on 'from school to work', but also on 'from work to work' and 'at work'. Projects focus on increasing the influx towards the technical sector and solving the current and future mismatch in the labor market.

- Infrastructure: There are opportunities for employment in building, reinforcing and maintaining the necessary infrastructure, such as the heat and power grid.
- Home modifications: Insulating and ventilating buildings creates many jobs. TNO expects the insulation task in Rotterdam to lead to about 900 jobs by 2030. New forms of electricity generation and storage and electrification of mobility also create changes in and around the home.
- Port: There are also many changes in employment in the port-industrial complex. For example, jobs will disappear due to the closure of coal-fired power plants and the phasing out of fossil activities, while at the same time developments around hydrogen will create new jobs. CE Delft has calculated that hydrogen in the Netherlands could generate a demand for labor of 6-17 thousand FTEs in 2030 and 16-92 thousand FTEs in 2050.18 A large part of this is in the import, trade and transit of hydrogen. The Port of Rotterdam expects to play a major role in this. The offshore wind sector will also grow to about 12 thousand FTE in 2030. From the Just Transition Fund there is a firm commitment to creating a healthy labor market to support the energy transition in the port and at the same time fully commit to retraining and upskilling the current workforce.

A-3.2. Governance and Policy

Figure 15 multi-level decision-making process concerning the energy system, illustrates the coherence between different sectors, spatial planning and investment.

In terms of governance, for each sectoral agreed policy in the Climate Agreement, there are National Programmes in place to implement and



monitor the agreed measures in cooperation with regional authorities and municipalities. Because many changes needed for the energy transition and the density of the Netherlands, close alignment with spatial planning processes is needed, as shown in figure 15.

A-3.3. Social innovation, democracy and participation

Social entrepreneurship

In order to find more people who can join the workforce that is needed for the energy transition, the municipality is working with several social entrepreneurs in Rotterdam. They have programs to train the unemployed to work in the energy transition. They have already started training people to work on solar energy, and on building district heating systems.

Activating citizens

There are several initiatives in Rotterdam that activate citizens to participate in the energy transition, and also develop their own skills at the same time. In Bospolder Tussendijken, one of the poorest neighbourhoods of the Netherlands, for example, there is a program called "Reselient BoTu". As part of that program there are many projects that are linked to the introduction of district heating in that area. Resilient BoTu follows the method of Asset Based Community Development, and is monitored by the "Veldacademie", a research platform that links the city of Rotterdam with several universities in the region.

Stimulating energy sharing between large consumers

Since Rotterdam is facing grid congestion, it is not possible for large consumers to get new grid connections and expand their current grid connection. Large consumers can share their contracts and use electricity at different time slots. In this manner there can be possibilities to electrify processes and expand business. Rotterdam stimulates large consumers to research the possibility of energy sharing by subsidizing "Flex Scans", research of the energy profiles, and possibilities to share energy or contracts for large energy consumers that are situated close to each other.

Citizen counsel

To tackle the barriers that Rotterdam faces in creating support for the energy transition in Rotterdam, the current administration started a citizen council that took place in 2024. A group of 100 citizens advised the administration on additional ways to reduce CO_2 emissions in Rotterdam. Part of the citizen counsel will remain active as an advisor to the administration of Rotterdam.

Energy Communities

In order to make sure citizens of Rotterdam reap the financial benefits of the energy transition, to increase support from citizens for the energy transition, and also to get a group of people who is willing to change their behaviour, Rotterdam is supporting the growth of energy communities. There are currently seven energy communities active. The city of Rotterdam subsidizes "Energie van Rotterdam", which is an NGO that supports the energy communities by assisting them in their professional development, and making sure learnings are exchanged between the energy communities in Rotterdam, as well as connection them to the national and international learnings taking place. The energy communities are currently mostly active in the field of solar energy. The municipality and the energy communities are working together in discovering which role energy communities can take in the heat transition and how energy communities can get a better position in wind energy as well. As part of the "Nationaal Klimaatakkoord" that Rotterdam committed to, the municipality has policy in place to ensure 50% local ownership in large scale solar and wind projects.

A-3.4. Finance and Funding

See IP (page 34 -)

A-3.6. Learning capabilities

Local & regional

In the Rotterdam area, several institutions and initiatives focus specifically on climate mitigation, sustainability, and environmental innovation. The municipality of Rotterdam has formal agreements and partnerships with many of the institutions focused on climate mitigation, especially with research centres like DRIFT, or Erasmus Centre for Sustainability, these agreements typically involve collaboration on research, policy development, climate action strategies, and urban sustainability projects. The municipality actively supports these institutions as part of its broader efforts to mitigate climate change and transition to a more sustainable, low-carbon city. Furthermore, the municipality of Rotterdam is involved in many different national and international networks to stimulate knowledge exchange.

Erasmus University Rotterdam (EUR)
A major public university offering a wide range of programs in social sciences, business, law, health, and more.

Erasmus Centre for Sustainability (ECS)
Focus on business-driven solutions to sustainability challenges, including climate mitigation. Part of Erasmus University, ECS conducts research on integrating sustainability into business practices, including tackling climate change through corporate innovation, sustainable finance, and the role of businesses in climate action.

DRIFT (Dutch Research Institute for Transitions)
Focus on climate change mitigation, sustainability transitions, and social innovation. DRIFT is one of the leading research institutes in the Netherlands for studying societal transitions in the areas of sustainability, climate, and energy. It focuses on how societies can transition to more sustainable and climate-resilient futures through systemic change.

TNO – Climate and Energy
Focus on innovative solutions for sustainable energy, climate mitigation, and carbon reduction technologies. TNO (Netherlands Organization for Applied Scientific Research) has various projects dedicated to reducing the environmental impact of industrial processes, advancing renewable energy technologies, and supporting the transition to a carbon-neutral society.

Energy Transition Centre (ETC)
Focus on transitioning from fossil fuels to sustainable energy sources, including renewable energy and energy efficiency. Located in the Rotterdam area, the ETC conducts research and innovation in energy transition strategies, focusing on mitigating the impacts of climate change and reducing carbon emissions in various sectors.

Holland Circular Hotspot
Focus on circular economy solutions, including for climate mitigation. Rotterdam is a key player in the Netherlands' circular economy movement, which is integral to mitigating climate change. Holland Circular Hotspot works on promoting circular business models, recycling, and reducing waste, all of which help decrease the environmental footprint of industries.

International Institute for Applied Systems Analysis (IIASA) – Collaborations with Rotterdam
Focus on global systems analysis for climate mitigation, sustainable development, and policymaking. IIASA, although based in Austria, has research collaborations with Rotterdam-based institutions on climate change and environmental sustainability, focusing on strategies for mitigating climate change on both local and global levels.

Sustainable Development Solutions Network (SDSN) Netherlands
Focus on advancing climate action through policy, research, and partnerships. Although part of a global initiative, the Netherlands chapter includes collaborations with Rotterdam

institutions. It works on implementing the United Nations' Sustainable Development Goals (SDGs), with a strong focus on climate action and sustainable development.

The Port of Rotterdam Sustainability and Innovation Hub
Focus on sustainable energy transition, CO2 reduction, and circular economy in the port industry. The Port of Rotterdam has been a key player in the Netherlands' climate mitigation efforts. The Innovation Hub focuses on sustainable shipping, hydrogen production, carbon capture and storage (CCS), and renewable energy sources, which are crucial for reducing emissions from one of Europe's largest industrial hubs.

The Institute of Housing and Urban Development Studies (IHS)
Part of Erasmus University, this institution focuses on urban planning and development, including sustainable cities and housing.

Rotterdam Academy of Architecture and Urban Design
This institution shapes the next generation of urban planners and architects, emphasising innovation and sustainability in its programmes.

Het Nieuwe Instituut.
Dedicated to architecture, design, and digital culture, this institute fosters cross-disciplinary collaborations and critical thinking about the role of design in shaping society.

Delft University of Technology (TU Delft) – nearby but influential
Although based in Delft, TU Delft collaborates heavily with Rotterdam on research projects, particularly in engineering and technical fields.

EU and International Networks

Comité of the Regions, Eurocities, Global Parliament of Mayors (GPM), U20, C40, Connecting Delta Cities, Global Covenant of Mayors for Climate & Energy, Global Resilient Cities Network (GRCN), ICLEI, ISWA International Solid Waste Association, Polis, Walk21, The Global Walking Network, Transport Decarbonization Alliance (TDA), WHO European Healthy Cities Network.

Part B – Pathways towards Climate Neutrality by 2030

As shown in the previous sections, the municipality of Rotterdam on its own has the biggest influence on the built environment, mobility, the local energy system and local businesses. In the Climate Action Plan Rotterdam (KAR, appendix 1) detailed information is shared on targets, sub-targets, actions and projects that were/are/will be undertaken.

The plan is made to monitor and communicate about our progress. The infographics in this plan show what results we have achieved, what results we expect to achieve and what gap still exists towards climate neutrality. So, it offers us the opportunity to properly discuss progress with the municipal council. It also shows that residents' and entrepreneurs' commitment is needed to achieve our climate goals. The plan was first published in April 2023 and is updated and discussed twice a year.

The European consortium Net Zero Cities has developed a logic: the theory of change. By defining these impact pathways, systematically analyzing the outcomes and secondary outcomes, this logic ensures that we can clearly see what needs to be done to facilitate and accelerate this transition. Since the admission of the CCC is for a part meant as an evaluation moment, an analysis has taken place to identify which pathways were not addressed in our current action plan. We performed a 'gap analysis', identifying the consistency between our policies, identified pathways and actions.

We concluded that the current reporting, as we were already sensing, has a couple of shortcomings:

- Pathways are not for every demission domain clearly established. As a result, its monitoring contains a mixture of input, output and outcome indicators. For some domains, the reason is due to not having established a clear 'end' goal in our current polices and/or other multilevel stakeholders. We are concretely referring to the level of insulation, which is also linked to the temperature level of district heating (see section A-3), and second the goal for renewable energy, which is part of a regional multi-stakeholder process to determine. So, as we show in B-1, we started working on a new outline for multiple pathways that we see for every domain.
- The list of actions or projects which are presented in the annual Budget, KAR, and the calculations on CO2-emmissions do not correspond always, due to separate administrative procedures, we are currently digitalizing in a common data environment, so we don't have to separately report and increase coherency.

B-1 Climate Neutrality Scenarios, Impact Pathways

We have arranged all existing relevant policies so that we can show the impact pathways in a structured manner. These overviews (maps) provide insight in the coherence of the issues we work on and at the same time expose gaps. This will guide us further into updating our action plan in preparation for the incoming administration.

Our current main goals are **a climate neutral Rotterdam in 2050** and **a 55% reduction of GHG emissions by people and organisations in 2030 compared to 1990.** This translates into four domains of focus (excluding the Rotterdam harbour):

- In 2030, Businesses have more sustainable processes and GHG emissions are reduced.
- In 2030, Rotterdam will have a sustainable, safe, fair and reliable energy system that contributes to lower GHG emissions.
- In 2030, buildings in Rotterdam will emit less GHG's.
- In 2040, the urban mobility system by road and water will no longer emit GHG's.

The domains are outlined across 17 transition pathways, each accompanied by corresponding actions. A portion of these actions has been already translated into specific projects, which are detailed in the Climate Action Plan Rotterdam. The coherence between the transition paths and their respective actions is illustrated below. In the accompanying figures, black text represents existing policy, while red text highlights identified policy gaps that we intend to address.

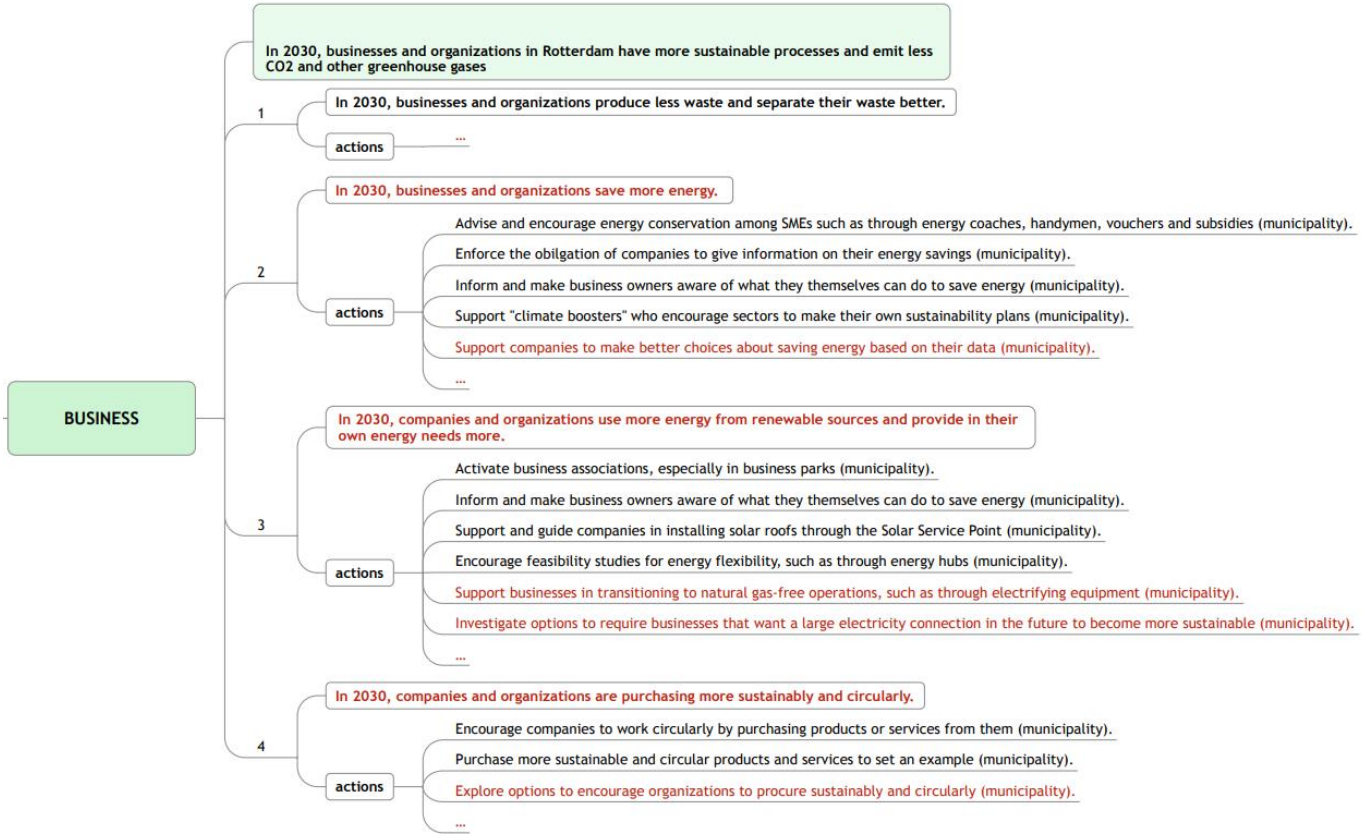


Figure 16 Business transition pathways + actions.

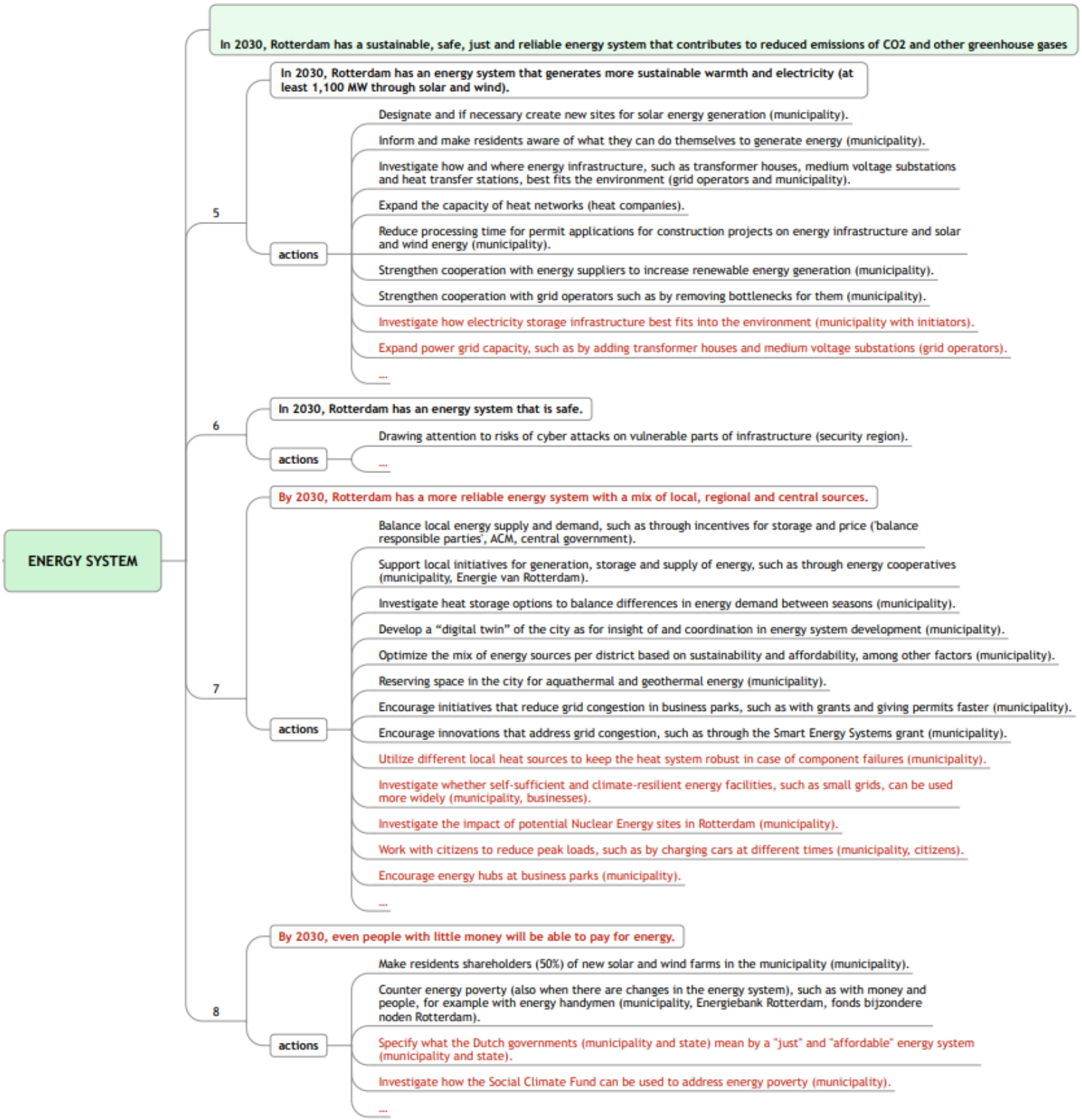


Figure 17 Energysystem transition pathways + actions.

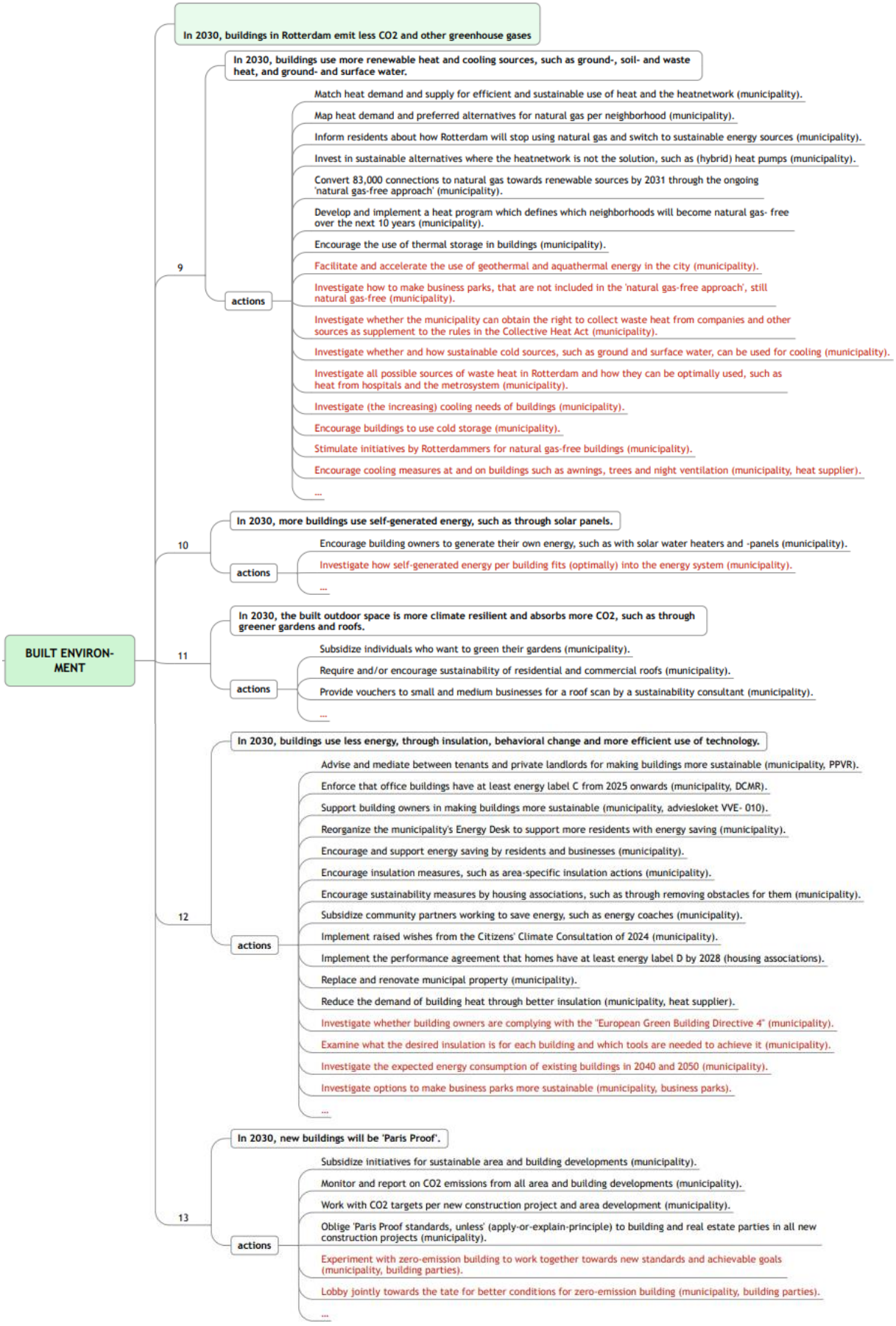


Figure 18 Built environment transition pathways + actions.

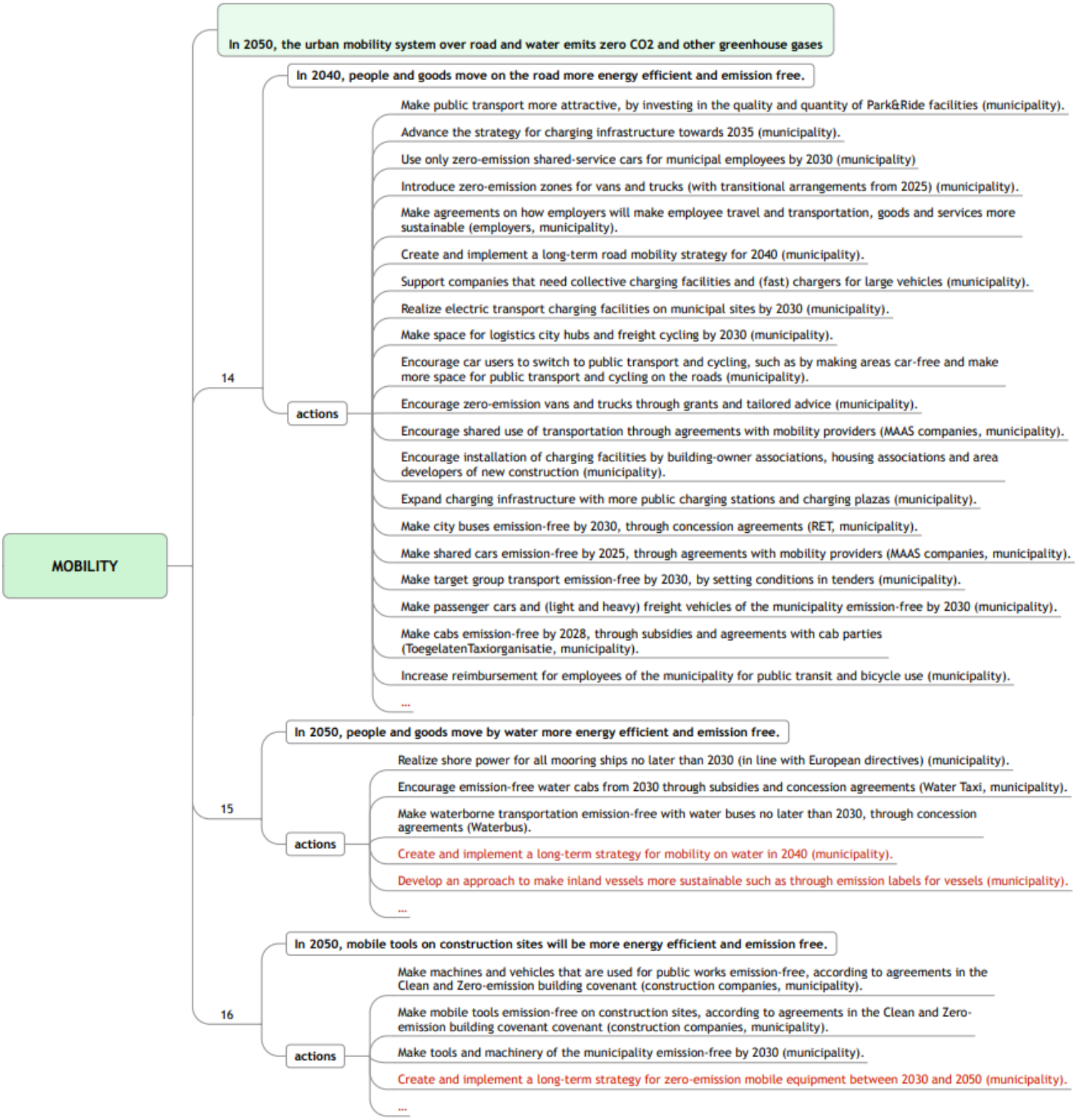


Figure 19 Mobility transition pathways + (potential) actions.

B-2 Climate Neutrality Portfolio Design

As explained, we are realigning our pathways and update policies and portfolio of actions for the next administration. the climate neutrality portfolio design is shown above, and details can be found in the KAR (Annex 1) and the current portfolio of actions (annex 2).

B-3 Indicators for Monitoring, Evaluation and Learning

Our KAR is updated every half year to monitor and discuss progress with our Council to evaluate and take further action. Monitoring of progress during current administrative period (2022-2026) as enshrined in our budget's Planning & Control Cycle uses the following indicators:

Table 11 Indicators Energy system

Indicators	Realisation 2022	Realisation 2023	Realisation 2024	Target 2025	Target 2026	Target 2030	Target 2050
3,2 km^2 solar panels	0,7 km^2	1,1 km^2	1,97 km^2		3,2 km^2	3,4 km^2	N/A
350 MW wind energy	N/A	340,9 MW	323,9 MW	350 MW	N/A	N/A	N/A

Table 12 Indicators Built Environment

Indicators	Realisation 2022	Realisation 2023	Realisation 2024	Target 2025	Target 2026	Target 2030	Target 2050
Start of area-based insulation trajectory	N/A	6	6				
Annually started advisory trajectory homeowner associations	23 large associations 38 small associations	35 large associations 17 small associations	Not available yet	30 large associations 20 small associations	30 large associations 20 small associations		
Improvement of energy label (>E) of 8.358 social housings by 2028	N/A	Not available yet	Not available yet	3.600			
House visits energy handymen		8.000	12.000	7.000			
Reduction of natural-gas connections and amount of WEQ's made natural-gas free		Not available yet	Not available yet		10.000	85.000	
Reduction of natural-gas usage in the city		Not available yet	Not available yet	-20% compared to 2021	-25% compared to 2021		

Table 13 Indicator Mobility

Indicator	Realisation 2022	Realisation 2023	Realisation 2024	Target 2025	Target 2030	Target 2050
Percentage of clean motor vehicles crossing the ring motorway	8,6%	10,6%	Not available yet	20%	N/A	N/A

Table 14 Indicator own municipal business operations

Indicator	Realisation 2022	Realisation 2023	Realisation 2024	Target 2025	Target 2030	Target 2050
CO_2 performance ladder	N/A	Level 3	Level 4	Level 5	N/A	N/A

Table 15 Metadata

Metadata										
Indicator Name	**3,2 km² solar panels**	**350 MW wind energy**	**Start of area-based insulation trajectory**	**Annually started advisory trajectory homeowner associations**	**Improvement of energy label (>E) of 8.358 social housings by 2028**	**House visits energy handymen**	**Reduction of natural-gas connections and amount of WEQ's made natural-gas free**	**Reduction of natural-gas usage in the city**	**Percentage of clean motor vehicles crossing the ring motorway**	**CO_2 performance ladder**
Indicator Unit	km^2	MW	N/A	N/A	N/A	N/A	N/A	%	%	Level
Definition	Realisation of 3,2km^2 surface area of solar panels	Accumulated power of wind energy	Amount of started insulation trajectories	Amount of started advisory trajectories	Amount of social housings with improved energy label (>E)	Amounts of visits by energy handymen to help with saving energy	Amount of natural-gas connections		Passages of clean motor vehicles (car, bus, van, truck) within the ring motorway of Rotterdam; electric, hybrid of hydrogen.	Level is based on (a) insight (b) reduction (c) transparency and (d) participation
Indicator Context										
Does the indicator measure direct impacts (reduction in greenhouse gas emissions?)	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	No
If yes, which emission source sectors does it measure?	Energy sector	Energy sector	N/A	N/A	Built environment	N/A	Built environment	Built environment	Mobility	N/A

Does the indicator measure indirect impacts (i.e., co-benefits)?	No	No	No	No	No	No	No	No	No	No
If yes, which co-benefit does it measure?	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Is the indicator useful for monitoring the output/impact of action(s)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
If yes, which action and impact pathway is it relevant for?	5, 10	5	12	12	12	12	9	All pathways	14	1-4
Data requirements										
Expected datasource	Aerial photographs	Multiple	N/A	N/A	N/A	N/A	Energy suppliers	KEV	Traffic camera's	Assessment by independent organisation 'CO_2 prestatieladder'
Is the data source local or regional/national?	Local	Local	N/A	N/A	N/A	Local	Local	National	Local	Local
Expected availability	Available	Available	Available	Available	Available	Available	Available	Available	Available	Available
Suggested collection interval	Annual	Annual	Twice a year	Twice a year	Twice a year	Twice a year	Annually	Annually	Continuously	Annually

Part C – Enabling Climate Neutrality by 2030

In this section, Part C "Enabling Climate Neutrality by 2030" we aim to outline any enabling interventions, i.e., regarding organizational setting or collaborative governance models or related to social innovations –to support the climate action portfolios (Module B-2) as well as aiming to achieve co-benefits outlined in the impact pathway (Module B-1). These interventions also address the identified opportunities, gaps and barriers identified Module A-2 and A-3.

Module C-1 Governance Innovation Interventions

As stated, to address all the barriers and opportunities, strengthening multi-level cooperation, between layers of government, cities, and actors within cities is needed. The joint effort of all European cities in the mission clarifies what the barriers to acceleration are and what solutions are needed for this at the European, national and local levels.

National level

On the national level, one barrier is the multi-level governance which is still quite sectoral focused on the energy transition while the step towards Climate Neutrality (as shown in A-3) requires addressing multiple issues (spatial development and social in general) which are otherwise barriers for this transition. On top we see many other challenges which are not yet adequately addresses and part of multi-level governance, with clear pathways and goals (f.e. adaptation, circularity) which should also be dresses so we can more utilize co-benefits when investing in the energy transition. These considerations have currently no platform.

So we are delighted that because of this mission the National Cooperation Structure (NSS) has been set up so we as cities can take the lead to put forward actions and solutions to address the,

European Union

The mission label given to cities for the climate contract will help finalize the financial framework for our sustainable transitions and promote cooperation here. Through this enhanced collaboration and pooled innovation and scale-up power, we aim to achieve accelerated implementation of our current strategies. Currently however, it takes a long time before EU-legislation and finance are reaching cities (plus 6, 7 years).

So to accelerate and make this all possible, sharing the right data and information between them, which is one of the purposes of this CCC, is preconditional. Using the same data and exchanging them on an intelligible way is key to coordinate and collaborate. As this CCC already makes clear this concerns a lot of different and a vast amount of data. From our local experience this means digitalization is key to do this more efficient and on time but setting it up requires a lot of work.

So, to move forward, we intend working within the NSS to reflect on all the data, including all the parts contained in the CCC, so to agree how we are progressing towards digitalisation of our data. From our experience, this on itself will result in a flywheel to more standardisation and development of the preconditions that are necessary for data driven action, covering aspects like organisation, policy goals and indicators, finance and governance structures. This will have to be a joint effort to be helpful and successful. Rotterdam has a lot of experience and invested on this issue. So, we think, utilising all the strengths and differences between the relevant stakeholders, towards this we have much to contribute. We would be very happy if the European Commission also joint this endeavour regarding the next iterations on the CCC.

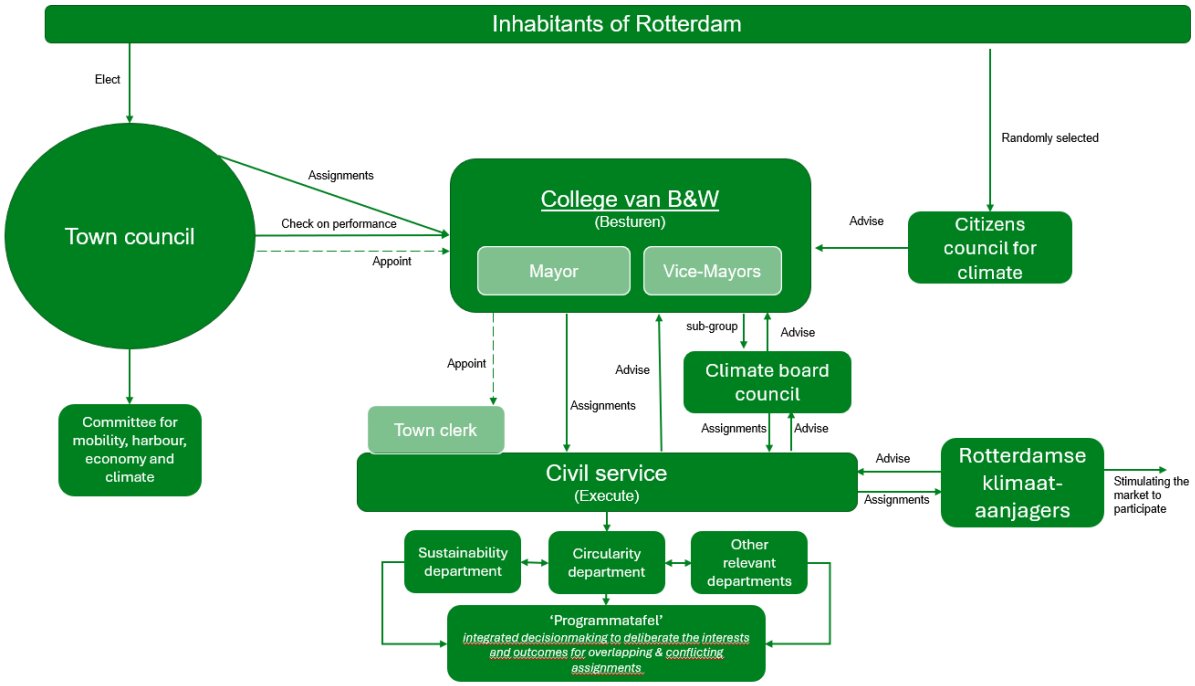


Figure 20: Governance structure Rotterdam.

Municipal

We have recently created a more programmatic governance structure for the energy transition and other cross-departmental issues. This will enhance the capabilities for this mission (wich is lead by the department of Sustainability) to more effectively cooperate on this mission. Also we have created a WHAT and HOW tables when issues arise addressing multiple programmes, on policy (what) and implementation and execution (how) to foster more holistic and integral approach towards multiple linked issues. So it will be easier to collaborate on our long-term strategy for the development of our city.

Module C-2 Social Innovation Interventions

In A.3.3 we have listed the social innovation interventions that are currently being executed in Rotterdam. In 2026 a new administration will be elected. We will evaluate which social innovation interventions the new administration can deploy. But as been pointed out to us, our current set-up of our KAR, a user friendly digital and easy to understand monitoring of our progress and actions can bee judged as quite an innovation. We would encourage the reader not (only) to look at the paper version here in the annex 2 as part of the CCC but to experience it's look and feel about how we inform and engage with our citizens this way and frequently update about progress and new actions, to foster further collaborative action.

Outlook and next steps

This section should draw any necessary conclusions on the CCC Action Plan above and highlight next steps and plans for refining the CCC Action Plan as part of the Climate City Contract in future iterations.

We have made the following considerations and choices for the purpose of this CCC:

- Scope: we decided to focus in the CCC on the energy transition in the city, excluding targeting the emissions of the Port of Rotterdam area where the industry and the (fossil) energy sector is present. Observing the progress so far and being conscious of the limited influence of the municipality compared to the leading role of the national government and role of the EU, it's questionable whether the mission in its current approach and set-up is the right vehicle for change. We also do not include circular (scope3), biodiversity or climate adaptation goals and policies, unless in relationship with the energy transition. While they are of utmost importance, we are choosing to go for coherence instead of being overly complete for the purpose of this CCC and the mission in general. This can change in the future in relationship to the establishment and/or progress of other missions.
- Goals: for 2030 no intermediate goal has yet been set specifically for the city, besides the overall -55% for the whole city. Regarding climate neutrality, there are goals set for mobility for 2040 and for the rest, mainly the Built environment in 2050. The moment of submitting this CCC coincides with
    - a) the preparation of the incoming administration in 2026
    - b) the preparation of new national measures by the national government to (still) reach the national goal in 2030, as well establishing a goal for 2035 as obligated to do by the national Climate Law, and
    - c) the negotiations on the proposed EU target of -90% in 2040.
    - This al has led us to the conclusion it is prudent to use the CCC as a starting point of preparation for the new administration, giving them the opportunity to establish an ambitious but feasible target with the further support this mission offers. To prepare, it's in our situation of utmost importance we can take these multilevel developments into consideration when we strategize what is wise. As we did in preparation for the current and previous administration, we are starting now to prepare new scenario's, policy options and an estimate of the needed investments.
    - In addition, many of the current policies and associated action plans are set to contribute towards a target set for 2030, while some even stop in 2026. As a consequence, policies targeting the emissions beyond, for a big part are in the middle in the process of being updated, which are essential in complementing our portfolio of actions for the periods beyond. The earlier mentioned barrier on the short term also forces us to reevaluate and update certain policies. When the new administration announces their plans, we can update the CCC accordingly.
- Pathways: Since the admission of the CCC is for a part meant as an evaluation moment, an analysis has taken place to identify which pathways were not addressed in our KAR (as shown in section B). We performed a 'gap analysis', identifying the consistency between our policies, identified pathways and actions. On basis of the results, we have realigned our current pathways and added new ones as input for the policy shaping process. This will guide us further into updating our KAR (with new pathways, establishing intermediate and end goals, actions, stakeholder engagement and investments) in preparation for the incoming administration. Based on the choices the new administration makes; we will adjust the CCC.
- Portfolio of actions: our current portfolio of actions is part of the baseline. Therefore, we did not (yet) classify them in terms of levers of change and represent them in B-2, but as part of our current Climate Action Plan Rotterdam (KAR, Annex 1). As stated

earlier, we are still dealing with a gap in 2030 based on the effect of our current portfolio of actions. We did not present a portfolio of actions capable of targeting this gap, since the only available options concerns scaling up current ones, where barriers prevent them now.

- Based on the gap analysis we did encounter established pathways without established actions, which need further exploring before they can be established as part of our portfolio of actions, as listed the KAR. In our next CCC we will add the actions that we have added to our portfolio of actions.

Action portfolio Rotterdam - CCC 2025

Domain	Pathway	Status	Project name	Project description	Project aim	CO2 impact
Built environment	Natural gas free	Done	Bospolder-Tussendijken II aardgasvrij	Area approach natural gas-free	Havensteder, Eneco and the municipality of Rotterdam have jointly investigated whether the area approach can be extended to the next part of the area. This does not appear to be possible at the moment because there is no agreement on the temperature regime to be used. Eneco supplies in the context of their 'One Planet' target Middle Temperature (MT). The municipality and Havensteder assumed High Temperature (HT). At the moment, the homes are not suitable for MT.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	110-Morgen naar aardgasvrij en duurzaam (Onze woning) (Klimaatdeal #13)	Onze Woning is a small housing association with about 1350 homes.	Progress in sustainability is guaranteed through the performance agreements.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Energiemaatregelen en verduurzaming door Heimstaden (Klimaatdeal #50)	Heimstaden is going to make all its 100% owned homes more sustainable, by insulating them better, making them more comfortable and - where possible - switching to the most sustainable heat source. Heimstaden continuously puts sustainability on the agenda at VvEs where Heimstaden does not have 100% ownership and encourages VvE members to participate. This climate deal is part of the collaboration between the municipality of Rotterdam and real estate parties in the 5 area approaches 14 explorations and the Rotterdam Heat Transition Vision, all aimed at making neighbourhoods natural gas-free.	From the municipality, we keep an eye on the progress of Heimstaden's plans.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Havensteder aardgasvrij en duurzaam (Klimaatdeal #9)	Havensteder intends to make 2,300 homes natural gas-free in Rotterdam. They are investigating whether 1,500 homes in Bospolder-Tussendijken can be connected to the district heating network. By improving or replacing another 800 homes will become natural gas-free. In addition, Havensteder is investing heavily in extra insulation of homes. Havensteder invests in climate adaptation and investigates the possibilities of circularity. In this way, Havensteder makes an important contribution to CO2 reduction in Rotterdam. This climate deal is part of the collaboration between the municipality of Rotterdam and real estate parties in the 5 area approaches, 14 explorations and the Rotterdam Heat Transition Vision; all aimed at making neighborhoods natural gas-free.	Progress in sustainability is guaranteed through the performance agreements.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Heimstaden: verduurzamen door elektrisch koken	In the case of vacant homes, Heimstaden replaces gas cooking with electric cooking.	Heimstaden has equipped 202 homes in Rotterdam with an electric hob.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Hoek van Holland naar aardgasvrij (Woningbouwvereniging Hoek van Holland) (Klimaatdeal #10)	Housing association Hoek van Holland, together with the municipality of Rotterdam, will investigate the possibilities of a heat network or other sustainable sources.	In the exploration of Hoek van Holland, the opportunities for an area approach to natural gas-free were jointly investigated. This showed that this is not yet feasible and affordable. In the meantime, housing association Hoek van Holland will continue to make its property more sustainable independently.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Rotterdam-Centrum aardgasvrij en duurzaam (Manhave) (Klimaatdeal #12)	Manhave Vastgoed will investigate how they can make their real estate holdings in the centre of Rotterdam as climate-neutral as possible. Manhave is also investigating whether solar panels can be installed on part of its property. In addition, they will open a sustainable boutique hotel in 2023 with a roof garden that is accessible to the public.	Manhave continues to carry out her plans. In total, there are approximately 230 units.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Verduurzamingstoolbox voor makelaars (Klimaatdeal #11)	The brokers can use this toolbox to inform their customers about the transition to natural gas-free heating options and thus stimulate the energy transition.	The toolbox is being used.	The effects have been calculated by the DCMR*

Built environment	Natural gas free	Done	Woningen, kantoren en winkels aardgasvrij en duurzaam (Bouwinvest) (Klimaatdeal #8)	Bouwinvest is a national real estate investor with approximately 1,200 homes, 2 office buildings and 2 shopping centres in Rotterdam. In 2045, they will ensure that the entire property is energy-neutral and natural gas-free. In total, it concerns more than 350 homes and 70,000 m2 of commercial real estate. In collaboration with the municipality of Rotterdam, they are also developing the offer of new mobility solutions so that the city becomes healthy and attractive. This climate deal is part of the collaboration between the municipality of Rotterdam and real estate organisations in the 5 area approaches, the 14 explorations and the Rotterdam Heat Transition Vision, all aimed at making neighbourhoods natural gas-free.	From the municipality, we keep an eye on how Bouwinvest's plans are progressing.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Woonbron Aardgasvrij en duurzaam (Klimaatdeal #17)	Until 2030, Woonbron is committed to insulating homes, making installations and lighting more sustainable and connecting its property to the heat network. Woonbron will work with the municipality and residents on climate-adaptive measures.	Progress in sustainability is guaranteed through the performance agreements.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Woonstad aardgasvrij en duurzaam (Klimaatdeal #18)	As part of the climate deal, Woonstad Rotterdam wants to make an effort to make approximately 8,000 homes natural gas-free by 2030. In addition, Woonstad Rotterdam wants to investigate which (extra) measures are needed to absorb heavy rainfall during renovation or new construction, so that streets and houses remain dry. Woonstad Rotterdam will also install LED lighting in all its complexes (ready in 2021) and, where possible, solar panels. This climate deal is part of the collaboration between the municipality of Rotterdam and real estate parties in the 5 area approaches, 14 explorations and the Rotterdam Heat Transition Vision, all aimed at making neighbourhoods natural gas-free.	Integrated in the natural gas-free area approaches. Progress towards making property more sustainable is monitored through performance agreements.	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Done	Woonstad Schutterskwartier	Project Executed	150 homes natural gas-free	The effects have been calculated by the DCMR*
Built environment	Natural gas free	Initiative	Kop van Feijenoord aardgasvrij	Market initiative and exploration of natural gas-free	2000 homes of housing corporation Woonstad. From 2025, 350 homes per year are expected. A total of 1750 by 2030.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Initiative	Oude Noorden verkenning	Exploration of natural gas-free	2174 homes owned by housing corporations are expected to be natural gas-free by 2030 and 705 homes owned by private owners are intended to be natural gas-free by 2030.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Initiative	Rozenburg aardgasvrij	Area approach Rozenburg natural gas-free	Private owners: 1619 homesHousing cooperative Ressort Wonen: 996 homes	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Schiebroek & 110-morgen Aardgasvrij	With a large, coherent package, the Netherlands wants to reduce CO2 emissions by at least 49% by 2030. The Netherlands must be natural gas-free by 2050. In 2021, 50,000 buildings per year must be taken off natural gas. Well before 2030, this number should even grow to 200,000 homes per year. In the districts of Schiebroek Zuid, Schiebroek Noord and 110-Morgen, initiator Enertrans is in the process of applying for permits and subsidies to connect these neighborhoods to a residual heat network together with housing corporations. These two districts are listed in the Rotterdam TVW as promising for starting an area approach before 2025.	The objective is to take the market initiative further. The aim of the market initiative is to connect the entire area of Schiebroek south, Schiebroek north and 110 morgen. The ambition of the heat party is to further expand the heat network in the area and to realize a geothermal source.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Agniessebuurt-Oost	Area approach natural gas-free	619 homes of Havensteder are expected to be natural gas-free by 2030 and 269 homes of private owners are intended to be natural gas-free by 2030.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Bospolder Tussendijken I aardgasvrij	Area approach natural gas-free	1345 homes of Havensteder will almost certainly be natural gas-free in 2026, including 7 pieces of municipal real estate and an intended 255 homes from private owners.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Heindijk aardgasvrij	Area approach natural gas-free	In 2022 and 2023, 323 homes (261 homes from Woonbron, 11 Heimstaden and 51 private owners) and 44 weq utility were connected. The remaining 47 homes will be connected in 2025. In 2027, Hef Wonen will join with 192 homes. We aim for the rest of the district to be natural gas-free by 2030.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	IJsselmonde: Woonbron aardgasvrij	Vattenfall and Woonbron signed a portfolio deal in 2019 for connecting homes in Ijsselmonde. This deal is now being executed.	1371 homes of Woonbron are or will be natural gas-free by 2025 at the latest.	The future effects have been estimated by the DCMR**

Built environment	Natural gas free	Ongoing	Ommoord aardgasvrij	Market initiative and exploration of natural gas-free.	3400 homes owned by housing corporations and private individuals are intended for 2030. WIS has been requested for 2400 homes and 1000 homes are located along an existing pipeline.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Pendrecht-Noord aardgasvrij	Area approach natural gas-free	Most homes in Pendrecht will be natural gas-free by 2030.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Pendrecht-Zuid aardgasvrij	Area approach natural gas-free	By 2030, most homes in Pendrecht will be natural gas-free. For 972 homes from the approximately 1900, an intention has now been received to switch to district heating: of these, 781 homes are individually heated and 191 collectively (block heating).	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Prinsenland Het Lage Land aardgasvrij	Area approach natural gas-free	5050 homes from private owners and 4750 homes from housing corporations Havensteder and Woonstad are intended until 2030	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Reyeroord-Oost aardgasvrij	In order to connect existing buildings to the heat network, an area-specific approach is needed that offers everyone an alternative to natural gas and keeps the social costs of the energy transition as low as possible. In the analysis, Reyeroord emerged as a suitable district for the roll-out of a heat network. This is because the heat network already runs through the area, the housing corporation in Reyeroord will also connect its property, there is a wide variety of buildings and the street in the district already has to be opened for a large part for a sewer replacement. Social marketing was used to map out the wishes of residents, their needs and ideas and how best to approach people for topics such as making the home more sustainable and connecting the home to the heat network.	With natural gas-free Reyeroord, we aim to achieve the following goalsThat Reyeroord will be natural gas-free by 2035:That all homeowners will have had the opportunity to connect to district heating, the natural gas alternative that the municipality supports, by 2030:That this switch to district heating is affordable for homeowners in Reyeroord, and that they are satisfied with the municipality's approachThat homeowners can make a well-informed decision on how to natural gas-free. That linkage opportunities are identified and, where possible, capitalized on.- 1197 homes of private owners are intended to be natural gas-free by 2030.	The future effects have been estimated by the DCMR**
Built environment	Natural gas free	Ongoing	Reyeroord-West aardgasvrij	In order to connect existing buildings to the heat network, an area-specific approach is needed that offers everyone an alternative to natural gas and keeps the social costs of the energy transition as low as possible. In the analysis, Reyeroord emerged as a suitable district for the roll-out of a heat network. This is because the heat network already runs through the area, the housing corporation in Reyeroord will also connect its property, there is a wide variety of buildings and the street in the district already has to be opened for a large part for a sewer replacement. Social marketing was used to map out the wishes of residents, their needs and ideas and how best to approach people for topics such as making the home more sustainable and connecting the home to the heat network.	With natural gas-free Reyeroord, we aim to achieve the following goalsThat Reyeroord will be natural gas-free by 2035:That all homeowners will have had the opportunity to connect to district heating, the natural gas alternative that the municipality supports, by 2030:That this switch to district heating is affordable for homeowners in Reyeroord, and that they are satisfied with the municipality's approachThat homeowners can make a well-informed decision on how to natural gas-free. That linkage opportunities are identified and, where possible, capitalized on.- 196 homes from private owners and 272 homes from Woonbron are or will be natural gas-free by 2025 at the latest.- 722 private owners have submitted an interest map and are expected to be natural gas-free for 2030- 1043 homes intended for 2030.	The future effects have been estimated by the DCMR**
Built environment	Energy saving	Done	Efficiente en intelligente straatverlichting	Public lighting in Rotterdam consists of 106,900 luminaires (lamps). This lighting consumes 22.7 million kWh on an annual basis. This corresponds to the average electricity consumption of more than 9,100 households. Already, 6 million kWh of electricity is saved annually (the electricity consumption of more than 2,400 households). If all public lighting is converted to LED, including a dimming regime, energy will be saved by approximately 30% compared to current consumption.	RUGGEDISED project R11. Replaced street lighting fixtures throughout R'dam with LED incl remote monitoring sensors. By June 2022, some 60,000 luminaires have now been replaced, saving 6 million kWh of electricity per year, which is equivalent to the electricity consumption of more than 2,400 households. The task for the next 3 years is to have replaced all 100,000 luminaires. An acceleration has been initiated because otherwise this operation would take another 25 to 30 years. The plan is that 15,000 luminaires will be replaced annually.	The effects have been calculated by the DCMR*
Built environment	Energy saving	Done	Isolatiesubsidie kleine VvE's	VvEs (with a maximum of 7 apartments) could apply for a subsidy for insulating their building. A VvE had to have at least one part of the building insulated, such as the roof, the façade or the ground floors.	VvEs, with a maximum of 7 apartments, can apply for this subsidy for insulating their building. A VvE only needs to have one part of the building insulated. Think of the roof, the ground floors, a façade or windows. We set requirements for the insulation value, the environmental quality of the insulation materials and there are some additional requirements for a healthy indoor environment. The VvE receives the subsidy in advance of taking the measures. The subsidy amounts to a maximum of € 1,500 per apartment and a maximum of € 10,000 per small VvE, up to a maximum of 50% of the costs. In total, there is € 450,000 in the subsidy pot	The effects have been calculated by the DCMR*

Built environment	Energy saving	Done	Verduurzamingspakketten	With this project, we set up a process of unburdening in which Rotterdammers were helped with insulation plans from the initial idea to implementation.	Project is closed. 136 homes reached; 163 measures implemented. This is without solar panels (33 homes).	The effects have been calculated by the DCMR*
Built environment	Energy saving	Done	Energiemaatregelen en verduurzaming door VVE Netwerk Rotterdam (Klimaatdeal #51)	The VvE Network Rotterdam, founded in 2020, wants to bring Owners' Associations into contact with each other to learn from each other. This climate deal will encourage Associations of Owners in Rotterdam to make their housing complexes more sustainable.	Round. Integral part of the sustainability program for VvEs.	The effects have been calculated by the DCMR*
Built environment	Energy saving	Done	Participatie platform (Klimaatdeal #14)	The aim of the consultation platform is to stimulate the implementation of initiatives in the field of sustainability, clean energy, circularity and employment, for example. This will make these initiatives more promising and the energy transition will be accelerated and scaled up.	The climate deal has been successfully completed. Discussions were held with these parties about how they could be involved in the implementation of climate policy. As a result, a VvE platform has emerged.	The effects have been calculated by the DCMR*
Built environment	Energy saving	Done	Isolatiesubsidie grote VvE's Pendrecht aanvragen	Large Owners' Associations (VvEs) in Pendrecht with at least 8 apartments can receive a subsidy if, in addition to maintenance work, they accelerate at least 1 insulation measure. This makes this scheme easily accessible for owners in a VvE with less capital. The insulation subsidy can be applied for from 1 January 2020 to 31 October 2023, or until the budget runs out. The effect of the scheme is that by increasing the quality of construction and living, all residents in the building not only experience more living pleasure and comfort, but ultimately also consume less natural gas, receive a lower energy bill and emit less CO2.	Large Owners' Associations (VvEs) in Pendrecht with at least 8 apartments can receive a subsidy if, in addition to maintenance work, they accelerate at least 1 insulation measure. This makes this scheme easily accessible for owners in a VvE with less capital. The insulation subsidy can be applied for from 1 January 2020 to 31 October 2023, or until the budget runs out. The effect of the scheme is that by increasing the quality of construction and living, all residents in the building not only experience more living pleasure and comfort, but ultimately also consume less natural gas, receive a lower energy bill and emit less CO2.	Impact is < 0.1 kton. See DCMR report for details**
Built environment	Energy saving	Done	Save the Homes	In order to make more private homes more sustainable, work is being done on the development of a citizen hub (an integrated housing renovation service) at district level. The aim of the project is to facilitate homeowners to determine a working method based on practical experience.	In Hoogvliet, the objective was to achieve 30 homes with a total of 91 measures: a total of 29.5 tonnes of CO2 reduction. This is an average of 21% Energy savings (incl. production). There are several results to report in Prins-Alexander. In 2022-2023, a guidance process was started for 16 comparable homes on the same street. In the lead is energy cooperative Alex Energie. A handyman team / construction collective has been set up especially for this project. Out of the 16 homes, 9 have gone through a very collective, deep renovation process. 6 of the 9 homes have become natural gas-free. 193 solar panels have been installed on the roofs of the 9 homes.	Impact is < 0.1 kton. See DCMR report for details**
Built environment	Energy saving	Initiative	GAI koopwoningen	This project contributes to Main Objective 2 Energy transition in the built environment/ 1. Energy saving and making the housing stock more sustainable. We are going to help owners through area-specific approaches to insulation. In 2023, we will start with three approaches. We want to reach about 4,000 homes with growth to 16,000 by 2030, if there is also money for that. Focus on areas that meet the following requirements: relatively many poor energy labels (E, F and G), relatively low WOZ value.We make owners an offer to insulate per area. This ensures that homes are prepared for medium-temperature or sometimes low-temperature heat solutions (for natural gas-free), consume less energy and that residents get a better grip on their energy bills. Part of future-proof living.	4000 homes an insulation measure. 2000 in three area-specific/collective insulation approaches and 2000 in the insulation approaches in the natural gas-free areas. Start in 2023 with a term of 4 years. The amount of savings depends on the type and number of insulation measures per home.	0,6 kton**
Built environment	Energy saving	Initiative	Energieloket 2.0	Every municipality is expected to have an Energy Desk. Contract with last Energy Desk has expired. That is why we have to select a new counter by means of a tender.		The future effects are still being assessed by the DCMR***
Built environment	Energy saving	Ongoing	0% lening verduurzamen VvE's	A 0% interest loan for VvEs In the focus districts urban renewal, so that when tackling the sustainability of the private housing stock, owners in VvEs also choose to take sustainability measures.	65 loans (500 homes)	The future effects have been estimated by the DCMR**
Built environment	Energy saving	Ongoing	Leenfonds verduurzaming en verbeteren van panden/woningen ETF-G	The energy transition loan fund is a financing instrument of the municipality. From 2021, the energy transition loans intended for building sustainability and improvement will be available. Private individuals, homeowners, VVEs, small businesses and social organizations can apply for a loan.	The aim is to lower the financing threshold for property owners, because residents, VvEs (large and small) and small businesses, among others, have the opportunity to borrow money at a relatively low interest rate for the sustainable maintenance of their property.	The future effects have been estimated by the DCMR**

Built environment	Energy saving	Ongoing	Verduurzaming VvE	VvEs are guided in drawing up a sustainable Long-Term Maintenance Plan (DMJOP), including the necessary decision-making within the VvE, market request and financing.	50 VvEs (30 large and 8 or more apartments) and 20 small (7 or fewer apartments) participate in a sustainability advice and support process (= 1,000 apartments) per year. Expected result: 20-40% reduction in energy demand. Implementation has started. The guidance for large VvEs has 2 phases. PHASE I: QUICKSCANPHASE II: ORIENTATION PHASEFor the 58 HOAs that started the advisory process from 2022 onwards, 14 HOAs have now completed both phases. (state of affairs reference date 15-08-2024)PHASE I48 VvEs have gone through PHASE I, of which 14 VvEs stopped the guidance after PHASE I.9 VvEs are still going through PHASE I1 VvE has stopped early. PHASE II14 VvEs have completed PHASE II16 VvEs are still going through PHASE II5 VvEs are 'on hold' (for various reasons)The aim is to have completed all ongoing processes by mid-2025.	0,8 kton**
Built environment	Energy saving	Ongoing	Prestatieafspraken corporaties	Working together with the housing corporations with homes in Rotterdam to make their homes more sustainable. This can be through: natural gas-free, insulation, solar panels, tackling excessive energy costs, circularity, adaptation and e-charging. In addition, housing associations and the municipality are working together on an action plan to remove obstacles to sustainability.	The agreements can be divided into process agreements and agreed numbers. The agreed concrete results in terms of numbers are: insulate 3,600 homes with an E, F, G energy label, make at least 4,084 homes natural gas-free and install at least 10,000 solar panels on roofs.	15,6 kton**
Built environment	Energy poverty	Done	Energiearmoede bestrijden door coaching	Handing out 32000 Energy Boxes to Rotterdammers who are most sensitive to energy poverty, of which 15000 including a consultation or energy handyman.	The implementation was carried out completely according to plan: 15,000 boxes distributed at events and 585 times coaching at home.	The effects have been calculated by the DCMR*
Built environment	Energy poverty	Done	ETB: Energiebesparing programma bij particulieren: inzet energiecoaches	Training energy coaches.	Coached 200 families and distributed 17000 Energy Boxes	The effects have been calculated by the DCMR*
Built environment	Energy poverty	Done	Gebiedsaanpak Pendrecht: Energiecoaches	The aim of the project is to make the energy transition more accessible by deploying so-called energy coaches from the neighbourhood. In addition to professionals, energy coaches can also be local residents who give other local residents quick energy-saving advice. They are trained for this.	Various activities have been carried out in the Pendrecht district in the context of awareness of energy saving. Activities 2022. 1. Group information on energy saving to 6 language groups (60 people) and 1 group of Yemeni refugees (15 people). 2. Radiator foil: free equipment installed in 55 homes. Another 210 people specifically provided information about this. 3. Door-to-door action: a draught strip was offered free of charge at 348 addresses, installed and information about energy saving was given. 4. Bi-weekly consultation hour on energy-saving behavior in living room natural gas-free Pendrecht.	The effects have been calculated by the DCMR*
Built environment	Energy poverty	Done	Energievouchers voor huurders	The project focused on tenants and offered energy saving packages and energy saving advice to households. Little attention is paid to this group in existing national and local schemes. In addition to awareness, the aim is to ensure that tenants apply small energy-saving measures (LED lamps, radiator foil, etc.) or energy-saving advice and are more aware of their energy consumption.	This budget was spent on reaching 2,222 tenants with an energy-saving package (such as LED lamps, draught strips and radiator foil). Or an energy saving advice worth 90 euros. The budget has been used as a supplement to the budget from the central government through the Energy Use Reduction Scheme; since it was only aimed at homeowners. The vast majority of tenants opted for energy-saving products. They were able to place an order themselves via a webshop and/or were approached by local organizations (including the Energy Bank and language/environmental coaches Stichting Pauw in the Bospolder-Tussendijken district) that are committed to energy savings in combination with combating energy poverty.	The effects have been calculated by the DCMR*
Built environment	Energy poverty	Ongoing	Collectieve energiecoaching	During existing group meetings, Rotterdammers receive information about energy savings and also receive small energy-saving products to take home. This is organized by the Energy Bank.		0,1 kton**
Built environment	Energy poverty	Ongoing	Convenant energiearmoede met woningcorporaties	A significant proportion of tenants affected by energy poverty live in housing corporations. The housing corporations and the municipality are working together to reduce the energy consumption of the target group.	The municipality is making an amount of € 12,600,000 from the SPUK available to the corporations through a subsidy. This amount will be used to reduce the energy costs of these tenants through sustainability measures that the housing associations implement extra or faster.	Impact is < 0.1 kton. See DCMR report for details**

Built environment	Energy poverty	Ongoing	Energieklussers	Energy fixers offer energy-saving advice and apply small energy-saving measures to Rotterdammers who have difficulty paying their energy bills and have an income of up to 200% of the social minimum income.	The energy handyman applies an average of € 100 worth of small energy-saving measures and looks at which mix of measures has the most impact on the energy bill for each home.	0,8 kton**
Built environment	Energy poverty	Ongoing	Isolatiesubsidie appartementen tot 300000 euro	There is a subsidy scheme for VvEs with an energy label D or worse and homes with a WOZ value of up to €300,000. The scheme provides a subsidy of €1,000 per measure per home, with a maximum of two subsidized measures, and therefore a maximum of €2,000 per home (with a bonus of €1,000 per home for the use of insulating glass with window frames). A total of €2 million is available. The subsidy can be used for various insulation measures and connection to district heating, and can be combined with national schemes. Hosts can also participate.	Until the end of 2025, 2 million euros is available for making VvEs that may be affected by energy poverty more sustainable. This subsidy scheme is only available to VvEs with an average maximum WOZ value of 300,000 euros or lower. Guidance from VvE010 is a requirement. For each measure, 1000 euros will be reimbursed per apartment, with a maximum of two measures per apartment. For VvEs that use insulating glass with new window frames, a bonus of 1000 euros is available per apartment.	0,1 kton**
Built environment	Energy poverty	Ongoing	Pilot stimuleren overstap elektrisch koken	The energy transition in the built environment includes heating, cooking and hot tap water. Through a combination of our own investments, subsidy (for heating and cooking) and loans, we want to keep the costs manageable for the people of Rotterdam. Residents are most apprehensive about switching to electric cooking. Many residents have little financial space (60% of homeowners in Pendrecht have a low income). With this pilot, we unburden and offer subsidies to residents in neighborhoods where there is an ambition to become natural gas-free.	910 households to make the switch to electric cooking.	The future effects have been estimated by the DCMR**
Built environment	Energy poverty	Ongoing	Energieklusser+	Due to the increased energy prices, a group of Rotterdammers is struggling with Energy Poverty. They are finding it increasingly difficult to pay their energy bills, and are not always able to make their homes more sustainable in order to reduce energy consumption. The target group consists of tenants and homeowners. One way to reduce Energy Poverty is through the use of Energieklussers. The Energy Fixer immediately applies energy-saving measures to residents' homes and gives behavioral tips to reduce energy bills. Implementing small energy-saving measures is for Rotterdammers with an income of up to 200% WSM. For homeowners, expand the measures with medium-sized energy-saving measures such as installing bottom foil, replacing the ventilation box and hydronic balancing.	Implementing small energy-saving measures for Rotterdammers with an income of up to 200% of the social minimum income. For homeowners, expand the measures with medium-sized energy-saving measures if relevant. This involves installing bottom foil, replacing the ventilation box and hydronic balancing. It is estimated that at the end of the SPUK 17,500 home visits have been made.	The future effects are still being assessed by the DCMR***
Built environment	New buildings	Ongoing	Gemeentelijk vastgoed	The municipality uses many buildings. Replacing or renovating these buildings in the right way contributes greatly to making municipal real estate more sustainable.	We have two goals for making our real estate more sustainable: By 2030, we want to reduce CO2 emissions by 55%. To this end, we are going to replace or renovate 250 municipal real estate buildings to extend their lifespan. Buildings with a poor energy label are particularly affected. But beware, these new and renovated buildings are not yet energy-neutral. We want to achieve that, by 2050.In 2050 we want to achieve a 100% reduction in CO2 emissions. This is not possible at the moment because we currently only have enough money for normal maintenance, renovation and new construction that complies with current laws and regulations, with a small focus on sustainability (e.g. BREEAM Good or GPR 7.5).	10,4 kton**
Built environment	New buildings	Ongoing	Nieuwbouw duurzame gebiedsontwikkeling	With the Sustainable Area Development programme, we help planning teams and developers to make Rotterdam's sustainability ambitions concrete and include them in their projects. We do this by providing integrated sustainability advice for projects, developing tools and sharing knowledge.	The Sustainable Area Development programme has process objectives, not concrete numbers for homes, for example. This is because we are not directly responsible for these projects. Our goal is: sustainability is integrally included in all area developments from the start.	The future effects have been estimated by the DCMR**
Built environment	New buildings	Ongoing	Subsidieregeling duurzaam bouwen	For the realization of affordable housing, it is becoming increasingly difficult to include sustainable measures given the high construction costs. We are working on a subsidy scheme for housing corporations that could use a helping hand.	1. A subsidy scheme that stimulates sustainable construction. 2. Dozens of sustainable new construction projects of corporation homes. Sustainability is integrally included and the sustainable quality level is above the legal standards. 3. Insight into the current CO2 performance in relation to the (desired) Paris Proof homes.	The future effects have been estimated by the DCMR**

Business	Businesses	Done	Energievouchers voor ondernemers	With this project, energy vouchers will be made available to all entrepreneurs in Rotterdam's urban business parks. The voucher gives a 700 euro discount on performing an energy scan, roof scan for solar panels or energy-saving measure. We expect to achieve an investment with a multiplier of at least 5 (for every 500 euros, an investment of at least 2,500 euros). This will accelerate the use of sustainable energy within the built environment. The aim was to use the vouchers to encourage entrepreneurs to invest in making their building(s) more sustainable in the period 2020 - 2022.	In 2022, more than 200 entrepreneurs made use of an energy voucher and took energy-saving measures. Based on the first results, the CO2 savings achieved will be included in the city's calculations. Over the course of 2023, we will gain more and more insight into the results.	The effects have been calculated by the DCMR*
Business	Businesses	Done	Mobility City Campus	The Mobility Campus aims to become the campus of Europe in the field of mobility innovation. Product development, events and marketing are central to this. The establishment of companies is starting the campus development. Through an experience center, the innovation becomes accessible to a wide audience, which ultimately contributes to the acceleration of acceptance. This will make Rotterdam a 'living lab' in the field of mobility innovation that focuses on sustainability, energy transition and circularity. The contribution is intended for the further development of the business case by a private organization.	Project was aimed at the further development of the business case of a private organization. Since that organization is not present, the project has not gotten off the ground.	The effects have been calculated by the DCMR*
Business	Businesses	Done	Rotterdam The Hague Innovation Airport	The Rotterdam The Hague Innovation Airport (RHIA) programme aims to promote innovations for the Dutch aviation sector. Innovations that are aimed at a positive and sustainable impact on the environment of airports. RHIA focuses on reducing CO2 emissions from aircraft and (transport to and from) the airport. RHIA carries out projects around electric flying, clean fuel and the generation of sustainable energy from the sun, wind and hydrogen. Part of the programme is innovation and education projects that should lead to less impact on the environment (such as noise and CO2 emissions).	Results 2022: [redacted]. Collaboration with Zero Avia (hydrogen aircraft). [redacted]. RHIA H2 Challenge. [redacted]. Feasibility study hydrogen flying at RTHA. [redacted]. Research into maintenance training for sustainable flying. [redacted]. Tender for self-driving transport 'MARTHA'. [redacted]. Cooperation with SHELL (electric charging). [redacted]. Location determination of SAF pilot plant. [redacted]. Plan exhibition center innovations. [redacted]. Drone test flights at RTHA. Urban Air Mobility collaborations.	The effects have been calculated by the DCMR*
Business	Businesses	Done	Waste to Chemicals	Waste to Chemicals (W2C) ensures that waste can be turned into a product for which oil or gas have previously served as raw materials. This innovative project initiates circularity on a large scale between citizens, waste processing and industry.	Project did not go ahead.	The effects have been calculated by the DCMR*
Business	Businesses	Done	Verduurzamen bedrijventerreinen	The approach to making business parks more sustainable is part of the Work Locations Implementation Programme. The aim of the approach is to achieve a minimum of 50% CO2 reduction at the business park level by 2030 by saving energy in buildings and production processes by reusing energy and generating sustainable energy. This is done by encouraging entrepreneurs in business parks to invest in making their building(s) and business processes more sustainable.	In 2022, an Energy Potential Scan was carried out for 10 business parks. This provides insight into energy consumption and savings potential. In addition, a collective approach to sustainability has been launched at the Ommoord and Hoek van Holland business parks. In 2023, energy-saving measures will be implemented in both areas, for which a provincial subsidy has also been awarded.	The effects have been calculated by the DCMR*
Business	Businesses	Done	Verduurzamen van bedrijfsterreinen (Klimaatdeal #53)	Entrepreneurs, local partners and urban parties are joining forces on energy saving, generation and mobility. In this way, they realize a tailor-made approach to making Rotterdam's business parks more sustainable.	Realisation of a tailor-made approach to make Rotterdam's industrial roads more sustainable	The effects have been calculated by the DCMR*

Business	Businesses	Done	Programma versnellen Innovatie Rotterdams MKB	MKB010NXT: The broad SME sector is the mainstay of Rotterdam's economy and employment. In addition to frontrunners, SMEs also have a large 'peloton' that finds it more difficult to keep up with the high pace of innovation and has difficulty shaping necessary innovations. This while there are great opportunities for sustainability and digitization. The Accelerating Innovation Rotterdam SME programme focuses on increasing awareness (information and inspiration), overview (knowledge, financing) and action perspective for SMEs at large. We are developing the programme with partners such as MKB Rotterdam-Rijnmond, VNO-NCW Rotterdam, Chamber of Commerce, Rabobank, Ministry of Economic Affairs and Climate Policy and educational institutions. The program focuses only on those things that are beyond the reach of SMEs themselves. With this, we want to encourage SMEs to start the transition to more circular, sustainable and digital business operations.	This is a program part of the Economics department. Various things have been realized. For example, in 2019, 150 SMEs were present at the SME Day 'your waste is worth gold'. Furthermore, the project 'frontrunners circular restaurants' has recently been launched, the CIRCO project is running tracks in which SMEs get started with a circular design of their service or product, digital and circular goodie bags are available via ondernemen010, and a communication campaign is being developed. Continued via DTB.	The effects have been calculated by the DCMR*
Business	Businesses	Ongoing	MKB Duurzaamheidsvouchers	With this project, we offer SMEs (small and medium-sized enterprises) a helping hand city-wide in making their business premises more sustainable.	Every year, 500 SMEs help make their business more sustainable by means of an energy or roof scan.	2,8 kton**
Business	Businesses	Ongoing	Toekomstbestendig MKB Groeiversnelling	If Rotterdam also wants future economic returns, more activity and create new jobs in the field of sustainability, stimulating sustainability alone is not enough. Investing in innovative entrepreneurship that develops in the city is at least as important. So that new solutions, for example in the field of sustainability, also come from our city. From an economic perspective, we do this in different ways.	By focusing on four programmes and activities, investments are made in Rotterdam's innovation climate in a broad sense. In doing so, we create conditions that increase the opportunities for companies to come up with new solutions for CO2 reduction. By driving innovative entrepreneurship, innovation in various sectors gets going. It is necessary to focus and scale up innovations within SMEs so that they are applicable and effective on a larger scale. It contributes to the broad support among entrepreneurs in the city and helps the smaller companies in the city further in their growth. The accompanying SME action programme was adopted by the Municipal Executive in March 2023. The expenditure is in line with this programme to make the transition to an optimal innovation ecosystem through projects.	The future effects have been estimated by the DCMR**
Business	Businesses	Ongoing	Kantoorpanden energielabel C	Uitvoering van wet: kantoorgebouwen moeten minimaal aan energielabel C voldoen per januari 2023. Dit houdt een primair fossiel energiegebruik in van maximaal 225 kWh per m2 per jaar.	DCMR heeft eerder gerekend aan de maatregel om alle kantoren met label D of slechter naar label C te krijgen Het ging daarbij om 3273000 m2 kantoren waarbij een aanname is gedaan voor de verdeling over de energielabels en het gasverbruik van een kantoor per m2.	10 kton**
Business	Businesses	Ongoing	Maaskoeling Nieuwe Luxor	Connection of the New Luxor (municipal real estate) to mesh cooling by Eneco's cooling network. The cold at Nieuwe Luxor is now supplied with (conventional) cooling machines on the roof. These machines will need to be replaced in 2021, so this creates a natural replacement moment and the opportunity to become more sustainable.	Reduction of CO2 emissions of 73 tons per year.	The future effects have been estimated by the DCMR**
Business	Businesses	Ongoing	Toekomstbestendig MKB - Circulair ondernemerschap	The commitment to Circular Entrepreneurship is aimed at accelerating the transition of Rotterdam entrepreneurs to circular working. We do this for starting and existing SMEs who want to do business in a circular way. From combating food waste in the hospitality industry to innovations in the field of recycling.	We strive for more efficiency with raw materials, better separation of waste streams, less (food) waste, longer lifespan of machines, reuse of materials, etc. In doing so, we put Rotterdam in the spotlight as a hub for secondary raw materials and a circular exemplary city.	Scope 3 effect wordt niet meegenomen in de DCMR berekeningen.
Business	Businesses	Ongoing	Verduurzamen MKB detailhandel en horeca: Energie Klus & Coach aanpak	The SME receives free energy advice and in addition, a budget of EUR 500 worth of energy-saving measures is installed, so that the SME will immediately start saving. Finally, SMEs will receive support for 1 year in taking further sustainability measures.	The aim is that approximately 1,000 - 1,500 SMEs in the neighbourhoods will immediately save 5-10% energy and be encouraged to become more sustainable. We aim to save at least 5.5% energy per year on average. A pilot was launched in the fourth quarter of 2022 in a number of neighbourhoods that are hit hardest by rising and uncertain energy prices. The results are positive. A scale-up plan is being worked on for the coming years, with the ambition to support approximately 1,000 to 1,500 SMEs with this. This contributes to a future-proof SME.	The future effects have been estimated by the DCMR**

Business	Businesses	Ongoing	verduurzamen werklocaties (bedrijventerreinen)	In recent years, corona and the energy crisis have taken a big toll on small and medium-sized businesses. Lake Entrepreneurs are becoming more aware of future-proof entrepreneurship. It is becoming increasingly important that you make your company more sustainable, also because government agencies already have a policy for this or are busy making rules for this. Offices must have at least energy label C by 2023 and from 2025 the Inner city prohibited for vans and trucks that run on fossil fuels (diesel or petrol). Since 2040, this ban will apply everywhere. Entrepreneurs who are large consumers of energy must comply with the obligation to provide information according to the Environmental Management Act. It is only a matter of time before there will be more laws and regulations for all entrepreneurs. With the Sustainable Work Locations approach, the entrepreneur is helped with energy savings, energy (solar panels) and with making his building and the business park more sustainable. He is relieved of the burden of applying for subsidies, receives information about his building and installations and is relieved of the burden of taking energy-saving measures. In doing so, this programme contributes to a sustainable economy with future-proof work locations and makes entrepreneurs in the city resilient and ready for the future.	CO2 reduction at work locations (business parks, offices, catering and retail)	The future effects have been estimated by the DCMR**
Business	Businesses	Ongoing	Verduurzaming bedrijventerreinen door inzicht, advies en ondersteuning	The approach aims to achieve a 50% CO2 reduction at company site level by 2030 through energy savings in buildings, production processes and through the generation and reuse of energy. This is done by encouraging entrepreneurs in business parks to invest in making their building(s) and business processes more sustainable. An Energy Potential Scan is carried out, companies are individually / collectively stimulated and supported in investing in sustainability.	The intended result is a 50% CO2 reduction by 2030. An annual saving on business parks of 5.5% per year in the period 2023-2025. In recent years, 15 Energy Potential Scans (EPS) have been carried out. In the coming years, 2 additional EPS per year will be carried out.	The future effects have been estimated by the DCMR**
Circularity		Done	Circular waste valorisation projects	The polymerization of polyester textile waste is an efficient technique for converting polyester waste into polyester raw material of so-called 'virgin' quality. This is an important application for making textile waste circular. Compared to the production of raw material from oil, this results in a saving of 62% CO2. In addition, it prevents the use of fossil fuels for the production of polyester.	Various feasibility studies have been carried out.	Scope 3 effect is not included in the DCMR calculations.
Circularity		Done	Selective Plastic Extractie	The subsidy is for the realization of a demo installation to chemically dissolve plastic films. After which the pure plastic raw material can be tapped. This is a breakthrough, never before could plastic waste films be processed back into a raw material.	The demonstration installation was delivered according to plan. This is currently being used to test different qualities of plastic.	Scope 3 effect is not included in the DCMR calculations.
Circularity		Done	Umincorp	Umincorp: recyclet PET-afval recyclet tot een hoogwaardige grondstof voor nieuwe plastics	Factory on the Keileweg (and branch in Amsterdam)	Scope 3 effect is not included in the DCMR calculations.
Circularity		Done	Circular Retail in the city centre (Climate Deal #55)	UDS and the municipality of Rotterdam want to experiment with making the center of Rotterdam more sustainable by means of concept or pop-up stores with innovative, sustainable retail concepts. Consider, for example, the reuse of packaging, stimulating sales of products that last longer, or products that are easier to recycle or repair (locally). Work has been done on cooperation and knowledge exchange between the parties involved. This formed coalition will continue to work on making existing shopping centres more sustainable by collecting textiles, improving source separation of organic waste, making shop windows more sustainable and interior offerings.	A coalition aimed at cooperation and knowledge exchange between the parties involved.	Scope 3 effect is not included in the DCMR calculations.

Circularity	Done	Geen Woorden Maar Draden (klimaatdeal in ontwikkelen #58)	The Netherlands is a major importer and exporter of used consumer textiles. A significant proportion of the sorters of these textiles are located around the port of Rotterdam: 55% of the sorters are affiliated with the national trade association Vereniging Herwinning Textiel (VHT). These process a total of more than 126,000 tons of textiles per year. All in all, a huge Rotterdam textile mountain, a growing part of which is not sellable on the second-hand market. The Rotterdam region seems to be the ideal location for the realisation of the infrastructure for post-sorting and chemical recycling. In this Climate Deal, governments and market parties are actively working together to develop the investment proposition and attract financing for the realisation of textile post-sorting and recycling in the Rotterdam region.	A feasibility study and an investment proposition	Scope 3 effect is not included in the DCMR calculations.
Circularity	Done	Gezonde en duurzame Lijnbaan (Klimaatdeal in ontwikkeling #57)	The climate deal includes a feasibility study with market parties into a different catering offer and the possibilities for sustainable and circular retail concepts and manufacturing companies in the Korte Lijnbaan. The aim is to arrive at broadly supported, commercially feasible concepts for area development on the Korte Lijnbaan that can serve as an example for the rest of the city. At the end of 2022 - beginning of 2023, there was a challenge under the banner of the Nieuwe Nassen to add healthier and more sustainable choices to the menu. This has resulted in awareness and small changes among the hospitality entrepreneurs, who are making an impact given the number of visitors. In 2023, a vision for the Healthy and Sustainable Lijnbaan was drawn up. In 2024, it was explored whether partners are enthusiastic about initiating concrete changes.	Healthy and sustainable Lijnbaan	Scope 3 effect is not included in the DCMR calculations.
Circularity	Done	De Erasmus Universiteit creëert positieve impact (Klimaatdeal #48)	Erasmus University is committed to two lines: (1) Erasmus University will, among other things, map out the ecological footprint annually and develop a roadmap to a sustainable campus. (2) Start a Sustainability working group that focuses on making education more sustainable and use the campus as a living lab to experiment with applied sustainability research. Partly as a result of the corona impact, the intended cooperation and expansion to other educational institutions has not yet got off the ground sufficiently. This will be the stake for 2023.	Approach to making schools more sustainable	Scope 3 effect is not included in the DCMR calculations.
Circularity	Done	Scheiden van gft in studentenflats (Klimaatdeal #45)	By 2024, vegetable, fruit and garden waste (GFT) must be collected separately throughout Rotterdam. At the moment, this is done in most low-rise homes, but not in all high-rise buildings. We especially want to make students aware of this theme.	Awareness in student flats about organic waste.	Scope 3 effect is not included in the DCMR calculations.
Circularity	Done	Zero Food waste pakketten voor studenten (Klimaatdeal #49)	Every week, students can receive such a package of fruit and vegetables in exchange for 3 volunteer hours per month at the Zero Foodwaste Foundation	Deal is closed (no to little activity anymore)	Scope 3 effect is not included in the DCMR calculations.
Circularity	Ongoing	Circolab Maritime	The maritime manufacturing industry is an important part of the maritime cluster. There are many shipyards in the region active with production, maintenance and refits (conversions) for various types of ships. These shipyards work closely with all kinds of (technical) suppliers who are highly regarded (worldwide) in the field of quality and innovation. The maritime manufacturing industry is facing a major sustainability challenge. This involves reducing emissions and waste in production chains, as well as designing and building sustainable ships for the entire life cycle. In response to the major sustainability challenge, the Circolab was set up to meet the needs of companies at chain level by working together with knowledge institutions, companies and governments and actually getting solutions implemented from the drawing board.	To help as many maritime manufacturing companies as possible to devise and implement practical solutions at chain level to make the manufacturing industry (in particular a focus on refit, because it is a growth market) circular, sustainable and future-proof. In this way, we can strengthen the local economy and at the same time profile Rotterdam as a forerunner when it comes to maritime innovations and circularity.	Scope 3 effect is not included in the DCMR calculations.

Circularity		Ongoing	Programma Rotterdam Circulair	Rotterdam Circular is working on the development of an economy in which Rotterdam uses raw materials and materials throughout the chain as efficiently as possible. A large part of the CO2 emissions in Rotterdam are caused by the use of raw materials and materials. A circular economy therefore makes an important contribution to CO2 reduction. Through the programme, we are working on less, better, longer and reuse of materials and raw materials. This contributes to a greener and more sustainable Rotterdam. And of a city that is healthier, cleaner and more economically resilient. We are working on 3 chains: Construction, Organic Flows and Consumer Goods and with 3 user groups: Municipal commissioning and purchasing, Entrepreneurs and Rotterdammers. We expect to make the most impact within these agendas.	The raw materials transition is not an end in itself. It is a means to restore the balance between people, the environment and the economy. A circular economic system contributes to three overarching goals: 1) A greener and more sustainable Rotterdam, 2) A more economically resilient Rotterdam, 3) A healthier and cleaner Rotterdam. By 2030, the municipality wants the use of minerals, metals and fossil raw materials to be 50% less. By 2050, Rotterdam will be fully circular.	Scope 3 effect is not included in the DCMR calculations.
Circularity		Ongoing	Samenwerking 'Rotterdam tegen Verspilling' (Klimaatdeal #46)	Prevent food waste	Collaboration with partners in the city. A Meetup XXL will be organized in 2024 and the initiative is still at Gastvrij Rotterdam. In September (week against food waste), the Nieuwe Nassen and Shareaty serve free soup from residual flows on the Stadhuisplein. Catering and healthcare institutions can also buy this soup.	Scope 3 effect is not included in the DCMR calculations.
Circularity		Ongoing	Stimuleren van een meer plantaardig dieet (Klimaatdeal #47)	Stimulate plant-based diet	A behavioural survey and campaign New Nasties. A campaign aimed at Rotterdammers about plant-based food. In the week of the Circular Economy 2024, two waste-free dinners took place.	Scope 3 effect is not included in the DCMR calculations.
Circularity		Ongoing	Ontwikkeling aanpak Circulair afdeling Vastgoed	The lack of a structural approach at the Real Estate department to always be able to include circular principles in the development, management and maintenance of municipal real estate. In order to develop and establish this approach (starting points and coverage options), a DTB budget has been applied for and obtained.	By structurally accelerating the circular transition with pilot projects and results	Scope 3 effect is not included in the DCMR calculations.
Energy system	Solar	Done	Opwek zonne-energie in de stad programma	The programme Generating solar energy in the city includes research into and experiments with the scalability of generating solar energy within the built environment and on or along infrastructure. This should provide insight into which experiments have sufficient potential to scale up solar energy. This is being investigated within the three experiments, namely: solar energy in Next Generation Residential Areas, solar roofs in parking lots and generating solar energy on and along highways.	In a regional context, project A15 (solar along motorways) has been started but is still in the research phase. In addition, a study has been started into Solar Carports at Hockey Club Rotterdam for the Solar Carports component.	The effects have been calculated by the DCMR*
Energy system	Solar	Done	Werk maken van zon	Climate Fund Rotterdam has been able to financially support the purchase of 4500 solar panels for residents' initiatives, VVEs and social institutions.	A municipal service point has been opened for companies where independent advice can be obtained for everything related to the development, construction and operation of solar energy. As a result, more than 50,000 solar panels have been realized more quickly.	The effects have been calculated by the DCMR*
Energy system	Solar	Done	Zon op gemeentelijk vastgoed	Research which roofs municipal real estate are suitable for solar energy.		The effects have been calculated by the DCMR*
Energy system	Solar	Done	Ontwikkelen van productie van duurzame energie uit de haven (Klimaatdeal #36)	It is being investigated what new possibilities there are until 2030 to develop wind and solar energy generation in the port area. The aim is to gain a clear understanding of these opportunities and to make optimal use of them, together with parties in the port area.	In collaboration with the port authority and Rijkswaterstaat, an external study has been carried out into the possibilities for generating solar and wind energy in the port. Discussions have been held about the results with the regulators and companies involved. There are opportunities for modest expansion of wind energy generation, many opportunities for the generation of solar energy. These opportunities are being worked out in more detail.	The effects have been calculated by the DCMR*
Energy system	Solar	Done	Parkeerterreinen overkappen met zonnepanelen-daken (Klimaatdeal #42)	Parking lots that are suitable for covering with solar panel roofs are selected and then further developed. Other functions can also be filled, such as electric charging stations, docking stations for electric bicycles and/or energy storage.	Research has yielded suitable locations in parking lots owned by the municipality of Rotterdam. The final shortlist forms the basis for further development of this deal. In order to activate private parking lots, the municipality of Rotterdam, together with the company Sobolt and the Province of North Holland, developed an interactive online tool in 2020, www.parkthesun.com .	The effects have been calculated by the DCMR*

Energy system	Solar	Done	Zon op bedrijfsdaken in het stedelijk gebied (Klimaatdeal #43)	In order to provide all suitable roofs on business parks with solar panels and, where possible, an application of wind energy, park managers and business associations are facilitated with independent advisors who take the subsidy application off their hands. In this way, the motion adopted by the city council 'a roof full of energy' is being implemented. It concerns the Hoogvliet-Gadering, Feijenoord-Stadionweg and Rozenburg-Pothof industrial sites.	In 2020 - 2022, business associations were supported at six business parks to collectively realize solar panels. This has led to investments among entrepreneurs, using SDE+ subsidies and subsidies from the province. In addition to the collective approach, the subsidy scheme 'Energy vouchers for entrepreneurs on business parks' was launched for the individual entrepreneur in 2021: a roof scan for solar panels. This scheme expired at the end of 2022 and will be continued in a new form for all SMEs in 2023.	The effects have been calculated by the DCMR*
Energy system	Solar	Done	Zonnepanelen op bedrijfsdaken in het havengebied (Klimaatdeal #37)	Many companies in the port area are considering solar panels on their roofs, preparing for this, approaching developers, being approached or receiving independent advice from a municipal advisor. As a result, there is a lot of activity around the larger company roofs. SDE+ has been granted for many companies (more than 40 MWp).	Many companies in the port area are considering solar panels on their roofs, preparing for this, approaching developers, being approached or receiving independent advice from a municipal advisor. As a result, there is a lot of activity around the larger company roofs. SDE+ has been granted for many companies (more than 40 MWp).	The effects have been calculated by the DCMR*
Energy system	Solar	Done	Zonne-energie in woonwijk Prinsenland – Het Lage Land (Klimaatdeal #41)	It is being investigated how the generation, storage and distribution of solar energy can be linked. On the basis of the report 'Verzicht elektriciteitsneutraal Prinsenland-Het Lage Land', the municipality is making agreements with Woonstad and Stedin, aimed at organizing consortia that will realize experiments or pilots.	The letter of intent between the municipality, Sportbedriif and Energie voor Rotterdam for 4 cooperative roofs with solar energy on gymnasiums has been signed. This has resulted in the realization of the first 2 roofs in Q1 2023 Solar energy will be delivered at vv Alexandria '66 Q1 2023.Storage of clean energy at Alexandria '66 has not proven feasible under the current circumstances.	The effects have been calculated by the DCMR*
Energy system	Solar	Done	SES - LENS	LENS has developed a device for the direct reading of solar PV installations. The existing so-called data loggers were too expensive, but with the new logger an affordable alternative was realized. This innovation offers an affordable solution to gain more insight into the performance of solar panels and any defects. The data logger also makes it possible for users to develop business cases for battery storage.	In the feasibility study, a prototype of the data logger was successfully tested at 33 locations. The data logger was tested together with the Rotterdam housing corporation Woonbron. In addition, standardization of the product and the business case was examined. The developed data logger is now being used nationwide and provides better insight into the performance and defects of solar PV installations	The future effects have been estimated by the DCMR**
Energy system	Solar	Initiative	Zon op land en water Slufter OER	The realization of a solar field on the Slufter by HBR, the Central Government Real Estate Agency and Rijkswaterstaat. They are in the lead here, the role of the municipality is very limited.	By the end of 2026, 0.47km2 of sun will have been realized on the Slufter.	39 kton**
Energy system	Solar	Ongoing	Zon op daken coöperatieve daken	Energie van Rotterdam is realizing 90 collective solar roofs. Through the ETB, EVR is enabled to start up the organisation and revolving financing of start-up energy cooperatives. EVR also encourages the start-up of new energy cooperatives, and works on the professionalisation and representation of Rotterdam's energy cooperatives	By the end of 2026, 0.13km2 of solar will have been realized on cooperative roofs.	Impact is < 0.1 kton. See DCMR report for details**
Energy system	Solar	Ongoing	Zon op daken bedrijfsdaken	Municipal Service Point Solar for companies.	By the end of 2026, 1.6 km2 of solar will have been realized on company roofs.	20 kton**
Energy system	Solar	Ongoing	Innovatie circulaire zonnepanelen	Research into the potential for second-hand solar panels in the municipality of Rotterdam and encouraging the purchase of more sustainable panels (e.g. PFAS-free, easier to recycle, EU-made)	Learning from possibilities about circular solar panels.	The future effects have been estimated by the DCMR**
Energy system	Solar	Ongoing	Innovatie dataverzameling monitoring zon	Every year, the sun monitor shows how many m2 of solar panels there are in Rotterdam. This analysis is done using the aerial photo that is taken every spring (commissioned by OBI).	Annual analysis of the number of solar panels in place.	The future effects have been estimated by the DCMR**
Energy system	Solar	Ongoing	Innovatie zon op gevels	Research into subsidy options for solar panels on facades. Relaxing and standardizing rules for aesthetics for certain areas/situations. Visualising the potential of sun on facades. 2 pilot projects Sports company in progress. Project apartment complex of Woonstad made possible by Citylab. Facilitating existing initiatives.	Learning from the solar facades in the pilots, and inspiring the market to develop solar facades in more places.	Impact is < 0.1 kton. See DCMR report for details**
Energy system	Solar	Ongoing	Zon op daken scholen	School Roof Revolution relieves and supports schools on behalf of the municipality of Rotterdam in the installation of solar on roofs.	By the end of 2026, 0.09km2 of solar will have been realized in schools.	1 kton**
Energy system	Solar	Ongoing	Zon op daken vve WoCo particulieren	Municipality supports WoCos in accelerating the construction of solar on roofs by means of various innovative concepts. The municipality supports private individuals through collective purchasing campaigns for solar panels.	By the end of 2026, 0.5 km2 of solar will have been realized on the roofs of VVEs, WoCos and private individuals.	Impact is < 0.1 kton. See DCMR report for details**
Energy system	Solar	Ongoing	Zon op infra OER	Generate solar energy along highways.	By the end of 2026, 0.3 km2 of sun will have been realized along highways.	23 kton**

Energy system	Solar	Ongoing	Zon op infra Solar Carports	The municipality facilitates the construction of solar carports.	By the end of 2026, 0.1 km2 of solar will have been realized in parking lots.	Impact is < 0.1 kton. See DCMR report for details**
Energy system	Solar	Ongoing	Zon op infrastructuur van de gemeente Rotterdam	In May 2021, a motion was submitted asking the municipal executive: 1. map out which municipal infrastructure within the city limits can be equipped with solar panels, 2. where it is promising to apply this and 3. To investigate the possibility of making these locations available to energy cooperatives. An engineering consultancy carried out the requested potential study.	The final report was delivered in June 2022. At first glance, the potential for solar along infrastructure seems great. However, the research shows that many locations are excluded because the installation of solar panels at these locations is technically complex, financially unfeasible and/or spatially not possible or desirable. For the promising locations, we will talk to Energie van Rotterdam, the umbrella organization for Rotterdam energy cooperatives.	The future effects have been estimated by the DCMR**
Energy system	Solar	Ongoing	Zon op land en water Hoek van Holland	The realization of solar fields Hoek van Holland - Oranjebonnenpolder.	By the end of 2026, 0.12km2 of solar will have been realized on solar fields Hoek van Holland – Oranjebonnenpolder.	8 kton**
Energy system	Solar	Ongoing	Zon op land en water Schiebroek	The realization of solar fields Schiebroek.	0.01 km2 / 2MW will be realized.	1 kton**
Energy system	Solar	Ongoing	Zonnig Pendrecht	The immediate reason for this project plan is a subsidy obtained from the Ministry of the Interior for the realization of solar roofs through the concept of a social postcode rose. A social postcode rose means that residents of Pendrecht can receive a share in the solar roof provided they provide a social quid pro quo. From the area approach - Aardagsvrij Pendrecht, this project is known under the name: 'Sunny Pendrecht'. Recently, we have been working on a new variant of this project in which we have adapted the original project in design and scale. This new set-up/approach of Sunny Pendrecht fits in well with the program: 'Opportunities for West' and thus a claim is made for subsidy funds from the program: 'Opportunities for West'.	With the Sunny Pendrecht project, we want to tackle energy poverty by giving residents the opportunity to permanently reduce their energy bills with a small investment. This project focuses on residents of apartments in Pendrecht that are part of a VvE, both tenants and owner-occupiers. The municipality aims to generate a capacity of 750 Megawatts by 2030. Sunny Pendrecht translates this into the number of solar panels and the number of households that are helped in Pendrecht. In Pendrecht, 23 VvEs with a total of 17,500 m^2 of roof area are eligible. Our goal is to reach 3 VvEs with this pilot and to install at least 300 solar panels, which will help at least 35 households.	The future effects are still being assessed by the DCMR***
Energy system	Solar	Ongoing	SES - Rable zon op parkeerplaatsen	RABLE is developing an innovative solar carport system, based on a previously developed self-supporting solar panel system. The aim is to make the realisation of solar carports easier and more economically attractive. This innovation responds to the need for more efficient and cheaper solutions for solar energy infrastructures, with potential for large-scale application in urban areas. Ecorys expects that there will be approximately 80km2 of carports in the Netherlands. RABLE aims for 30-50% cost savings compared to current carport systems.	The project is a feasibility study into the solar carport. RABLE researches the market, which will lead to a market introduction plan. In addition, RABLE examines the business case and delivers a technical design. Finally, RABLE aims to set up a pilot, preferably at partner EMO in Rotterdam.	The future effects have been estimated by the DCMR**
Energy system	Solar	Ongoing	SES - Delfshaven lokalectriciteit	The Delfshaven Energy Cooperative (DEC) makes sustainable energy in the Bospolder Tussendijken district accessible to everyone, with the aim of preventing energy poverty. DEC is working with CoRenew, which has developed a model for the collective generation and sharing of electricity. This model should contribute to the accessibility of sustainable energy for everyone within the Rotterdam context.	This project focused on applying the model at the Delfshaven Energy Cooperative in Rotterdam. The project resulted in new insights and models. The models are being further developed at the national level. The knowledge gained will be shared with other energy cooperatives and the umbrella organization Energy for Rotterdam. In this way, the project ensures a broad impact in the energy transition.	The future effects have been estimated by the DCMR**
Energy system	Solar	Ongoing	SES - Rable	Rable is developing an innovative and affordable method for the installation of (large-scale) solar panel systems. This technology offers a solution for roofs of which a large part (approx. 50%) is unsuitable due to insufficient load-bearing capacity for traditional solar panel systems. This innovation increases the potential of rooftop solar energy in Rotterdam.	In the project, Rable investigated the development and realization of an assembly line (in Rotterdam). In addition, Rable has installed a demonstration system on the roof of Xtra Materiel. These achievements have enabled Rable to make strategic decisions about future investments. The project was successful: the Energy Transition Fund has invested in Rable and Rable continues to grow.	The future effects have been estimated by the DCMR**
Energy system	Solar	Ongoing	SES - Wattlab solar	Wattlab is developing the Solar Flatrack, a modular solar energy system for inland and seagoing vessels. This system makes it possible to switch off the electricity generator more often. This leads to a significant reduction in CO2 emissions and an improvement in air quality and a potential saving of 100 tonnes of CO2 per ship per year. This innovation is important for making the maritime sector in the municipality of Rotterdam more sustainable.	Wattlab has carried out a successful feasibility study into the application of the Solar Flatrack, together with service provider in sea transport Vertom. The technical design and business case of the Solar Flatrack were investigated. The project has been successful, the Solar Flatracks have now been placed on an inland vessel. Wattlab will continue to develop this innovation for seagoing vessels	The future effects have been estimated by the DCMR**

Energy system	Solar	Ongoing	SES - ZEF MethaGis	Zero Emission Fuels (ZEF) is developing a system that converts solar energy directly into sustainable methanol. This technology focuses on the use of large-scale solar energy installations. The methanol produced can serve as a sustainable fuel for power plants and shipping. In this way, the innovation contributes to making the energy and transport sector more sustainable	In this project, ZEF is developing the tool 'MethaGis', which can predict the annual methanol production per location worldwide. The software can also calculate the optimal layout of a solar methanol farm. This tool helps ZEF validate the feasibility of the system. This allows ZEF to make decisions about further investments and developments after the subsidy process.	The future effects have been estimated by the DCMR**
Energy system	Wind	Done	Repowering Landtong Rozenburg	The 10 wind turbines from 2007 have been replaced by 9 more efficient turbines. In total, there are now 12 turbines and 34 MW of installed capacity that can generate more than 117 GWh of green electricity.	34,2 MW	The effects have been calculated by the DCMR*
Energy system	Wind	Done	Windenergie winning harde en zachte Zeewering	Wind turbines have been completed and are currently being adjusted and tested. Delivery planned for spring/summer 2023.	116 MW	The effects have been calculated by the DCMR*
Energy system	Wind	Done	Haalbaarheidsonderzoeken kleinschalige windenergie winning	This project concerns the co-financing of feasibility studies into small-scale generation of electricity from wind energy.		The effects have been calculated by the DCMR*
Energy system	Wind	Done	Aanlanding elektriciteit uit windenergie op zee (Klimaatdeal #40)	In the Rotterdam region, the landing of this electricity plays a major role in the ambitions for making the port area more sustainable. This climate deal is part of the joint lobbying agenda from regional parties towards the national government (Climate Deal #39)	At present, the landing of three offshore wind farms in the port of Rotterdam is planned or is already in the process (Ministry of Economic Affairs and Climate Policy) The landing goal is achieved. This deal has therefore been successfully completed.	The effects have been calculated by the DCMR*
Energy system	Wind	Done	Ketenstimulatie van elektriciteit uit windenergie winning op zee (Klimaatdeal #39)	The link between the demand for renewable electricity and the supply of new offshore wind farms should provide an important stimulus for the further development of the Rotterdam offshore wind cluster. The aim of the deal was a lobby letter in which the senders call on the national government to ensure that there is clarity about when which infrastructure will be available where between now and 2030, with a view to 2050 and, if necessary, to accelerate and/or adjust legal frameworks	In 2020, the deal parties and broader organisations sent a lobby letter to the Ministry of Economic Affairs and Climate Policy in support of a policy acceleration when it comes to supply/demand coupling and the role of electrification in this. Partly in response to the recommendations of the Afry report, the Ministry of Economic Affairs and Climate Policy is committed to taking follow-up steps with the sector (including converting them to tender criteria).	The effects have been calculated by the DCMR*
Energy system	Wind	Done	Regionale versnelling windenergie winning op land (Klimaatdeal #38)	The municipality, developers and landowners have signed the agreements for four wind energy projects. The goal is to be realized by 2023 at the latest. Ongoing processes around creating social support and participation are preconditions for this acceleration.	In 2021, acceleration within the deal was achieved through cooperation with landowners and developers.	The effects have been calculated by the DCMR*
Energy system	Wind	Done	SES: Kuneverda	Together with Woonstad, KuneVerda will investigate whether energy generation by means of wind turbines, whether or not in combination with other sustainable generation, can be widely used in homes and buildings. The primary goal of the research project is to map out environmental influences and location locations of the turbines on the expected yield.	This project aims to conduct a feasibility study with the following results: a model for optimal wind turbine placement on buildings, advice on assembly and power, four turbines on the 'De Snor' building of Woonstad, overview of environmental influences, and market analysis. These findings support future decisions and investments after the grant process.	The effects have been calculated by the DCMR*
Energy system	Wind	Ongoing	Intensivering Windenergie Winning programma	The Rotterdam Offshore Wind Coalition (ROWC) is a coalition of the frontrunners within the offshore wind cluster in the Rotterdam region. The coalition consists of 18 parties, including Van Oord, SIF, Boskalis and the Port Authority. Together, there is a joint focus on dialogue, marketing, education and training, policy, lobbying and innovation. This results in better cooperation, linking supply and demand and concrete innovative investment projects. The municipality and the Port Authority offer support, expertise and a modest contribution.	The realisation in 2022 consists of the municipal contribution for the Rotterdam Offshore Wind Coalition (ROWC), process management and labour market campaign HBO ROWC.	The future effects have been estimated by the DCMR**
Energy system	Wind	Ongoing	Bargemaster	(patented) motion-compensating solution for the offshore wind industry.	Technology that supports offshore wind energy.	The future effects have been estimated by the DCMR**
Energy system	Wind	Ongoing	Uitbreiding windenergie Landtong Rozenburg	Rozenburg is one of the VRM (Spatial Planning and Mobility Vision) locations from the Provincial Environmental Policy and part of the Covenant for the Realisation of Wind Energy in the Rotterdam City Region (City Region Covenant). The five VRM locations will generate a total of 50MW within the municipal boundaries of Rotterdam. On the east side of the wind farm on the Rozenburg headland, one new wind turbine will be developed with an installed capacity of 6.4MW. A tender for this took place in 2021 and the permit was granted in September 2023. Developers are Pondera Development, Rebel Group and Enercon.	6.4 MW	7 kton**

Energy system	Wind	Ongoing	Windenergie winning bedrijventerrein Innocent	In the port covenant, it has been agreed to generate at least 300 MW of wind energy. This objective has now been achieved. Wind energy continues to be developed within the port area, and several wind farms will be completed in the coming years. Two 5 MW wind turbines are being developed on the site of SAP manufacturer Innocent. The energy generated is used for Innocent's production processes. An irrevocable environmental permit has now been granted for the turbines.	10MW	9 kton**
Energy system	Wind	Ongoing	Windenergie winning Charloisse Poort	Charloisse Poort is one of the VRM (Vision Spatial Planning and Mobility) locations from the Provincial Environmental Policy and part of the Covenant for the Realisation of Wind Energy in the Rotterdam City Region (City Region Covenant). The five VRM locations will generate a total of 50MW within the municipal boundaries of Rotterdam. A solitary turbine turned out to be financially unfeasible. The feasibility of a hydrogen turbine is currently being investigated, in which wind energy is converted directly into green hydrogen.	5MW	5 kton**
Energy system	Wind	Ongoing	Windwinning Beneluxplein	Beneluxplein is one of the VRM (Vision for Space and Mobility) locations from the Provincial Environmental Policy and part of the Covenant for the Realisation of Wind Energy in the Rotterdam City Region (City Region Covenant). The five VRM locations will generate a total of 50MW within the municipal boundaries of Rotterdam. The Beneluxplein search area has been allocated an intended installed capacity of up to 12MW. Since 2018, the municipality of Rotterdam has been investigating how wind energy can be integrated here.	Maximaal 12MW	10 kton**
Energy system	Wind	Ongoing	Windwinning Hoeksebaan	Hoeksebaan is one of the VRM (Vision for Space and Mobility) locations from the Provincial Environmental Policy and part of the Covenant for the Realisation of Wind Energy in the Rotterdam City Region (City Region Covenant). The five VRM locations will generate a total of 50MW within the municipal boundaries of Rotterdam. Two wind turbines will be built in the Hoeksebaan project, with an expected installed capacity of 12MW. One turbine will be placed on the Renewi site, the other on the site of the Delfland Water Board.	12 MW	13 kton**
Energy system	Wind	Ongoing	Windwinning Hartel 3	In the port covenant, it has been agreed to generate at least 300 MW of wind energy. This objective has now been achieved. Wind energy continues to be developed within the port area, and several wind farms will be completed in the coming years. Two wind turbines with an expected installed capacity of 9 MW will be installed between the Hartel Canal and the Europaweg.	9 MW	14 kton**
Energy system	Wind	Ongoing	Windwinning SIF 2	In the port covenant, it has been agreed to generate at least 300 MW of wind energy. This objective has now been achieved. Wind energy continues to be developed within the port area, and several wind farms will be completed in the coming years. In the port area, a second wind turbine will be installed on the SIF site with an expected installed capacity of 8 MW. The permit has been granted and it is now clear that no appeal has been filed with the Council of State.	8 MW	10 kton**
Energy system	Energy system	Done	Energiebesparing en productie Living Lab Kleinpolderplein	The municipal work location Kleinpolderplein (KPP) has been set up as a testing ground and 'living lab' for energy savings and CO2 reduction.	Realisation of a testing ground and living lab for energy saving and CO2 reduction.	The effects have been calculated by the DCMR*
Energy system	Energy system	Done	Energiewinning rioolgemaal Zuiderparkweg (Ahoy)	The work includes implementing heat exchangers in the basin of the sewage pumping station for heat recovery and also connecting this installation to the smart grid of RACC & Ahoy	The work was carried out and completed in July-September 2022. RUGGEDISED project R2. Thermal energy recovery from wastewater (TEA, or riothermy). With a heat exchanger of 50 m2 on the basin floor, heat is extracted from the sewage water and supplied to Ahoy's smart thermal grid, including a link to a thermal energy storage system.	The effects have been calculated by the DCMR*

Energy system	Energy system	Done	Programmatische aanpak Smart Energy Systems (afronding Vorige college periode)	By the end of 2022, the Smart Energy Systems programme will comprise 27 innovation projects in the field of energy systems and the energy transition. The municipality facilitates companies and consortia that work on these innovations with a subsidy and a permanent contact person from the municipality who can help with challenges in other areas. Such as searching for locations, follow-up funding or contacts. The innovation projects have considerable potential for achieving climate goals (CO2) and creating innovative activity and investments.	The programme has been successful in identifying promising innovations with potential for Rotterdam. The available annual innovation budget has largely been allocated to companies and consortia working on these innovation projects. Many innovation projects have not yet been completed.	The effects have been calculated by the DCMR*
Energy system	Energy system	Done	SES - C-Green Energie	C-Green has developed an innovative technology to reuse sludge. Sludge is a residue that is often present in the port area. The technology prevents approximately 90% of this waste stream from disappearing into the waste incinerator. In addition, it prevents up to 80% of greenhouse gas emissions.	In this project, C-green investigated the feasibility of installing its technology on the Reym site. The result includes an assessment of the technical, commercial and financial feasibility. The project was successful and Kansen voor West has given a follow-up grant for a longer test. There is a prospect for additional investments (for upscaling).	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	3D City operations model	With the 3D operational city model, it is possible to work from a platform with open data standards to develop new applications. The first concepts for this have been implemented within the EU project RUGGEDISED. This results in more efficient processes and energy savings.	RUGGEDISED EU project R9. The 3D operational city model offers opportunities to unlock data with open data standards and to offer it via the platform. This allows companies to use and combine this data to develop new areas of application. This then results in new applications. Three concepts have been implemented and tested within the EU project. These concepts ensure more efficient processes and energy savings.	The effects have been calculated by the DCMR*
Energy system	Energy system	Done	Energie management/ 3D city operations model	By applying the Simaxx energy and building management system at Ahoy and Rotterdam Ahoy Convention Centre, approximately 5 percent energy is saved by providing insight into consumption and being able to monitor KPIs. Part of EU project RUGGEDISED.	RUGGEDISED EU project R8. The energy and building management system Simaxx has been implemented at Ahoy and Rotterdam Ahoy Convention Centre. This gives Ahoy more insight into the performance of its buildings and can also bill energy per event. It provides insight into consumption and monitors the various KPIs that are measured by a large number of sensors. In total, approximately 5 percent of energy is saved.	The effects have been calculated by the DCMR*
Energy system	Energy system	Done	Hernieuwbare energie opwek op daken Zuidplein dmv zonnepanelen	Within the project area of the EU project RUGGEDISED in Hart van Zuid, more than 14,000 m2 of solar panels (PV) have been installed. This generates 2443 MWh of electricity annually.	RUGGEDISED EU project R5. Sustainable electricity is generated with the help of more than 14,000 m2 of solar panels (PV) that have been installed on the roof of the Rotterdam Ahoy Convention Centre, the Ahoy Congress Centre, the bus station, the Kunstenpand and the 84 almost energy-neutral homes. This generates 2443 MWh of electricity annually.	The effects have been calculated by the DCMR*
Energy system	Energy system	Done	Strategische agenda Stedin en Gemeente Rotterdam	In order to prevent the congestion of the electricity grid where possible, the municipality is drawing up a Strategic Action Agenda together with grid operator Stedin. Part of the strategic action agenda is the Rotterdam Approach to Grid Congestion.	The Action Agenda should facilitate and accelerate the deployment of electrical infrastructure.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	Thermische energiewinning uit asfalt warmte-koude collector	At Ahoy, an asphalt heat-cold collector has been installed in the road surface that cools the roadway in the summer and heats it in the winter and thus keeps it frost-free. This allows thermal energy to be extracted (solar collector) and the lifespan of the road surface to be extended. Part of EU project RUGGEDISED.	RUGGEDISED EU project R4. In one of Ahoy's arenas, an asphalt heat-cold collector of 400 m2 including a monitoring system has been realized. With this collector, thermal energy is extracted from the asphalt which is heated by the sun (solar collector). Just below the surface, a network of tubes has been constructed through which water flows so that energy can be extracted from the asphalt. In winter, the asphalt can also be heated in this way, or cold extracted, so that the road surface remains frost-free. This flattening of temperature peaks ensures a longer life of the asphalt. The thermal energy is supplied to Ahoy's heat-cold storage.	The effects have been calculated by the DCMR*

Energy system	Energy system	Done	Warmte Koude opslag Ahoy icm Smart thermisch grid	With seasonal heat-cold storage (ATES), Ahoy and Rotterdam Ahoy Convention Centre are connected to each other via a Smart thermal grid so that thermal energy can be exchanged. The residual heat and cooling is thus stored for the next season so that energy efficiency is increased. Part of EU project RUGGEDISED.	RUGGEDISED EU project R1. The central objective is to make the large buildings/building complex Ahoy and Rotterdam Ahoy Convention Centre (RACC) natural gas-free and to offer a more efficient and sustainable heat-cold supply. This was achieved by constructing a Smart thermal grid between the buildings so that heat and cold can be exchanged. In the summer, the residual heat from the buildings is captured and stored in the seasonal heat-cold storage about 150 m deep in the subsurface (ATES). In winter, this process is reversed and the heating water cooled in the building is also stored for a season. Other sustainable sources can be connected to this Smart thermal grid, such as energy from sewage water (TEA).	The effects have been calculated by the DCMR*
Energy system	Energy system	Done	SES - Battolyzer	Battolyser Systems is developing the 'Battolyser', a battery that both efficiently stores energy and produces hydrogen. This allows the system to be used flexibly and efficiently. The system stores electricity surpluses for both the short and long term. This is important for the energy transition (in Rotterdam).	The project has successfully investigated the feasibility of a pilot plant in the Waalhaven. To this end, Battolyser looked at: the required production installations, (cost estimates for) suitable locations and a complete business case. With these results, Battolyser Systems can take concrete next steps in Rotterdam.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Blockchain Fieldlab	Blocklab receives SES subsidy to set up the investment platform ILSA.tech with blockchain. Residents and SMEs can use this platform to invest small amounts in local sustainable projects, such as solar and wind energy. The platform promotes (citizen) participation and stimulates sustainable urban connection by allowing society to share in the proceeds.	This project is intended to carry out a feasibility study that will result in an inventory of the investment willingness of various target groups in Rotterdam: an overview of active solar power installation developers in the region: and a selection of three projects that can be developed initially. In addition, a project plan is drawn up for the roll-out of projects with specific communities. For the experimental development, the applicant wants to onboard three solar power installations to TILISA, test this and further professionalize the platform. Achieving these achievements enables them to make decisions about next steps and investments.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Data Safe House	The independent foundation 'Data Safe House' is developing a digital database for the secure and confidential sharing of public and private data. This concerns data on energy consumption and production by industry, grid operators and government. The availability of the data is important for making investment decisions in the energy transition.	In the project, the Data Safe House foundation was established and the IT platform for data exchange was developed. In addition, additional participants are bound to the platform. In addition, a plan for scaling up with a budget has been presented. The project has been successfully completed and is now being further developed at a national level	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Elestor flow batterij	Elestor and Vopak are investigating the large-scale electricity storage in the port of Rotterdam. They do this by developing and applying a flow battery of hydrogen and bromine. By linking the battery to the hydrogen infrastructure, the cost of electricity storage is reduced. The aim is to create an innovative solution for industrial energy storage and thus contribute to the energy transition and economic growth in the Rotterdam region.	The feasibility and application of the flow battery was investigated in the project. Among other things, the technical specifications of the flow battery, the risks and the requirements for safe storage were examined. The project was successful. Vopak has invested in Elestor, and investments in Rotterdam are being further explored.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Enertrans schiebroek	EnerTrans is working on the further development of an innovative energy platform, in a consortium with Unisun, TNO and the RHIA foundation. This platform links the energy systems for electricity and heat in Schiebroek and Zestienhoven. The platform ensures that the generated sustainable energy is optimally used (locally) through smart energy management. In this way, the consortium contributes to the energy transition (in Rotterdam).	The consortium has conducted a feasibility study on the platform. Attention was paid to: the program of requirements, optimization of software and the elaboration of the business case. The project was successful and provided concrete insights and an energy platform.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Gradyent	Gradyent's cloud platform contains a "digital twin" of the energy network that provides a sharper insight into the network and optimal control can be realized. This makes the complexity of integrating sustainable sources manageable. Heat losses can be reduced by 10% or more. In this feasibility study, Gradyent's technology is applied to Eneco's district heating network and feasibility questions for further development and roll-out are addressed.	The aim of this project is to conduct a feasibility study, in which the following results will be achieved: simulation of an optimally controlled heat network with live control, identification of required product functionalities, bottlenecks and return on investment, and an updated product development roadmap for Gradyent. These achievements enable applicants to make informed decisions about future steps and investments after completing the grant process.	The effects have been calculated by the DCMR*

Energy system	Energy system	Done	SES - Riothermie relining	Jules Dock developed an innovative sewage thermal system that recovers heat from sewage water to heat buildings. In addition to heating, it can also be used to cool when desired. This innovation is integrated into a reinforced tubular element. This pipe element is also used for sewer renovation. This makes it easy to install the system during regular maintenance of the sewer.	In the feasibility study, Jules Dock investigated the market potential of the innovative sewage thermal system. Jules Dock used this to determine whether additional investments in Rotterdam's production capacity are justified. However, the intended result has not been fully achieved, due to the adjustment of municipal ambitions to use the sewer system for the heating and cooling network.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - S4 energy elektriciferen havenkraan	S4Energy has developed the KINEXT energy storage system, an innovative flywheel that efficiently stores and returns energy at peak loads. It is a slow-turning but large flywheel. This form of energy storage is used for grid stabilization, but also to electrify quay cranes. In this way, S4Energy contributes to the energy transition in the port area of Rotterdam.	In this project, S4Energy investigated the application of the KINEXT flywheel in the Waalhaven. Preparatory simulations were carried out, the design was adjusted and the flywheel was delivered. The project resulted in the successful installation and commissioning of the KINEXT flywheel in the Waalhaven. Here it is used for the electrification of a quay crane.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Skoon flexibele netstabiliteit	Skoon Energy develops software that makes mobile energy assets, such as batteries and hydrogen generators, flexible for grid stabilization and other applications. This innovation, integrated into the Skoon Sharing platform, optimizes the use of mobile energy sources for a more efficient energy system and contributes to more sustainable energy management.	In the project, Skoon Energy investigated the technical and commercial feasibility of the platform. To this end, the coupling of mobile batteries and the added value for congestion management was simulated. The project has resulted in the successful expansion of the platform, and has helped Skoon attract new investors (for international growth).	The future effects have been estimated by the DCMR**
Energy system	Energy system	Done	SES - Starke	Starke Energy focuses on providing services around stabilization of the low-voltage grid – in particular the energy grid in cities. It does this on the basis of a product, the 'Urban Power Bank', with the business model 'Storage as a Service'. This model offers a solution to the high investment costs for battery systems. Starke Energy invests in the storage itself and users pay for use of the system.	Starke Energy has investigated the feasibility of scaling up to an 'Urban Power Bank' 1.5MW across 16 locations in Rozenburg. This is an important step for an energy-neutral Rozenburg. Starke Energy has collaborated with housing corporation Ressort on a pilot of an 80kW 'Urban Power Bank'. This project provided valuable insights into the business case and the application of Urban Power Bank in apartment complexes. Unfortunately, the market turned out not to be ready for the innovation, so it was not possible to raise the necessary investment.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Initiative	Flex Scans	Due to (imminent) grid congestion, it is not always possible for companies to become more sustainable, to grow or to establish themselves in the municipality of Rotterdam. This often requires a larger electrical connection, for which there is no more room on the electricity grid in congestion areas. The flex scan gives companies insight into whether and how you can still achieve the goals with the help of flexible energy consumption and thus make the energy transition possible and ensure that Rotterdam continues to have an interesting business climate. This keeps up the pace of the energy transition and in this way we retain space on the grid for housing, for example.	At the end of this project, a significant group of companies was helped to map out the flex potential (the extent to which they can make flexible use of grid capacity) of their business operations. This advice offers a concrete action perspective for these companies to apply flex. Based on this advice, companies can, for example, purchase equipment, modify existing equipment and/or work with neighboring companies to form Energy Hubs. This will allow companies inside and outside the congestion area in Rotterdam to continue their sustainability plans and boost efficient grid use as much as possible.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Initiative	Thermische energiewinning afvalwater	On 4 July and 19 December 2023, the Municipal Executive determined the distribution of DTB funds in 2 steps. The project Thermal energy recovery from wastewater - potential and pilots' is one of the projects to which funds have been allocated under the condition "how to use and unlock sewage thermal energy so that this input can be used for other locations". Funds have been made available for the implementation of this until 2026. In this plan, we describe (=IBR) the intended project implementation. During the implementation of the project, this plan will be updated in consultation with the AOG on the basis of experiences and interim project results.	To develop Riothermy as an addition to the sustainable energy mix and as a contribution to CO2 reduction. Linking sewage energy to heat demand by (contributing to) the development of the governance of riothermy.	The future effects are still being assessed by the DCMR***
Energy system	Energy system	Initiative	Rotterdamse Energie Databank	The Municipality of Rotterdam and Stedin are cooperation partners in the energy transition. In order to be able to plan the energy system integrally, we need smarter digital collaboration with one shared truth that we centrally control.	The aim of this project is to set up a digital collaboration process, with concrete deliverables (1) data deals with Stedin on topics and (2) a viewer – The Rotterdam Energy Transition Database (RED). The data underlying RED can be used for various municipal tasks, such as our spatial task of providing a place for electricity infrastructure in the city.	The future effects have been estimated by the DCMR**

Energy system	Energy system	Ongoing	Energietransitiefonds Rotterdam	100 million euros is available from the Eneco funds in revolving financing for sustainable investments that contribute to the reduction of CO2 emissions, air quality, reducing the use of primary raw materials and strengthening a 'green' economy in Rotterdam. The fund is aimed at projects that require (additional) investments, but cannot go to the capital market for this		The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	pMIEK	The pMIEK identifies projects that are of above-average (social) importance for the energy system of Zuid-Holland. The pMIEK status of these projects ensures acceleration, priority and special attention from both public stakeholders and the grid operators and initiators.	The aim of the provincial Multi-Year Programme for Energy and Climate Infrastructure (pMIEK) is to make choices and select which projects are of great social importance at the regional scale. Rotterdam contributes to this.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	12 Smart Energy Systems	The SES programme is an innovation programme aimed at accelerating and facilitating the energy transition. The programme comprises 44 innovation projects, which together deliver significant impact and results for Rotterdam's energy transition and economy. A diverse portfolio of innovations at system level and in the field of generation, storage, distribution/transport.	Supporting innovations has a significant impact on the sustainability goals of the Municipal Executive. In addition, it provides knowledge about relevant innovations in the energy system, from which lessons can be drawn. This also strengthens the innovation ecosystem in the city.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	Facilitering Aanlandingsprojecten Wind op Zee	Various cables from offshore wind farms come ashore in Rotterdam (Maasvlakte II). These are projects of high-voltage grid operator TenneT that are facilitated by the municipality.	A total of three landings of 2 GW are being prepared here, all in a different phase. These are IJmuiden Ver Beta, IJmuiden Ver Gamma and Nederwiek 2. In addition, the VAWOZ programme is also exploring how landfall can be realised after 2030 and there is a possibility that the route for the landing of Nederwiek 3 will run through Rotterdam territory.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	Kernenergie	The government is exploring the possibility of building two large nuclear power plants in the Netherlands at one location. Borssele has the political and administrative preference of the cabinet, but the Maasvlakte is also being investigated.	The government (EZK) is conducting research and is starting a participation and communication process. The municipality will make a contribution in the context of the EIA commissioned by the government.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	Regionale Energie Strategie RES	The regional energy strategy sets out how much sustainable onshore generation must be realized in Rotterdam by 2030 and how the heat transition can take place.	In 2030: 3.4km2 of solar panels and 350MW of wind	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Amela - Slim energiemanagement	AMELA is conducting a feasibility study on the 3-EM platform. This is a solution that optimizes energy processes at industrial parties. The solution integrates data collection, sustainability analysis and improvement of operational processes. AMELA has partnered with Coatinc, a zinc coating company with high gas consumption and significant CO2 reduction potential.	AMELA wants to test and validate the 3-EM platform through a pilot at Coatinc. In addition, Amela is investigating which CO2 reductions are possible at Coatinc and at other industries and target groups.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - circulair vanadium Elektrolyt	Startup Phoenix Metals BV is investigating the feasibility of extracting vanadium from sludge in the Rotterdam port area. Vanadium, which is scarce and extracted from ore under poor working conditions, is important for battery production. This project aims to create a local, more energy-efficient and sustainable production process in Rotterdam.	The project aims to complete a feasibility study for the extraction of vanadium from sludge and to explore the possibilities for a production site in Rotterdam. In addition, collaborations with companies in the flow battery sector are being examined. These companies use vanadium for the production of batteries.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - ENRICH Rotterdam	HyER Power and DC Opportunities are developing the 'ENRICH' system that makes it possible to heat emission-free, generate energy locally and reduce grid congestion. The 'ENRICH' system integrates an innovative local electricity grid with a technology that converts hydrogen into electricity and heat. HyER Power envisages application at building level in the port area.	The project aims to demonstrate the feasibility of the 'ENRICH' system. The partners are also investigating the feasibility of the system for a new location of Fieldlab Industrial Electrification (FLIE).	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - F&L Powerrental Hydrozine	F&L Powerrental is developing the 'hydrozine' generator as a sustainable replacement for diesel generators. Hydrozine (formic acid) is a hydrogen carrier, which allows hydrogen to be stored in liquid form. The hydrozine aggregate emits no CO2 and is silent. F&L powerrental hopes to be able to use the generators for shore power in the future	In this project, F&L Powerrental is testing the 'hydrozine' generator on the Rotterdam market. This should result in technical specifications of the prototype and insight into the feasibility. These results form the basis for future decisions and possible follow-up investments.	The future effects have been estimated by the DCMR**

Energy system	Energy system	Ongoing	SES - Flower turbines	Flower Turbines develops silent wind turbines in the shape of a tulip, with heights of 1, 3 and 6 meters. The turbines are suitable for integration in both urban and rural areas. Flower Turbines is developing the turbines with the aim of realizing a sustainable energy solution that is visually attractive and causes little noise pollution. With this, Flower Turbines focuses on locations that are less suitable for larger wind turbines	The aim of this project is to investigate the feasibility of the 6-metre Flower turbine in the Amaliahaven. Unfortunately, the cooperation with the Port Authority has not led to any follow-up investments.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Flying Fish	Flying Fish develops hydrofoils that will make it possible to sail emission-free in the future, by making boats both faster and up to 80% more efficient. Hydrofoils ensure that when there is sufficient speed, the hull of the boat is lifted out of the water, which reduces drag and increases efficiency. The hydrofoils are being developed in close cooperation with companies such as the Water Taxi and the Pilotage Service from the port.	In the project, Flying Fish has developed hydrofoils that bring emission-free sailing closer. Flying Fish has done this in collaboration with various stakeholders from the port area. A 1:10 demonstrator model has been built. This will allow Flying Fish to further test the technology and convince potential customers of its operation and effectiveness.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Greenchoice	Greenchoice and Spectral are working on making business parks more sustainable by responding to flexible management. This involves better coordination of self-generation and consumption of energy. This leads to a more efficient (self-sufficient) energy system. Making business parks more sustainable is essential for the energy transition.	The project has resulted in a practical and validated (process) approach for the integral sustainability of business parks. This approach makes sustainability easier, faster and cheaper. The partners are in consultation with the municipality to explore the next steps.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - HYGRO	Hygro is developing an offshore wind turbine that produces hydrogen directly. This innovation aims to achieve a higher energy yield per wind turbine, which can be beneficial both economically and socially. In another project, Hygro is focusing on chain innovation that is not only needed to produce hydrogen but also to distribute it.	The project investigates the feasibility of the offshore wind turbine by delivering concrete results. The results consist of: the choice of location for a demonstration project, a technical concept, and a financial business case. These results should lead to a decision on further investments and development steps.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - HySiLabs	HySiLabs has developed the unique liquid hydrogen carrier 'HydroSil' for hydrogen transport, storage and use. HydroSil can store up to seven times more hydrogen than other techniques. In addition, HydroSil can make use of existing infrastructure. These factors make HydroSil more efficient and economically advantageous.	In this project, HySiLabs, together with Den Hartogh Logistics, conducted a feasibility study into the transport of green hydrogen with HydroSil from Brazil to Rotterdam. The study included an analysis of the required infrastructure and a life cycle analysis for CO2 reduction. The project provided valuable insights, but has not yet been followed up in Rotterdam.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Proton Ventures	Proton Ventures is investigating the possibilities for a large-scale ammonia cracker. Proton Ventures wants to use high pressure to make the conversion of ammonia to hydrogen more efficient and cheaper. This process is also called "cracking". With their approach and innovation, Proton wants to ensure that ammonia becomes a more attractive option for the transport and storage of hydrogen. Hydrogen plays an important role in the energy transition and the sustainability of the Port and Industrial Complex of Rotterdam.	Proton Ventures is investigating the technical and economic feasibility of a large-scale ammonia cracker. The expected results include the development of a concept and detail design and a detailed business case. In addition, Proton Ventures is investigating suitable locations in Rotterdam's port and industrial area. This project will enable Proton Ventures to make decisions about next steps and investments upon completion.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - QuinteQ vliegwiel	QuinteQ is working together with the Rhenus Port Authority to investigate and optimise the potential of the QuinteQ flywheel for the electrification of port cranes. The flywheel can deliver high electrical power for a short time, which corresponds to the consumption pattern of harbor cranes. The innovative flywheel variant from QuinteQ is compact and portable. QuinteQ is also researching other applications, such as construction cranes.	QuinteQ is investigating the potential for electrification of port cranes using the QuinteQ flywheel. In addition, the project focuses on optimizing flywheel technology. QuinteQ also wants to investigate the potential of preventing grid congestion in making port and business parks more sustainable.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Rent a battery	Rent a Battery is developing the Powertruck: a truck with a battery pack in combination with a fuel cell and a hydrogen storage tank. The Powertruck is a sustainable alternative to diesel generators. This project responds to the need for systems that can deliver high power for a long time and can be used flexibly. This applies, among other things, to construction sites and events. The aim is to reduce the environmental impact of such activities with the Powertruck.	The aim of the project is to complete the design of the Powertruck 1, demonstrations in the Rotterdam region and publication of results. These results form the basis for: concrete decisions on further investments in the Powertruck development, further upscaling and wider use of this technology.	The future effects have been estimated by the DCMR**

Energy system	Energy system	Ongoing	SES - RIFT - Renewable Iron Fuel Technology	RIFT focuses on the further development of iron fuel as a sustainable and CO2-free alternative to fossil fuels. RIFT is testing the technology in collaboration with Rotterdam companies. In this process, RIFT uses the fuel in boiler systems to produce energy. The rust powder that is released is converted by RIFT into iron dust with the help of hydrogen.	The project aims to test and implement the applicability of the technology at Rotterdam companies. This results in the development of pilot projects and possible upscaling in Rotterdam. This should lead to significant CO2 savings and new employment (in the municipality of Rotterdam).	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Smart Power Booster	The companies Regbes and Suptech, in collaboration with Power2Match, are conducting a feasibility study on the Smart Power Booster. This innovation focuses on the autonomous, faster and safer coupling of different types of ships to shore power. This supports the ambitious shore-based power goals of the municipality of Rotterdam.	The aim of the project is to investigate the feasibility of the Smart Power Booster (in the port of Rotterdam). The business case of the innovation in general is also further investigated. In addition, the cooperation partners are looking at the possibilities for scaling up. To this end, they are also investigating other applications of the Smart Power Booster.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - SuperHeat en benutten restwarmte	Geotherm Electric is developing the 'Superheat' technology to convert residual heat into sustainable electricity. This technology focuses on the local use of residual heat. This innovation contributes to making industry and business parks more sustainable and to reducing grid congestion.	Geotherm Electric is conducting a feasibility study in collaboration with Climax Molybdenum. The study covers economic, environmental and legal aspects and examines possible risks. The results of the study form the basis for an investment decision for the construction of the SuperHeat at Climax Molybdenum.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Tarnoc Turbine Ketel	Tarnoc is developing the turbine boiler, a replacement for the central heating boiler that helps to make homes that are poorly insulated gas-free. Existing solutions, such as heat pumps, require (very) good insulation of the homes. In addition, the turbine boiler can be combined with a heat storage system (for several homes).	In this project, Tarnoc provides two pilot homes (from Woonstad) with turbine boilers and one heat storage system. In the pilot, Tarnoc and Woonstad want to gain experience with installation within one day. The project also provides insight into: the financial feasibility of the Turbine Boiler, the supply of sufficient heat, and the possibilities for reducing grid congestion through heat storage. The applicants share the lessons learned with interested parties such as other housing corporations and residents.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Unify.energy - belonen voor balans	Unify is developing an innovative energy system in which all stakeholders play an equal role in the production, storage, and use of energy. The Unify system rewards you for creating balance and preventing grid congestion.	In the project, Unify is developing the "Reward for Balance" platform and an associated application. Unify tests and validates the technology in a real environment at the De Kleine Burg community in Rotterdam South. This provides insight into the feasibility and potential of the system, allowing Unify to make decisions about next steps and upscaling.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES - Withthegrid - smart transformer monitoring	Withthegrid and Crest Sensors are developing a real-time monitoring system for transformers to provide immediate insight into congestion and faults in the electricity grid. Sensors detect defects, reduce the need for inspections and extend the service life. The system helps to tackle grid congestion and promotes the connection of sustainable electricity to the electricity grid in Rotterdam.	This project investigated how monitoring transformers contribute to: connecting more sustainable electricity to the electricity grid, reducing maintenance inspections, and developing a model for residual life and investments. Although the project was successful, it turned out to be too early for Withthegrid to invest further in the roll-out of the system.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES HYGRO Waterstof hub infra en tankstation	This project is linked to another project carried out by Hygro. In that project, Hygro is investigating the feasibility of a wind turbine that produces hydrogen directly. In this project, Hygro is investigating the feasibility of the entire hydrogen chain: hydrogen compression, distribution and offtake for heavy road transport. Hygro is investigating this jointly in a consortium including Boskalis, TNO and Visser & Smit Hanab.	The objective of this project is to assess the feasibility of a complete hydrogen chain. This includes the realization of a hub, pipeline, satellite filling stations and mobile filling stations. Hygro is also investigating the business case for all partners involved in the chain. Successful implementation of the project will form the basis for applying for permits and subsidies. This is a prerequisite for the development of this chain.	The future effects have been estimated by the DCMR**
Energy system	Energy system	Ongoing	SES Lokaal energiesysteem Schouwburgplein	The 7SE project aimed to work together on a climate-neutral Schouwburgplein by 2030. Based on a program of requirements and an energy plan, an innovative energy concept was created. This was developed in collaboration with Eneco. This concept offered participants the opportunity to make an investment decision.	The project has resulted in valuable insights for Eneco and the municipality of Rotterdam. Although the partners have not invested jointly, the lessons learned can be used for future similar local initiatives within Rotterdam. These lessons are also interesting at the national level.	The future effects have been estimated by the DCMR**

Energy system	Energy system	Ongoing	SES - Blijstroom SKAR	Blijstroom, an energy cooperative active in Rotterdam, realizes collective solar roofs. The members of blijstroom are jointly investing in new solar roofs. Blijstroom wants to supply the locally generated solar energy directly to Stichting Kunstaccommodatie Rotterdam (SKAR). This collaboration allows SKAR to reduce energy costs and keep them constant, without SKAR having to invest in solar panels itself. This contributes to making Rotterdam energy-neutral.	In the project, the partners are developing a cooperative solar roof on a SKAR building, with the aim of direct supply of solar energy. In addition, the project aims to develop a legal and technical blueprint. This serves as the basis for other projects of Blijstroom and SKAR. If successful, the other approximately 30 buildings of SKAR will be eligible for the same development, partly in collaboration with other energy cooperatives.	The future effects are still being assessed by the DCMR***
Energy system	Energy system	Ongoing	SES - FLASC	FLASC is developing an energy storage system based on water and air pressure. Current storage systems are often based on battery technology. The innovation can easily be applied at sea for energy storage at wind farms. The innovation has a positive effect on grid congestion and on land use. This makes the innovation interesting for densely built-up areas, such as the Rotterdam region.	In this project, FLASC is conducting a feasibility study for a pilot location in the Rotterdam region. FLASC is investigating possible locations for this. In addition, they design the test set-up in outline, tailored to the chosen location. Finally, FLASC examines the necessary permits and draws up a draft contract for the selected location. If successful, this project will form the basis for a pilot at a Rotterdam location.	The future effects are still being assessed by the DCMR***
Energy system	Energy system	Ongoing	SES - Green SOCCS	In the Rotterdam region, many extra cables and pipelines are needed for the generation of energy at sea or for making the energy system more sustainable. DOT and Callidus are developing the 'Green SOCC' technology. This technology is able to drill underground more cheaply with minimal impact on the environment. This innovation contributes to the energy transition in Rotterdam and the port area.	In this project, DOT and Callidus are investigating the feasibility of a test rig for horizontal drilling of more than 10 km. In addition, the partners are investigating what is needed to cover a distance of 30 km in one go. That is about the distance from offshore wind sites to the mainland. To this end, they are investigating the technical feasibility and analysing the costs of scaling up. They are also looking at possible cooperation partners.	The future effects are still being assessed by the DCMR***
Energy system	Energy system	Ongoing	SES - Kalpana Systems	Kalpana Systems B.V. is a start-up from Rotterdam that wants to accelerate the energy transition with a patented sALD (spatial Atomic Layer Deposition) machine. This machine can apply layers to flexible materials with high precision. This is important for flexible solar panels. Kalpana's machine can produce up to 1000x faster than current machines, significantly reducing costs.	In this project, Kalpana develops and validates a new prototype. Based on research data and feedback from the market, Kalpana adjusts the system. Kalpana is also investigating the application of the system in other markets. When the feasibility study can demonstrate that Kalpana's machines meet the requirements of the market, this provides the necessary evidence for their customers to invest in the purchase of the machine. This also provides the basis for Kalpana to invest in upscaling.	The future effects are still being assessed by the DCMR***
Energy system	Energy system	Ongoing	SES - SchipWALwalSCHIP	Schneider Electric and Techbinder are developing a ship-to-shore energy management system for ships berth. Ships currently meet their energy needs by using engines and generators. They have little or no insight into their consumption. There is also a lack of insight on the quay side. This lack of insight makes it difficult to make port locations more sustainable. The system offers a solution for this.	In this project, the partners, in collaboration with SIF, Fluvia and Chemgas, are investigating the feasibility of the 'ship-to-shore' energy management system. To this end, they are investigating the technical, legal, practical and economic feasibility. This insight provides the basis for the follow-up strategy and scaling up of the innovation.	The future effects are still being assessed by the DCMR***
Energy system	Energy system	Ongoing	SES - Smart Energy Pumping	Snijders B.V. and MarFlex Europe BV are developing the Smart Pumping System to make the unloading of tankers cheaper, more efficient and more sustainable. In this way, the innovation contributes to making the maritime sector and the port area of Rotterdam more sustainable. The current Smart Pumping System has been developed for a specific ship.	The partners are developing a modular variant that can be used by multiple ships. To this end, the partners are investigating automating the current system and implementing sensors. In addition, they are developing new Smartpumping software. If successful, this project will form the basis for further upscaling in the port of Rotterdam and possibly beyond.	The future effects are still being assessed by the DCMR***
Moblity	Charging infra	Ongoing	Aanpak logistiek laden	In 2025, the zero emission zone for city logistics will be introduced in Rotterdam with a transition period until 2030. Sufficient charging infrastructure (for logistics) is a precondition for the introduction of this zone. Rotterdam has laid down its strategic vision in this area in the Charging Infrastructure Strategy 2021 – 2030. As part of this strategic policy, a separate approach was officially drawn up for the logistics target group at the end of 2021. With this, Rotterdam wants to remove obstacles to the realisation of logistics charging infrastructure and pave the way for the transition to clean city logistics.	Developing and implementing an approach to provide sufficient private and public charging points for the logistics sector, in connection with the arrival of the zero emission zone for delivery and freight vehicles. Results:- 4 heavy duty chargers- installation of public (fast) chargers (see KAR measure public charging infrastructure)- Approximately 500 individually advised companies	The future effects have been estimated by the DCMR**

Moblity	Charging infra	Ongoing	Privaat laden	To help electric drivers who live in an apartment for sale or rent and are not allowed to park on the street to realize a charging point, a VvE charging counter has been set up. In addition, we are lobbying to make the regulations for the installation of charging points in VvEs easier (through the Building Decree) and to perpetuate them for new construction through regulations. Agreements are also made with housing corporations. VvEs and rental complexes will soon be able to install charging infrastructure more easily.	Support decision-making at VvEs to the construction of charging points, agreements with housing corporations, Rotterdam's VVE010 as a knowledge portal for private charging. There are a number of qualitative objectives:- the four largest housing corporations have a facilitating policy for enabling charging infrastructure- the new building decree perpetuates the construction of charging infrastructure and the associated energy supply.	The future effects have been estimated by the DCMR**
Moblity	Charging infra	Ongoing	Publieke laadinfrastructuur	Installation of popular charging stations and fast chargers in Rotterdam to meet the (fast-growing) demand. Sufficient charging infrastructure is necessary to be able to drive electrically. Because the current concession expires in 2025, we are preparing a new tender to be able to install additional public charging stations after 2025. The number of electric mobile equipment and shared cars is also increasing, and with it the charging demand. In order to anticipate this in a targeted manner, we are drawing up a plan of action for charging infrastructure for mobile equipment and shared mobility.	This is what we are going to achieve: • 2,000 extra charging stations• 100 fast charging points	22 kton**
Moblity	Charging infra	Ongoing	Reststroom onderzoek RET	Research into and application for a permit to use residual power from the metro for charging electric vehicles. In this way, we avoid unnecessary burden on the Rotterdam power grid. We make better use of the existing connection(s).	In 2024, permission to make the metro network available to third parties for charging electric vehicles.	The future effects have been estimated by the DCMR**
Moblity	Charging infra	Ongoing	Laadvoorzieningen gemeentelijke terreinen	All municipal vehicles, which will become electric, must be able to charge. To this end, we are installing charging stations and fast chargers on municipal grounds. In a number of cases, the power connections need to be expanded.	The number of charging points follows the demand from the change of the own fleet	Impact is < 0.1 kton. See DCMR report for details**
Moblity	Freight transport	Done	Stimuleren slimme bouwlogistiek	With the construction logistics incentive scheme, we encourage more efficient, more systematic and (if possible) emission-free (without harmful emissions) construction logistics, in which builders make fewer trips through the city to supply Rotterdam's construction sites.	Construction loads in the city are down by 19%.	The effects have been calculated by the DCMR*
Moblity	Freight transport	Done	Bundeling ophalen bedrijfsafval (Klimaatdeal #24)	A "white label" collection system is being developed, within which emission-free vehicles can be used profitably for the collection of industrial waste. The aim is to make more sustainable use of vehicles that collect industrial waste and to reduce the number of transport movements. This climate deal coincides with the climate deal Emission-free supply of building materials (Climate Deal #23). This means that this climate deal was successfully completed in 2021. Further initiatives in the field of sustainable logistics are being implemented through Logistiek 010.	See project "emission-free supply of building materials".	The effects have been calculated by the DCMR*
Moblity	Freight transport	Done	Emissievrije belevering van bouwmaterialen (Klimaatdeal #23)	Transporting building materials such as concrete paving stones requires heavy vehicles, for which there were no emission-free models on the market yet. A supplier of building materials, together with its transporter, has taken the initiative to purchase an emission-free (= without emission of harmful substances) trailer with tractor, for the supply of building materials for the municipality of Rotterdam. The aim is to set an example to initiate the desired transition to emission-free inner-city transport in this segment as well. This pilot has become feasible partly due to the support of the national government and the municipality. The emission-free delivery has successfully started and this climate deal has been completed.	Pilot emission-free delivery of building materials.	The effects have been calculated by the DCMR*

Moblity	Freight transport	Ongoing	Verduurzaming gemeentelijk wagenpark	The municipal vehicle fleet must be sustainable by the end of 2030 (replacement of fossil fuel vehicles with emission-free ones). This is necessary for the climate and air quality and to be able to continue to carry out municipal activities, such as waste collection, in the ZE zone for City Logistics. By making its own fleet more sustainable, the municipality of Rotterdam is also setting a good example and stimulating the market for electric driving. Knowledge sharing is of great importance here.	The objective is:- Passenger cars 100% emission-free by 2023.- Light commercial vehicles 100% emission-free by 2025.- Heavy-duty vehicles 100% emission-free by 2030.- Machines and tools 100% emission-free by 2030.	The total impact of making the municipal vehicle fleet more sustainable is 3 kton.
Moblity	Freight transport	Ongoing	Slimme logistiek stadshubs en vrachtfietsen	Encouraging and facilitating the logistics sector to make logistics more efficient, for example by using logistics city hubs and cargo bikes.	Through this measure, we are trying to achieve a reduction of 8% of delivery vans through more efficient loading and by using cargo bikes instead of delivery vans.	4 kton**
Moblity	Freight transport	Ongoing	Slimme en schone bouwlogistiek	With the smart and clean construction logistics project, we want to encourage construction logistics to be carried out more efficiently and emission-free. This will have a positive impact on accessibility and air quality and we will limit CO2 emissions.	Signing a letter of intent with 6 developers who are simultaneously carrying out 7 construction work on Katendrecht. In addition to direct efficiency, the BLVC (accessibility, quality of life, safety and communication) framework is also tested.	Impact is < 0.1 kton. See DCMR report for details**
Moblity	Freight transport	Ongoing	Stappenplan ZES	This multi-year programme is a coherent package of stimulating and regulating measures to achieve efficient and emission-free city logistics in Rotterdam. The most important part is the introduction of the zero-emission zone for vans and trucks from 1 January 2025. The zero-emission desk for entrepreneurs has been open to entrepreneurs since 1 July 2024, so that exemptions can be applied for. By 2030 at the latest, no business vans and trucks with a fuel engine will be allowed to enter the ZES zone at all.	This multi-year programme is a coherent package of stimulating and regulating measures to achieve efficient and emission-free city logistics in Rotterdam. The most important part is the introduction of the zero-emission zone for vans and trucks from 1 January 2025. The zero-emission desk for entrepreneurs has been open to entrepreneurs since 1 July 2024, so that exemptions can be applied for. By 2030 at the latest, no business vans and trucks with a fuel engine will be allowed to enter the ZES zone at all.	40 kton**
Moblity	Passenger transport	Done	Verkeersexperimenten schone lucht	Conducting a number of experiments (in 2020 - 2021) in which lanes were closed off on a number of road sections to address air quality bottlenecks. This approach should contribute to the three main tasks: facilitating the growth of the city, promoting the mobility transition and cleaner air. The effects of the measures have been mapped out and on the basis of this it has been decided to make this approach permanent.	Experiments have been evaluated and for some locations it has been decided to make the situation permanent.	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Alle kinderen op de fiets naar school (Klimaatdeal #32)	Work is being done on a shared bicycle system that is accessible to everyone. Encouraging alternative transport to the car is important to keep the city accessible, healthy and liveable. The implementation is tailored to the actual needs of the residents of the district. This requires close cooperation with residents, associations, community centres and schools. Round. included in municipal policy.	A shared bike system.	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Coöperatie deelmobiliteit (Klimaatdeal #22)	In local cooperatives in which residents share vehicles, the residents are cheaper, fewer vehicles are needed and more space is created on the street. The aim is for at least 40% of the vehicles to be fully electric. In Rotterdam, due to circumstances, the concept of Deel! has not developed. However, the initiative is assessed as valuable and is involved in the climate deal City-wide shared mobility (Climate deal in development #56).	Lessons learned for overall policy on shared mobility.	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Eenrichtingsverkeer Nieuwe Binnenweg (Klimaatdeal #25)	Residents, entrepreneurs, RET, the municipality of Rotterdam and the area committee are jointly committed to changing the Nieuwe Binnenweg into a one-way street. As part of the Nieuwe Binnenweg plan development, the Mobility Survey has been completed	A mobility study	The effects have been calculated by the DCMR*

Moblity	Passenger transport	Done	Elektrische BoTuBus, voor banen en de buurt (Klimaatdeal #31)	This climate deal aims to (be able to) use an electric neighborhood bus from and for the Bospolder-Tussendijken district. The bus uses locally generated electricity.	Overall result: 2021 realisation 8.6% (of which 3.3% fully EV) / 20% estimate 20% Realisation in 2022 10.6%. Specific result:From 2025, all new business vans and trucks in the ZE zone must be emission-free. By 2030 at the latest, no business vans and trucks with a fuel engine will be allowed to enter the ZES zone at all. Specific result	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Elektrische deelauto voor iedereen (Klimaatdeal #20)	At the end of 2019, a car-sharing program was rolled out with 100 electric cars. You can reserve a car via an app and leave it anywhere in Rotterdam after use. The initiator withdrew at the start and this further independently developed. At climate deal #56 City-wide shared mobility and climate deal #52 Mobility approach for Rotterdam employers, General use of shared mobility and possibilities 'free floating' shared cars.	A car-sharing programme	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Experiment schoolomgevingen (Klimaatdeal #26)	Two schools in Rotterdam will have a safer traffic environment for a period of approximately four months. The aim is that children who previously did not participate in traffic independently by bicycle will now do so. A positive side effect is that less car traffic in the school environment and lower speeds benefit the quality of life in the vicinity of these schools. Two schools have been given concrete follow-up as part of the deal: The Theresia School and the Bergse Zonnebloem. Both experiments have now been completed. The school environment approach will be continued as part of municipal policy.	A school environment approach for stimulating bicycle use among children on the basis of an experiment at 2 schools: The Theresiaschool and the Bergse Zonnebloem.	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Fietscampus 010 (Klimaatdeal #34)	The neighbourhood hubs of Fietscampus 010 are the base for cycling mobility activities in the neighbourhood. From there, networking, theme, information and workshop meetings are provided. As a result, a Bicycle Campus offers a suitable answer to emerging mobility questions and needs for each neighbourhood. Deal has been included in municipal policy.	Neighbourhood hubs for bicycles	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Gemeentelijke mobiliteit (Klimaatdeal #30)	The municipal HR policy on commuting and work-to-work travel of the municipality's own employees will be brought in line with the Rotterdam Mobility Approach as much as possible. This means that the use of sustainable modes of transport is encouraged. This deal is in line with Anders Reizen. Round. Since 1 January 2023, a new mobility policy has applied to all employees of the municipality of Rotterdam, with allowances that depend on the way they travel.	Renewal of mobility policy for the municipality of Rotterdam	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Groene Connectie Rotterdam Centrum (Klimaatdeal #27)	On the way to a green ring, small interventions are made to experience what is possible. The views were explored through workshops and walking expeditions. This deal will be followed up in the realization of the 7 city parks. With the exception of Weena/Hofplein, these are other places. Completed in 2021.	Exploration of vistas through workshops and walking expeditions.	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Klimaatalliantie – Transitiekamer Mobiliteit (Klimaatdeal #35)	The Mobility Transition Chamber is a partnership between the municipality and partners aimed at accelerating and scaling up the transition to emission-free and shared mobility in Rotterdam.	An alliance between the municipality and partners. This was not created under this name.	The effects have been calculated by the DCMR*

Moblity	Passenger transport	Done	Multimodale wijken station hubs (Klimaatdeal #21)	In multimodal hubs you will find electric shared cars, shared bicycles and shared cargo bikes. This ensures an increasingly widespread use of shared mobility in the city. The pilot in the Hoogstraat with Hely has been followed up with a number of pilots. The municipal policy for (design) hubs was developed in 2022 partly on the basis of this. This climate deal is involved in the City-wide shared mobility in 2020 (Climate Deal in development #56),	Various pilots multimodal neighbourhoods station hubs	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Ondernemerstafel (Klimaatdeal #28)	The ambitions of the Rotterdam Climate Agreement have been laid down in a network of entrepreneurs' umbrella organisations and influential employers (R10). This network puts together a group of frontrunners, who challenge each other to come up with ways for companies to realise the ambitions of the Rotterdam Climate Agreement. This climate deal has been scaled up to the Mobility Approach to Rotterdam Employers (Climate Deal #52).	See project "Mobility approach to Rotterdam employers (climate deal #52)	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Stadsbrede deelfiets (Klimaatdeal #33)	The neighbourhood hubs of Fietscampus 010 are the base for cycling mobility activities in the neighbourhood. From there, networking, theme, information and workshop meetings can be provided. Round. This climate deal ended in 2021. The proposal did not fit in with the municipality's policy: too large-scale an application at once, additional funding requested and the technology with docking station was not approved. No follow-up, principles to be included in climate deal #52 city-wide shared mobility.	N/A	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Vervoersbank (Klimaatdeal #19)	The bicycle bank will become a transport bank, the cars can be borrowed by the participants. This will reduce distances to the labour market and allow more people to benefit from mobility. This climate deal ended in 2021. In addition to negative consequences due to COVID-19, practical impossibilities for the provider – offering an adjusted rate to the target group – also proved to be an obstacle. It was evaluated and decided to include the lessons learned in scaling up to City-wide shared mobility (Climate Deal in development #56).	A transport bank	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Done	Zakelijke deelmobiliteit (Klimaatdeal #29)	The electric shared car is a good alternative to a private car or the lease, rental or pool car due to its mobility guarantee. We are therefore setting up a hub with electric shared cars for the business market. Because the car-sharing system is demand-driven, raw materials and valuable space are used efficiently. The deal has been followed up in the Kruisplein garage in which a 1-year pilot was started in September 2021 with electric shared cars (3 providers). This climate deal will be scaled up to the City-wide shared mobility (Climate deal in development #56). And possibly connected to the employer's approach Rotterdam center.	A hub for business shared mobility	The effects have been calculated by the DCMR*
Moblity	Passenger transport	Initiative	ZE Taxi's	Policy to make the taxis emission-free. Rotterdam has concluded a covenant with the government, measures are being worked out.	100% emission-free from 2028, according to the government covenant (with the exception of wheelchair taxis)	9 kton**
Moblity	Passenger transport	Initiative	Modal shift naar OV en fiets	We cannot only focus on electrification of all vehicles, which is why we are focusing on sustainable alternatives to car traffic. The municipality will map out which municipal policy contributes to stimulating bicycle and public transport use and the results will be monitored.	Emission-free mobility 2040	34 kton**

Moblity	Passenger transport	Ongoing	Werkgeversaanpak duurzame mobiliteit	Employers in Rotterdam have a lot of influence on making mobility in Rotterdam emission-free because they can influence the mobility choice of their staff and offer solutions such as working from home, cycling and public transport and electrifying their lease fleet.	55% reduction in CO2 emissions from commuting and business traffic by companies in Rotterdam by 2030.	29 kton**
Moblity	Passenger transport	Ongoing	Schone watertaxi	By cleaning up the water taxi fleet (electric boating/sailing on hydrogen), we are also contributing to Rotterdam's sustainability ambitions with Passenger Transport by Water (PoW).	The aim is to have the entire fleet of water taxis sail emission-free by 2030. Currently, there are 3 electric 40-seater water taxis, 3 electric 12-seater/bicycle water taxis and 1 hydrogen 12-seater water taxi. A ship with capacity for 80 people and bicycles will also be made fully electric. In addition, 190 solar panels have been installed on the base station that generate 50,000 kWh.	Total impact on transport by water (buses and taxis) is 4 kton.
Moblity	Passenger transport	Ongoing	Verdere verduurzaming dienstreizen	As part of the Municipal Executive's climate mitigation objectives, the municipality of Rotterdam wants to make business travel more sustainable with the ambition to reduce CO2 emissions from business travel to zero as quickly as possible.	Goal:To further develop the municipal offer of an emission-free and efficient (sustainable) business mobility system for employees of the municipality of Rotterdam.All passenger cars will be emission-free by the end of 2023. In addition, in 2023, the HR schemes for commuting and business trips will be made more sustainable. As part of this, a car-sharing system for business trips has been implemented. The above objectives have been achieved. Therefore, as of 1 January 2024, expansion in Scope 3: Develop additional measures to reduce CO2 emissions from business trips with private transport (mostly fossil fuel cars) and, where possible, the even more efficient use of vehicles.	The total impact of making the municipal vehicle fleet more sustainable is 3 kton.
Moblity	Passenger transport	Ongoing	Vervoer over water(bussen)	By changing the water buses (electric sailing), we are contributing to Rotterdam's sustainability ambitions with Passenger Transport by Water (PoW). The goal is to make all water buses emission-free. Waterbus sails on behalf of the Province of South Holland.	The fleet now consists of three fully electric water buses. The aim is to have the entire waterbus fleet emission-free by 2030. Hybrid ships are required for the longer connection between Rotterdam and Dordrecht, because the battery does not yet reach this distance. The emission-free fleet will eventually be expanded by six more, to a total of nine.	Total impact on transport by water (buses and taxis) is 4 kton.
Moblity	Passenger transport	Ongoing	ZE bussen RET	The RET is replacing the diesel buses with electric ones, in accordance with the MRDH concession, and is installing charging infrastructure for the buses. Diesel buses emit a relatively large amount of CO2 per vehicle, drive around all day (and are therefore used intensively) and can be cleaned cost-efficiently.	The RET buses will become electric in several steps, the last diesel bus will be in service in 2030. In 2022, 40% of all timetable kilometres will be emission-free, in 2026 60% and in 2030 100%.	9 kton**
Moblity	Passenger transport	Ongoing	ZE deelauto's	Part of the car-sharing policy is the electrification of the shared cars: all new shared cars are electric, the existing ones must be emission-free by 2025. The municipality facilitates shared car parking spaces with charging facilities and the municipality is also in talks with the providers of shared cars to encourage emission-free shared cars.	The range of shared car sections with charging facilities is in line with the shared cars available in Rotterdam.	1,6 kton**
Moblity	Passenger transport	Ongoing	ZE Doelgroepenvervoer	Include conditions through concessions that oblige the carrier to use emission-free vehicles. A tender is used to explore what the market can handle, at the same time we carry out market analyses and obtain market advice in order to issue realistic assignments/concessions. Target group transport will be emission-free by 2030.	Target group transport 100% clean by 2030. We aim for the following milestones:- 21 July 2025: (start of new Agreement): 80% of all vehicles will be 100% electric, with the exception of wheelchair buses. The non-electric cars are at least emission class 6. - 1 January 2026: 90% of all vehicles are 100% electric, with the exception of wheelchair buses. The non-electric cars are at least emission class 6. - 1 January 2027: All vehicles will be 100% electric, except for wheelchair buses. - 1 January 2030: All wheelchair buses are 100% electric. The timeline towards it partly depends on availability and affordability. The following criteria apply to this end.	4 kton**
Moblity	Passenger transport	Ongoing	Stadsbrede deelmobiliteit	Electric shared cars, shared scooters, shared (cargo) bicycles and mechanical shared bicycles, in combination with your own bicycle, public transport and walking, can form an alternative to private car ownership and thus contribute to reducing CO2 emissions in Rotterdam. The Rotterdam approach to shared transport and transport hubs includes measures to enable and encourage shared transport (including issuing permits for shared transport, deployment during major road works, hubs at public transport stops). The aim is to perpetuate shared mobility in the city.	Intended results:- Shared cars are available in all neighborhoods where parking is regulated:- At least 800 shared cars are available in the city:- On average on an annual basis, at least 5500 shared two-wheelers are available in Rotterdam, including min. 500 shared cargo bikes.	3,6 kton**

Moblity	Other	Done	Hardt Hyperloop	The project includes the development of a European Hyperloop Centre in Rotterdam. For this we are looking for a location (in Rotterdam) for a long test track (3 kilometers), where testing can be done at high speed. In addition, the project includes the development of an experience center where work is being done on standardization, customer engagement and further development of networks. The contribution is intended for the plan development and the further development of the business case.	In 2022, Hardt Hyperloop moved to their new office on Marconistraat. This office and with it the experience center opened in November.	The effects have been calculated by the DCMR*
Moblity	Other	Ongoing	Hytrucks	Creating a corridor for hydrogen-powered trucks between the Ports of Rotterdam and the hinterland (Brabant, Oost-NL, Germany, etc) where we want to have at least 500 hydrogen-powered trucks from Rotterdam within five years and about 1000 by 2030.	Creating a corridor for hydrogen-powered trucks between the Ports of Rotterdam and the hinterland (Brabant, Oost-NL, Germany, etc) where we want to have at least 500 hydrogen-powered trucks from Rotterdam within five years and about 1000 by 2030.	The future effects have been estimated by the DCMR**
Moblity	Other	Ongoing	Verduurzamen mobiele werktuigen	At the end of 2023, 45 parties signed the Clean and Emission-Free Construction (SEB) covenant: various ministries, water boards, provinces, municipalities and industry and network organizations. The municipality of Rotterdam is one of those parties. In the covenant, agreements have been made to make construction machines used in works purchased by the municipality cleaner, healthier and quieter.	The objective is to have the emissions of equipment used as a result of municipal procurement emission-free by 2030. In addition, we will work with project developers to work on commercial projects in the city as well. Agreements have been made for this in the plan of action for sustainable construction. We carry out 5 pilot projects every year.	20 kton**
Other	Other	Initiative	Energietransitieleningen	The municipality of Rotterdam is working on the energy transition to achieve the climate goals and at the same time build a new sustainable economy. In this context, the municipality set up the Rotterdam Energy Transition Fund (ETF-G) in 2020. The 2022-2026 Municipal Executive Agreement – one City – also states that the municipal wants to continue to make energy transition loans available to Rotterdammers, VvEs, entrepreneurs, schools and sports clubs who want to make their premises more sustainable.	Contributing to achieving the local climate goals and stimulating the sustainable economy of Rotterdam.	0,9 kton**
Other	Other	Ongoing	Rotterdams Burgerberaad Klimaat	We are organizing a citizens' assembly on climate in Rotterdam because:To achieve the climate goals of 2030 and 2050, we need the wisdom, knowledge and creativity of the city. With the Rotterdam Climate Citizens' Council, we hope to stimulate and collect them. The 2022 Omnibus Survey shows that 7 out of 10 Rotterdammers are concerned about the climate. The climate affects everyone. That is why it is important to involve Rotterdammers more in devising and deciding on actions to achieve the climate goals. The Rotterdam Climate Action Plan (KAR) shows that more plans are needed on top of what the municipality is already doing. After all, the municipality cannot do it alone: it also requires commitment from residents, organizations and companies in Rotterdam.In the coalition agreement 'One City' has been agreed to organize a citizens' assembly on the theme of climate.	The objective of the Rotterdam Climate Citizens' Assembly is to collect proposals that lead to achieving the Rotterdam climate goals and to gain experience with a citizens' assembly. We want to continue to build on the municipality's involvement with the people of Rotterdam and vice versa. Increasing the trust of Rotterdammers in the government is not the objective, but it can be a by-catch of the citizens' assembly.	The future effects have been estimated by the DCMR**

NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Commitments

Climate Neutrality Commitments of the city of Rotterdam

Gemeente Rotterdam

1) Introduction

When the mission was announced in 2021 it was a clear fit with Rotterdam. We had already been taking the steps advocated by this mission prior to the launch, in terms of understanding the system, building a mandate, shaping the right policies and actions, increasing our capacity to (imp)act and learn, evaluating and reassessing our course. Since the Rotterdam Climate Agreement (RKA, 2019) and our first and forecasting, assessing the impact of our climate actions, we have been going through many phases of learning, evaluating, and adapting our approach with the city council and our stakeholders, which we see as one of the key elements of this mission. This commitments section of the City Climate Contract (CCC) will show how we progressed so far and the ways we, the municipality and stakeholders, are working together on our climate actions

In this *introduction* we will show how we progressed since the RKA with our stakeholders, developing and implementing climate actions and other forms of engagement with stakeholders and our citizens. In the *second* part, we will elaborate on our setting of *goals* and the transitional phase we are in. Therefore, in the *third part on strategic priorities*, we will give an overview of our *current* priorities and the collaboration with stakeholders on the necessary actions, so to address in the fourth part the way forward. We conclude in the fourth part with the commitment on behalf of the Municipality of Rotterdam by Vice-mayor Chantal Zeegers, and an overview of all our agreements and collaborations on climate actions with our stakeholders which will be featured in *annex 1.*

In essence, our climate policy has slowly been shifting, from what can be done within the existing context to have the biggest CO2-reduction on the short and intermediate term, towards what in the end is needed to become a climate neutral city. This first of all, means practically, that no matter how big or how small the emissions are, for every person or business a viable pathway must be created towards a climate neutral city. This demands a progressive stakeholder engagement, in which more-and-more groups are involved in setting out climate actions.

But secondly, it leads to the necessity of more structural changes of which we are beginning to experience the signs. As our experience has taught us, an element is needed to be successful: a stronger multi-level governance and cooperation between the various state actors which shape our context for climate action. While targeting our current goal of -55% CO2-reduction in 2030 with our local climate actions, the success of them has been largely influenced (positively and negatively) by the way we work together. The mission is a chance to enhance the cooperation to successfully implement and scale-up our climate actions to accelerate the transition towards a climate neutral city.

Woking towards a climate neutral city asks for more than just reducing our emissions. It's about chancing the ways we live, work and leisure in our city. It requires a more integral and holistic approach and policies, where climate neutrality is part of a bigger endeavour, socially and economically, which is especially the case for the city of Rotterdam with the largest port of Europe. Alignment on time between the different policies and judicial and financial means is key to have the desired impact as well as ensure it is done on a just and inclusive way.

So, the mission is chance for all of us to deliver towards that goal. We express our hope we can mutually learn during this collaboration between Cities, the European Commission and our national government how to support local climate action more effectively and efficiently, because we are not on track yet to deliver on the goal set out in the Paris Agreement to limit global warming to 1,5 C degrees. Exchanging information (data) and mutual experiences in a

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faster digital way is from our point of view a precondition to ensure faster and more joint decision-making processes, ensuring we have a common understanding of the structural barriers to address which prevent us from accelerating towards zero. We with are stakeholders are determined to play our part. Rotterdam makes it happen!

The Rotterdam Climate Agreement

Since we set our first target of -49% CO2-reduction for 2030 in 2019, and drafted the first plans to achieve it, the focus for Rotterdam has been on getting the desired results and push further along the way. This couldn't and cannot be done without the involvement of our local stakeholders. Therefore we established our first Rotterdam Climate Agreement (RKA) in 2019 were local stakeholders endorsed the overall climate goals and agreed upon 49 climate deals to reach those goals. An important part was also to agree upon how to implement the tasks set out in the National Climate agreement (2019).

More than 50 meetings were held with the participation of more than 100 compagnies and organisations and over 1000 citizens. The 'climate deals' touched on a variety of issues, big and small, not limited to CO2-reducton but also on for example consumption/circularity and the labour market. So called 'Climate tables' were established for the various emission domains to monitor progress and inspire new actions. Part of the RKA was also the first forecast of our common actions towards the 2030 goal, which has been repeated annually since then.

The experiences and outcome showed first of all it's not an easy tasks on a local level to decide on our own on actions with the big impact on CO2-emmissions that is needed. Dependency on national and/or European policies for locally to be successful, was evident. Second, that it's all part of a movement in which we depend on the willing and able but there are large differences in the degree of organisation. So, while professional stakeholders could agree on impactful climate deals, many other were less impactful and just a start for further up-scaling.

The Rotterdam Climate Agreement (2019)

To address this, the need arose to develop more sector/stakeholder-specific agreements and governance structures depended on the tasks ahead and the degree of organisation. For example, the Zero Emissions Logistics Roadmap (2020) which facilitated and helped businesses to prepare for this year installed zero emission zone for the inner-city of Rotterdam. Or the performance agreements (bi-annually updated) with social housing compagnies (which own more than 40% of all the residential buildings), on concrete number of buildings to insulate and made natural-gas-free.

Performance Agreements with the 11 social housing corporations in Rotterdam in 2024 (Foto: Rhalda Jansen)

We also set-up specific support and governance structures to help stakeholders to professionalise, like a platform for energy communities and house-owners-associations. So in this way we could expand the networks of different stakeholders so to let more people engage in local climate action.

'Sun on South' (Zon op Zuid), one of the energy communities set-up with help of the support platform Energy of Rotterdam.

Targeting new stakeholders

Based on the experiences since the RKA, in 2022 we therefore decided to change the governance of the Rotterdam Climate Agreement with its five 'Climate tables'. While collaborating with many stakeholders on climate action, had become more institutionalised and part of the going concern, we focussed on addressing new target groups and networks so to ever expand our coverage among the city.

We first started with installing so-called 'Climate Boosters' (Klimaataanjagers): local persons with a broad private network, who's task is to build upon the networks established since the RKA, focussing on those areas were we perceived a gap and chances for strengthening stakeholder collaboration. An example are the activities of the Climate Booster on health care, which translates the Green Deal Sustainable Healthcare 3.0. (2022) in a local action plan for Rotterdam, addressing issues around energy, circularity and mobility. Worth mentioning is the research started on health care improvement in relation to CO2-reduction.

Nine regional hospitals agree on sustainable mobility actions (2024)

A second endeavour was setting up a citizens Council on Climate. It consisted of approximately 100 different Rotterdam residents. Young and old, from all kinds of neighbourhoods and with different backgrounds. The citizens' council met in six meetings last year to gain knowledge about the climate and to jointly devise solutions for a greener and healthier city. For example, should the heat and flooding in our neighbourhoods be reduced? Or do we want more green and energy savings? The members contribute from their own experience as a resident of Rotterdam. The citizens' council could call on experts and requests for information. Its advices have been adopted by the city council and preparations are underway to be implemented.

The Citizens Council on Climate deliver their proposals to vice-mayor Chantal Zeegers (2024)

Learning together

Because of the speed the transition is or must take place, common sense-making and sharing experiences is an import part to foster swift and effective collaboration. One of the many ways we try to contribute towards this goal is organising congresses on a regular basis.

Since 2020, a congress called 'Recharge Earth' is organised by our local congress location AHOY (which itself has 5.200 solar-PV's and a thermal grid, realises as part of the EU-funded project Ruggedized), where hundreds of professional and semi-professionals take part in workshops and plenary debates. They recently signed a collaboration with Euroforum to expand their networks and expertise.

Recharge Earth: Renew, Reuse, Rethink.

Another important local event is the Citymakers congress (Stadsmakerscongres). Starting out as an event wanting to transcend the different sectoral policies, focussing on the people who make this city (developers, architects, policy makers, local heroes, etc), this has been increasingly taking aim at what it is to be a climate neutral city.

On the link between Energy & Space during the Citymakers congress 2019

Together with international congresses (2024: Urban Feature, World Energy Congress, Hydrogen summit), we provide and stimulate common learning on and collaboration towards a climate neutral city.

2) Goal: A Climate Neutral City

In 2019 our City Council officially adopted the goal of reaching climate neutrality in 2050 and reducing the emissions within its boundaries in 2030 by 49%. This was agreed upon with the Council Agreement on Energy Transition (Raadsakkoord Energietransitie, 2019). It identified 5 'transition pathways' to succeed in towards climate neutrality: Port & Industry, Built Environment, Mobility, Energy-production, and the Economic transition. The last one is of utmost important for the city and our region, because it not only offers a chance for new economic growth and work, but also is essential to fill in the gap of current economic activities (especially Port & Industry) which relies heavy on fossil fuels and plans to develop towards a circular and hydrogen hub for Europe.

We established our first Rotterdam Climate Agreement (RKA) in 2019. Local stakeholders endorsed the overall climate goal of then -49% CO2-reduction in 2030 and agreed upon 49 climate deals to reach those goals. Regarding climate neutrality there has been one target set for mobility for 2040 and for the city as a whole in 2050. More than 50 meetings were held with the participation of more than 100 compagnies and organisations and over 1000 citizens.

In 2022 we assessed that a more ambitious goal of -55% CO2-reduction for the whole city in 2030 was feasible, but also added a specific goal for the urban area (mobility and build environment) of minus 25% in 2026 (scope 1+2). Currently we have not (yet) set a 2030 intermediate goal for the urban areas of the city. The reasons for this are:

a) the preparation of the incoming administration in 2026: many of the current policies and associated action plans are set to contribute towards a target set for 2030, while some even stop in 2026. Consequently, policies targeting the emissions beyond, for a big part are in the middle in the process of being updated, which are essential in complementing our portfolio of actions for the periods beyond. Also, barriers on the short term (grid congestion, new law on heath market) also forces us to reevaluate and update certain policies.
b) the preparation of new national measures by the national government to (still) reach the national goal in 2030, as well establishing a goal for 2035 as obligated to do by the national Climate Law, which are important to decide what to do additional.
c) the negotiations on the proposed EU target of -90% in 2040, of which we asses is to be very important for new European measures which impact our work and therefore actions.

To prepare, it's in our situation of utmost importance we can take these multilevel developments into consideration when we strategies what is wise. This version of the CCC thus is a starting point of preparation for the new administration, giving them the opportunity to establish an ambitious but feasible target with the further support this mission offers. As we did in preparation for the current and previous administration, we are starting now to prepare new scenario's, policy options and an estimate of the needed investments. We expect that a new goal will focus on the urban area (excluding the Port & Industry which are largely part of the Emission Trading Scheme). The underlying polices and portfolio of actions are as we speak topic of engagement with our local stakeholders.

3) Strategic Priorities

With our stakeholders we are focusing currently on a number of strategic priorities as set out in our climate action plan (Klimaatactieplan Rotterdam). The focus is on actions in the urban area on mobility, build environment and energy. For many of those actions', agreements between the municipality and specific stakeholders exist which are frequently updated. In this section we will highlight in brief the structures, priorities and actions on which the municipality and stakeholders work together to support our overall goal. A set out in the action plan, for a part we are currently reassessing these targets and ambitions in collaboration with our stakeholders.

A) Energy

Together with our stakeholders we are working towards a sustainable energy system. Realising new sources of sustainable energy (solar, wind) and expanding current and new infrastructure so other domains gain access on time to become fossil free.

Solar

For 2030, the goal is 3.4 km2 of new solar-PV's, which translates in a total of 1,889,000 solar panels. To stimulate, the municipality offers free advice and help towards business buildings. For residential buildings and utilities, the municipality works together with 'Energy of Rotterdam', a support platform for citizens and businesses who want to start their own energy community. This support platform was set up as a result of one of the climate deals in the RKA.

Wind

The city-regional covenant (2012) and the port covenant (2009) include agreements to generate a minimum of 350 megawatts of wind energy. These targets are also part of the regional ambitions for sustainable generation by 2030, as set out in the Regional Energy Strategy (July 1, 2021), an agreement between the 23 municipalities, who are part of the Metropolitan Area Rotterdam-The Hague. Discussions on the post-2030 ambition has started.

Infrastructure (electricity and gas)

We are working towards a sustainable, robust, flexible but also fair energy system. In the coming years, the focus will primarily be on the electricity grid, where developments such as transport electrification, heat demand but also industrial processes result in capacity shortages on the grid, or grid congestion. Currently, one of the main barriers to address to prevent slowing down the energy transition. The municipality and the grid operator Stedin, who is also responsible for phasing out the (fossil) gas-infrastructure, have agreed on a common Strategic Action Agenda for the period 2024 – 2026. This will be regularly updated and discussed very half year. It contains various concrete work-packages and actions towards our goal. Stedin also participates in the current updating of our policy and ambition on natural-gas-free neighbourhoods, which will be decided upon in 2026, which is relevant to prevent unnecessary electrification of the heath demand and the removal of gas-infrastructure.

B) Build Environment

The Built Environment consists of residential and non-residential construction. Non-residential construction refers to buildings without a residential function, such as hospitals,

commercial buildings, offices, and schools. Rotterdam has a total of 321.500 residential buildings of which almost 40% is owned by social housing compagnies, 20% by private landlords and the rest are owner-occupied housing. Most of the last-ones are part of a house-owner-association of which a majority agreement is needed to invest in sustainability. We have a variety ow ways to collaborate and/or help and stimulate these groups towards a sustainable build environment. With the social housing compagnies there is a governance structure and underlying agreements on targets and monitoring. In 2023 a Platform Private Landlords Rotterdam (PPVR) was created with the largest private landlords who want to rent properly, be entrepreneurial and be more visible as role models, with whom we develop support measures for also the smaller landlords to fulfil their obligations on insulation (minimal label C in 2029) and natural-gas-free. For private home-owners a Platform House Owner Associations was part of a climate deal (RKA) in 2020, whose members are expanding ever since.

Natural-gas-free Neighbourhoods

We are working towards 85.000 natural-gas-free residential building in 2030. These will mainly be connected to district heating. Almost half of these residential buildings are owned by social housing compagnies. After the climate deals between the corporations and municipality concrete 'Performance Agreements' have been made to implement these deals. These agreements are monitored and updated bi-annually.

District heating in Rotterdam is owned and developed by two (private) compagnies; Vattenfall and Eneco (owned by Mitshubishi) with whom we have concession agreement. Due to new legislation, these are being revised.

Insulation and energy saving

Our goal is to have all residential buildings having at least an energy label 'C' in 2030. This amounts to a total of 97.000 buildings. 33.000 are of private home-owners, 46.600 of social housing compagnies and 21.00 of private landlords. With the social housing compagnies, we have made concrete plans for 12.000 as agreed in the above mentioned performance agreements for the next 2 years and still 33.000 to pick up after 2026. For the remainder of 29.000 for private homeowners, continuation of the current grants from the national government is essential for which we have currently only concrete plans for 4.000.

Energy poverty

In the wake of the international energy crisis the municipality and the social housing compagnies made an agreement to help 5000 rental homes. Seven Rotterdam housing corporations are implementing various energy-saving measures in their homes in 2023-2024, thus reducing their tenants' energy bills. These include the replacement and water-side adjustment of central heating boilers, the installation of hybrid heat pumps and solar panels, and the deployment of energy coaches.

New Buildings

Since new building by law are obliged to be build natural-gas-free and energy neutral, are focus is to try to get them more 'Paris-proof', including thus circularity and other emissions during the building process, in line with the EU-taxonomy. The different parties who participate in the Platform Developers Rotterdam (developers, builders, municipality, social housing compagnies) have for this purpose agreed upon a Sustainable Building Approach

(2024). This focusses on a variety of actions which are monitored, like setting up a Climate Academy and a Field Lab, education named Green Workforce, developing of standard calculations and sharing results online.

Mobility

We are committed to make mobility fossil free in 2040. This requires making the inner city more car-free, clean rides and thus electric driving (energy transition), making motorized traffic emission-free, including mobile equipment, vans and trucks, and investing and making public transport more attractive throughout the city, including investing in the quality and quantity of Park&Ride (P&R) facilities linked to the main urban public transport links.

Charging infrastructure

Aan important partner for charging infrastructure is the national government with whom we collaborate within the National Approach Charging-infrastructure (NAL) and which funds the municipal investments and actions. Locally we have agreements with social housing compagnies (Performance Agreements) and support house-owners-associations. and employers.

Passenger transport

As a result of the RKA in 2021 a Climate Alliance Sustainable Mobility was launched in 2021 with more than 20 employers committed to reduce their emissions caused by commuting with -55% in 2030. Since then more-and-more employers are joining this alliance which currently accounts to 170 employers with over a 170.000 employees in the Rotterdam area. Specific for taxi's in 2022 a Zero Emission Taxi Agreement Framework (2022) was agreed upon to stimulate and enforce the electrification of taxi's.

Logistics

To prepare and ensure a smooth introduction of the Zero Emission Zone for logistics, which came in effect his year, in 2020 the municipality and compagnies agreed upon a Covenant Zero Emission City Logistics Rotterdam. Together we decided upon the precise size and step-by-step inclusion of different types of vehicles. Where the zone currently is in effect for new vehicles, in 2030 it also includes existing vehicles. After 2030 the zone will be step-by-step extended to cover the whole city.

Other

In 2024 the municipality, the Port of Rotterdam and many other compagnies and municipalities signed the 'Covenant Clean and Zero Emission Building' with the national government on reducing the emissions as a result of mobile machinery used for building activities. We agreed upon reduction targets and ambitions for 2030 to contribute to: 60% NOx emission reduction compared to 2018 (Nitrogen Reduction and Nature Improvement); 75% health gain compared to 2016 (Clean Air Agreement); 0.4 Mton CO2 emission reduction compared to 2019 (Climate Agreement); Climate neutral and circular national infrastructure projects by 2030.

4) Proces and Principles

As the previous sections showed, climate action in Rotterdam, working towards a climate neutral city, is by definition a multi-stakeholder process. Since the RKA, as set out in the introduction, working on the bases of a overall climate agreement has progressed towards a more multi-facetted collaboration. The municipality and our local stakeholders are working together in a variety of ways, with a continuously expanding network(s) and deepening the connections and actions between stakeholders. Depending on the sector, topic and phase of development, agreements are made and/or updated, governance structures put in place and monitored and updated. In the next update of the CCC we are sure we can show the growing involvement of stakeholders with whom we collaborate on climate actions.

Our KAR, as a overall monitoring tool, gives the municipality and stakeholders the necessary insight of progress and the task ahead. The updating of our KAR and underlying policies and actions, the municipality does with the involvement of our local stakeholders. Together we make this city!

We do this following these guiding principles:

- We keep the energy transition affordable for everyone and prevent and combat energy poverty;
- We are committed to maximum CO2 reduction at minimum social cost;
- We ensure a level playing field: the polluter pays;
- We use the energy and raw materials transition as a flywheel for entrepreneurship and additional jobs (especially for people distanced from the labor market);
- We ensure that companies and employees are enabled to take the steps in the energy transition as well as possible and in consultation, and we also use the energy transition to strengthen our (international) competitive position;
- We focus on measures at the interface of health and combating climate change. Think of: emission-free mobility, sustainable building and improving air quality;
- We are committed to a clean, safe and reliable energy supply;
- We are committed to no-regret decisions and we keep room in our choices for new solutions and future innovations;
- Through our commitment to raw materials transition, we aim to reduce CO2 emissions elsewhere in the world;
- We test all our decisions against the objective of energy transition, now and in the future;
- As a municipality, we set a good example ourselves;
- We ensure maximum involvement of and information to residents;
- We actively steer our participations from our shareholder role. And specifically for the Port of Rotterdam Authority to support the Port of Rotterdam in their efforts to combat climate change.

5) Signatories

On behalf of the Municipality of Rotterdam, I hereby testify to our commitment to reduce our CO2-emmisions with 55% in 2030, looking for new ways with our stakeholders to accelerate this transition towards becoming a climate neutral city with the support this mission provides. In addition I present the numerous ways, the city council and our local stakeholders have committed themselves towards climate plans and actions (as shown in the appendix), to ensure reaching this goal.

Date of signature	Name	Signature
20th of February	Vice-mayor Chantal Zeegers	

Appendix 1: Individual / Cluster Signatory Commitments

Category	Agreements	Signatories
General		
	Rotterdam Climate Agreement (2019)	1.2.2_Rotterdam_Climate_Agreement_ENG.pdf (pages 42, 43) over hundred stakeholders
	Climate Actionplan Rotterdam/ Klimaatactieplan Rotterdam (2023, 2024)	City Council (https://rotterdamraad.bestuurlijkeinformatie.nl/Document/View/1000ae9b-31c3-4a74-982d-cf6a0a7351d2)
Build Environment		
New buildings	'Sustainable Building Approach' (2024)	Developers, builders, social housing compagnies, municipality https://rotterdamraad.bestuurlijkeinformatie.nl/Document/View/589c8742-d266-4898-903d-e6b8bfb4516b
Existent buildings	Performance agreements with social housing compagnies	https://gemeenteraad.rotterdam.nl/Reports/Document/9c7a2001-28c5-4afd-814f-a7816978b5b4?documentId=8e53cc27-c773-4a0b-8633-fd26a3c65f80 (page 3)
	Letter of intent 'Samen goed Verhuren' (rent well together) Platform private landlords Rotterdam (2023)	7 large private landlords Verhuurders richten platform op voor verbetering van de huursector - Duurzaam 010
Energy poverty	Covenant to tackle Energy poverty	Ruim 9 miljoen voor verduurzamen Rotterdamse huurwoningen - Duurzaam 010 (7 social housing compagnies)
Mobility		
Logistics	Covenant Zero Emission City Logistics Rotterdam (2020)	Numerous compagnies and municipality Covenant Zero Emission City Logistics Rotterdam (page 42)
Taxi's	Zero emission taxi agreement framework (2022)	National government, large cities, representatives taxi-branche https://www.tweedekamer.nl/downloads/document?id=2022D50159 (page1)
Mobile machinery	Covenant Clean and Zero Emission Building	National government, provinces, municipalities, compagnies Staatscourant 2023, 31167 | Overheid.nl > Officiële bekendmakingen
Employers	Climate Alliance Sustainable Mobility (2021 and onwards)	Logistiek 010 • Nieuws • Rotterdamse werkgevers vormen alliantie voor duurzame mobiliteit
Energy		
Electricity network	Stategic Agenda Stedin and Municipality 2024 – 2026 (regulary updated)	Network operator Stedin and municipality https://rotterdamraad.bestuurlijkeinformatie.nl/Document/View/8183cdf4-fd1e-41d8-982f-5c5bd9ab82bf

Sustainable Energy	Regional Energy Strategy (2021)	21 municipalities, province of South-Holland, 4 water authorities, network operators, other stakeholders