



Climate City Contract

2030 Climate Neutrality Action Plan

City of Rotterdam



Gemeente
Rotterdam

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Contents

List of figures.....	4
List of tables.....	4
Summary.....	6
Introduction.....	8
The Rotterdam City Climate Contract	11
Prior steps.....	11
Current situation: from start-up to scale-up	13
Fulfilling of the CCC-requirements	14
Reading guide.....	16
Part A – Current State of Climate Action.....	18
Module A-1 Greenhouse Gas Emissions Baseline Inventory	18
A-1.1. Methodology	18
A-1.2. Analysis of current and historic emissions	21
Module A-2 Current Policies and Strategies Assessment	31
Relation between EU, National, Regional and local policies.....	31
A-2.1. European policies	34
A-2.2. National Policies	37
A-2.3. Regional Policies.....	40
A-2.4. Municipal Policies	41
A-2.5. Forecast 2030	43
Conclusion on the emission gap for 2030.....	47
Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality.....	49
A-3.1. City development.....	49
A-3.2. Governance and Policy	62
A-3.3. Social innovation, democracy and participation.....	63
A-3.4. Finance and Funding	63
A-3.6. Learning capabilities	63
Part B – Pathways towards Climate Neutrality by 2030	66
B-1 Climate Neutrality Scenarios, Impact Pathways.....	67
B-2 Climate Neutrality Portfolio Design	71
B-3 Indicators for Monitoring, Evaluation and Learning	71
Part C – Enabling Climate Neutrality by 2030	75
Module C-1 Governance Innovation Interventions.....	75
Module C-2 Social Innovation Interventions.....	76
Outlook and next steps.....	77
Appendix	78
1. Climate Action Plan Rotterdam (KAR)	78
2. Portfolio of Actions KAR.....	78

List of figures

Figure 1: Rotterdam territory.	7
Figure 2: Emissions for the urban part of Rotterdam compared to the 2025 target.	20
Figure 3: Share for urban sectors, built environment and mobility, by scope.	21
Figure 4: Trend scope 1 CO2 emission Rotterdam.	22
Figure 5: CO2 emissions of different sectors in Rotterdam: Port & Industry, Energy sector, Built environment, Mobility and Agriculture.	23
Figure 6: Trend in CO2 emissions scope 1 for the subsectors in the built environment: Wastewater (AWZI), Construction (bouwnijverheid), Public services, commercial services, residential).	24
Figure 7: CO2 emissions trend for subsectors in the built environment (scope 2).	25
Figure 8: Trend for the different modes of mobility.	26
Figure 9: Industry emissions by sector: other industry, Refineries, Chemical, Waste Incineration.	27
Figure 10: Trend CO2-for the different components within the energy sector (hydroelectric power (WKK), gas & coal.	29
Figure 11: Objectives of the Climate Agreement (2019) for all emission domains	31
Figure 12: Effect climate actions Rotterdam on CO2 emission (scope1).	43
Figure 13: effect current climate action plan scope 1+2 urban emissions	45
Figure 14: Development of energy mix in Rotterdam.	49
Figure 15: Overview of the energy transition and Rotterdam energy system.	51
Figure 16: Relationship between different sectors and spatial planning on the national, regional and municipal level.	61
Figure 17: Business transition pathways + actions.	66
Figure 18: Energy system transition pathways + actions	67
Figure 19: Built environment transition pathways + actions.	68
Figure 20: Mobility transition pathways + (potential) actions.	69
Figure 21: Governance structure Rotterdam.	75

List of tables

Table 1: emissions in Green are part of the urban target, Blue for Port & Industry, Red for excluded from local climate action plans.	19
Table 2: Relevant emissions for urban target	19

Table 3: CO2 emissions by sector in 2023 compared to 2022.	22
Table 4: Built environment emissions 2023 by subsector, scope 1 (direct emissions) and scope 2 (indirect emissions).	24
Table 5: Mobility emissions in 2023 by mode, scope 1.	26
Table 6: Industry emissions by subsector in 2023.	27
Table 7: Energy sector emissions by subsector.	28
Table 8: impact EU-regulations on local policies	32
Table 9: Overview of relevant European policies	33
Table 10: Overview of relevant national policies	36
Table 11: Overview of relevant regional policies	39
Table 12: Overview of relevant local policies	40
Table 13: CO2 emissions in kton and estimated results for 2025 and 2030. Source: 'Effect Klimaataanpak Rotterdam 2023' (DCMR).	43
Table 14: Forecast urban emissions (scope 1+2)	45
Table 15: Avoided emissions from renewable energy solar PV+ Wind)	46
Table 11: Indicators Energy system	70
Table 12: Indicators Built Environment	70
Table 13: Indicators Mobility	70
Table 14: Indicator own municipal business operations	71
Table 15: Metadata	72

Abbreviations and acronyms	Definition
AVR	Waste processing (private) company in Rotterdam
DCMR	Central environmental protection agency 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 of Rotterdam has dedicated itself in becoming a climate neutral city in 2019. Ever since Rotterdam is periodically updating its local Climate Action Plan (Klimaatactieplan Rotterdam/KAR), obtaining commitments from local stakeholders and forecasting it's impact so to progress towards that goal. Joining the EU's 100 Climate Neutral and Smart-cities mission is therefore a confirmation that Rotterdam is prepared in taking up all the opportunities and exploring new innovative and bold ways to make the necessary impact by 2030 in line with the mission's ambitions. For the purpose of sharing and distributing knowledge as a frontrunner for other cities, Rotterdam shows how since the Rotterdam Climate Agreement in 2019 it's has been implementing a mission driven approach, with local commitments, forecasting and action plan, and the lessons learned.

In regards to the commitment towards the mission and this City Climate Contract (CCC), Rotterdam makes a distinction between the Port of Rotterdam-area and the City (section A-1). The Port of Rotterdam and the industrial complex located there) accounts for 89% of the Rotterdam emissions (scope 1) and 20% of the national ones. 96% of those emissions fall under the Emission Trading Scheme (ETS).. The Port Authority and compagnies have committed themselves to become climate neutral in 2050 and have a clear transition plan and investment portfolio towards that goal(Harbor Vision). Because of the sheer magnitude of this transition and the governmental preconditions that have to be created (laws, tax-schemes, grants, etc) required for the compagnies to invest, the national government has taken the lead, because the municipality has limited ways to influence the transition there. Notwithstanding, we do take climate actions to contribute towards this goal when possible and necessary (for example the realisation of shore power before 2030).

Because of this reason, Rotterdam decided in 2022 to put focus on the remainder of those emission, designated as the 'urban area' of the City for scope 1 and 2 emissions where the municipality and local stakeholders can take responsibility to take actions towards achieving climate neutrality in contrast to the Port Industrial Complex.. Currently only energy related emissions from the built environment, mobility and renewable energy are accounted for while preparations are made to include the remaining sectors and emissions. The most recent forecast shows (A-2.5) that our current portfolio of actions aimed at these sectors, which is being implemented, will lead us to a reduction of 55% of these in 2030. This is still not sufficient and complete, so in the next update Rotterdam will present further possible actions to achieve the ambition set out by the mission to achieve climate neutrality in 2030.

For this purpose Rotterdam has started preparations for updating its local climate action plan with the lessons, support and advice of the mission in mind. It has identified shortcomings and new areas to explore for extra climate actions (B-2), while current actions are being evaluated whether they can be accelerated a.k.a. scaled-up. This update partly takes place in the context of a multi-level framework of cooperation between regional municipalities and the national government (A-2) and thus in terms of speed and clarity depended on common decision making processes. Rotterdam also expects that with the new incoming national government there will be enough clarity to let the new city council (elections march 2026) contemplate and adopt a new strategy, portfolio of actions and present an updated forecast including all urban sectors and emissions for 2030 in 2027. This periodically updating and adopting new strategies and major actions every new administrative period has been standard procedure in Rotterdam since 2018.

Because of these multilevel dependencies Rotterdam emphasizes 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. The

reason we included all our actions and forecast in this CCC while not all relevant for the goal of being climate neutral in 2030.

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 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 89% 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 (compared to 1990) 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 - 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% (scope 1). 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). Because of the sheer magnitude of energy-related CO₂-emissions compared to other greenhouse gasses, these last ones were for the time-being not included.
- *Commitments:* We established our first Rotterdam Climate Agreement (RKA) in 2019 where 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 companies and organisations and over 1000 citizens. The climate deals touched on a variety of issues, big and small, not limited to CO₂-reduction 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

implementing and executing 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 a mission oriented way. .

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

- *Scenario's, and investments*: our current strategies and policies were evaluated and an analysis was performed of the available (policy) options and cost to reduce the 'emission gap', which was calculated using the national and European target of -55% in 2030 (see investment plan) as a reference;
- *Goals*: as a result of the evaluation, the new administration decided to officially adopt a target of -55% for 2030 for the City as a whole. But for the purpose of monitoring and accountability, also in regards to the mission, introduced a new target, indicator and scope to monitor the impact of our local initiated actions and progress towards climate neutrality in 2030 mainly excluding the emissions from the Port Industrial Complex.
- The reason for this decision was that our experiences in the period before had learned us that the impact of our local climate actions were almost invisible and overshadowed by the developments in the Port Industrial Complex (see part A), while also the means to influence those developments in an impactful way were lacking. The situation in Rotterdam is that 89% (!) of the total scope 1 emissions in Rotterdam are a direct result of activities in the Port of Rotterdam area (industry + energy sector) of which 95% fall directly under the Emission Trading Scheme (ETS). These emissions are responsible for 20% (!) of the total of the Netherlands. Because of this magnitude, and the importance for achieving the national goals, the plans and actions addressing these emissions fall under a different governance framework where the national government has the formal lead, excluding it from the responsibilities municipalities have taken on themselves with the national Climate Agreement (2019, see section B). The national government who is in the lead for making climate deals with the companies responsible has not been inclined, nor the companies themselves, to raise their present ambitions to meet the ambition of this mission, currently even not on track to help achieve the national goal.
- The municipality therefore chose to focus and report on the remainder the emissions which originated from what we designated as the 'urban area' in contrast to the port. Which is also the scope we maintain for our commitment to the mission. Starting with the emissions of the built environment, mobility and energy and also monitoring their scope 2 emissions, temporarily leaving the (energy related emissions) from the non-port industry and other gasses (IPPU) aside due to the (back then) lack of reliable data and institutionalised reporting practices. This resulted in adopting a target for those CO₂-emissions to achieve in 2026 of minus 25%, while evaluating, researching, collaborating with stakeholders and common learning how to address the remaining ones.
- *Commitments*: the set-up of the governance of the Rotterdam Climate Agreement with five 'Climateables' 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 where we perceived a gap and chances for strengthening stakeholder collaboration and commitment.
- *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, while also being fully integrated in the day-to-day operations of the municipality in collaboration with stakeholders, while continuously improving it guided by the CCC-process..

Current situation: from start-up to scale-up

The results so far based on our recent forecast shows we have made considerable progress which if all is executed will result in a 55% CO₂-reduction (compared to 1990, scope 1&2) in 2030 for the urban area (as defined above). But this is not enough to put us in line with the missions ambition. We are entering the end of the current administrative period which is the moment to evaluate and adjust strategies based on the progress made so far. This will result in a new package of proposals for the next administration to ensure we are going to be on track.

The last few years we have been searching first of all to speed up our current actions so they will impact 2030 instead of later. But 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, and circumvent these barriers since they will affect almost all the planning of actions in our current portfolio which depend on the energy system. This also means that if not addressed we have to seek other ways to address these emissions. Therefore currently its hard to make a clear-cut distinction between which emissions are going to be addressed to reach climate neutrality

and which residual emissions remain to compensate by other means (technological, financially, etc).

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 some remarks concerning the 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. Rather than giving one-off estimates, a robust mission-driven-approach requires reliable data and monitoring practices to which all stakeholders who are committed to our common goals contribute.
- 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 heat 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:

- Goals and Scope : we decided to focus in the CCC on the energy transition in the city, in line with the scope and goal set by the current administration for 2025. This means we're excluding those emissions who arises from the activities related to the Port of Rotterdam area where the industry and the (fossil) energy sector is mainly present (for an exact breakdown between Port and City, see part A-1). 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. Regarding scope 3 emissions, we have a portfolio of actions aimed at reducing these. But a good methodology for monitoring has to be established first. We can support the idea to include these in the future if the EC decides to broaden the mission.
- Emission gap 2030: the latest forecast predicts for the urban area (and for the city in total as well) there will still be a (significant) amount of remaining emissions in 2030, which will have to be addressed by new actions, accelerating existing ones or compensated by other means. The table at the end of section A-2.5 shows the gap for the built environment and mobility, separately and in total for scope 1 and 2, which we intent to target. The effect of our renewable energy actions are presented separately because it contributes to an national integrated electricity network and so to prevent double accounting on scope 2. Also while we have given in A-1 an estimate of the other emissions not yet accounted for in the urban scope, our current portfolio of actions do not (fully) include the plans and actions of all relevant stakeholders addressing these . This currently prevents a reliable estimate of the remaining gap for those emissions.
- The moment of submitting this CCC coincides with when we periodically evaluate our whole climate policies so to prepare and advice the incoming administration on new policies, actions and strategy as well as to allocate the necessary financial means. Some of those policies are part of coordination and therefore depended on the timeframe in which multi-stakeholder decision making processes have been concluded. After completion of these processes and deciding upon them, they will become part of our climate action plan with a new forecast. While we have tried to give an understanding and overview of which new policies and actions are being explored, we are forced to limit ourselves to various statements underscoring our commitment to explore any new ways to create a bigger impact and accelerate towards climate neutrality.
- 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. As shown this will include the remaining sources of emissions in the urban area.
- Portfolio of actions: our current portfolio of actions we see as part of the baseline; decided upon, a source of funding available and being implemented (This is also reflected in the Investment Plan, were no funding or financing needs have been calculated, which is part of the updating process). 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). So part B is now rather a reflection of our current situation in which, as mentioned earlier, we are preparing a new comprehensive portfolio of actions for the next administration. For the purpose of giving insight on how

we determined our effect in 2030, we provided the forecast report of our KAR and the projects on which this is based in Annexes 2 and 3.

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;
- Marking the start of a new policy cycle in which we begin 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 and where our commitments for this mission extends to.
- 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 emissions in 2030. We conclude with an estimate of the remaining emissions in 2030 for the urban area (scope 1+2) to be addressed by a new package of actions we are currently working on, as well as which sectors and emissions also have to be included and targeted in a renewed action plan. This will give the incoming administration next year the basis to decide on which strategy to follow for 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. As well as the new pathways were currently working on the get a more clear focus and grip on the emissions in the urban area, which will be the base for new indicators and an update portfolio of actions.
- 2) The current range of key indicators used to measure progress.

In part C we:

- Explain how cities and the national government are innovating in their collaboration. To conclude with the next steps for updating the CCC in two years.

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., distinguishing between emissions related to the municipality as a whole and the Urban Area. 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 annually update the Climate Action Plan, but not with the extensive analysis.]

Module A-1 Greenhouse Gas Emissions Baseline Inventory

A-1.1. Methodology

Categories, data sources and scope

The DCMR environmental agency provides the core dataset on greenhouse gas emissions in Rotterdam. These figures are reported at the level of individual installations and companies, based on regulatory obligations. The main sources for are:

- EU ETS (Emission Trading System): large industrial installations and power plants report verified annual CO₂ emissions only under the European carbon market.
- PRTR (Pollutant Release and Transfer Register / Dutch Emissieregistratie, NER): companies above reporting thresholds submit annual data on CO₂ as well as non-CO₂ gases (methane/CH₄, nitrous oxide/N₂O, and fluorinated gases/F-gases).
- Energy efficiency duty (Energiebesparingsplicht, formerly E-MJVs): companies above an energy consumption threshold must report on energy-saving measures. These reports provide insight into energy use but do not contain verified annual emission figures.
- Other sources and gaps: smaller facilities and diffuse sources (e.g. households, small businesses, mobility, agriculture) are not monitored by DCMR directly. Instead, they are estimated using national models.

This installation-based reporting provides a robust overview of the largest emitters in Rotterdam, but it differs from the international inventory structure. The National Inventory Report (NIR), which underpins Dutch reporting to the UNFCCC and the EU, classifies emissions by categories: Energy, Industrial Processes and Product Use (IPPU), Waste, Transport, Agriculture, and LULUCF (Land Use, Land-Use Change and Forestry). For example, an industrial plant may appear in the DCMR dataset as one facility, while in the NIR its combustion emissions are counted under *Energy* and its process emissions under *IPPU*.

For clarity, this report first presents the DCMR figures exactly as reported. At the end, we return to IPPU which is not separately covered in the DCMR dataset and provide an explanation and indicative estimate, so that Rotterdam’s emissions picture is complete and comparable with the EU inventory structure. The only exception are numbers on LULUCF. No reliable data exist for our local situation. Experts judge, acknowledging the lack of farm land, type of soil, etc that this would probably be negligible but a definitive assessment has to be made in the next update.

Other greenhouse gases (CH₄, N₂O, F-gases)

Currently we do not explicitly monitor other greenhouse gasses or include them as equivalents. As requested, Rotterdam provides a preliminary estimate of non-CO₂ greenhouse gases in the city-wide and urban domains. Recent studies show these gases to be <2% compared to the CO₂-emissions. For the overall originating in the port-industrial cluster and the urban area:

- Methane (CH₄):
 - Port & Industry: released from certain chemical processes and waste handling.
 - Urban: mainly from wastewater treatment plants and sewer systems.

- Nitrous oxide (N₂O):
 - Port & Industry: mainly in the chemical cluster (e.g. fertiliser and nitric acid production)
 - Urban: arises from fuel combustion in transport and from wastewater processes.
- Fluorinated gases (F-gases):
 - Port & Industry: some use in industrial refrigeration, but relatively small compared to chemical N₂O.
 - Urban: leakage from building and commercial refrigeration/air-conditioning systems is the dominant non-CO₂ source in the city domain.

Total, Port & Industry and City emissions

As explained in the introduction, in the Rotterdam inventory a distinction is made between emissions that take place in the Port & Industry Complex and the remainder ones who are allocated to the urban domain. Also some emissions are currently not yet included in the reporting on the urban target (see **table 2**).

- Port & Industry regime: This covers the large industrial cluster and port-related activities. Climate action here is primarily led by the Port of Rotterdam Authority and large companies, with the national government in the lead. Targets are aligned with national and European frameworks such as -55% emissions by 2030 and climate neutrality by 2050. Policy instruments are mainly national or EU-level (e.g. ETS, carbon capture support, industrial decarbonisation funds).
- City regime: This covers the built environment, local mobility, services and smaller industries within the urban area. Here the municipality of Rotterdam is in the lead, working with housing corporations, residents, and local businesses. Action focuses on neighbourhood heat transition, sustainable mobility, building renovation and local renewable energy.
- Other: emissions coming mainly from some ETS-facilities not located in the port and not (yet) included in the urban scope for purposes of reporting.

Port & Industry domain thus includes the large-scale industrial cluster and activities directly connected to the port:

- Power generation: coal plants, CHP installations.
- Industry: waste companies, chemicals, refineries and other large industry.
- Transport linked to the port: heavy freight transport, port-area mobile equipment, rail, and maritime shipping and fishing.

The City domain includes activities and emissions in the built-up urban area:

- Transport within the city: cars, buses, delivery vans, middleweight transport, and freight within the urban area.
- Buildings and services: residential and commercial buildings, public services, construction industry, and wastewater treatment.
- Inland and recreational shipping is also assigned to the city domain rather than the port.

Other domain is reserved for sources which do not fall under these two regimes. This is first of all aviation. Secondly some ETS-facilities who are currently not located or part of the Port-regime.

The two regimes have different approaches:

- The source approach for the target for total city including 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 urban target. 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.

Table 3 shows scope 1 and 2 emissions for the Urban area according to the latest data (2023).

Sector	Source	Subsource	Domain
Energy	Coal Plants		Port&Industry
	Gas plants		Other
	CHP installation		Port&Industry
Industry	Waste companies		Port&Industry
	Chemical		Port&Industry
	Refineries		Port&Industry
	Other Industry		Port&Industry
Mobility	Aviation		Other
	Rail		Port&Industry
	Maritime Shipping and fishing		Port&Industry
	Inland and recreational shipping		City
	Road traffic (persons)	Cars, Busses	City
	Road traffic (freight)	Delivery vans	City
		Middleweight transport	City
		Heavy transport	Port&Industry
		Mobile tools	Port area
			Urban area
Build Environment	Residential buildings		City
	Commercial services		City
	Public services		City
	Construction industry		City
	Wastewater treatment plant		City
Agriculture			Other

Table 1: Emissions in Green are part of the urban target, Blue for Port & Industry, Red for not (yet) covered in local climate action plans (port or urban).

Urban area Scope 1 + 2		Scope 1 (kton CO2)	Scope 2 kton CO2
Build Environment	Residential	335	167
	Commercial services	165	442
	Public Services	69	102
	Construction	2	7
	Wastewater	109	11
Total		680	729
Build Environment total scope 1+2			1.409
Mobility	Interior shipping and recreational	91	
	Road traffic (persons and vans)	541	
	Road traffic (Fright)	181	
	Mobile tools	55	
Total scope 1		869	
Total scope 2	electricity tram, metro, charging stations, mobile tools		97
Mobility total scope 1+ 2			966
Total scope 1 + 2 urban area (user approach)			2.375

Table 2: relevant emissions for urban target

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 current Rotterdam climate targets.

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.

Emissions urban area

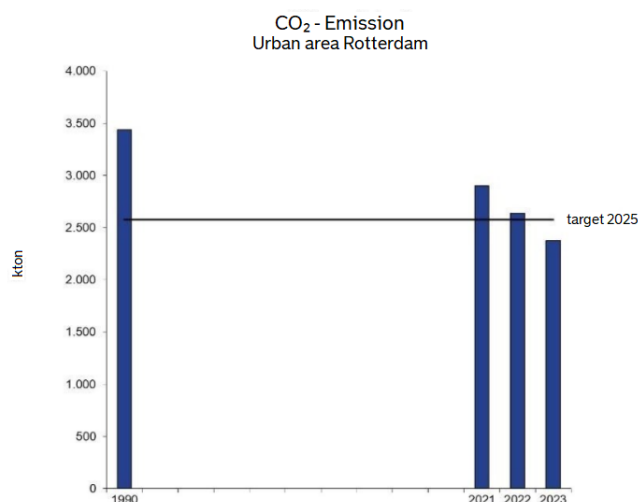


Figure 2: Emissions for the urban part of Rotterdam compared to the 2025 target.

The city's CO₂ emissions in 2023 are 2.37 Mton. This includes both scope 1 and scope 2. 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 mayor's target of 25% in 2025. With the 2023 emissions, the city's target would already be achieved.

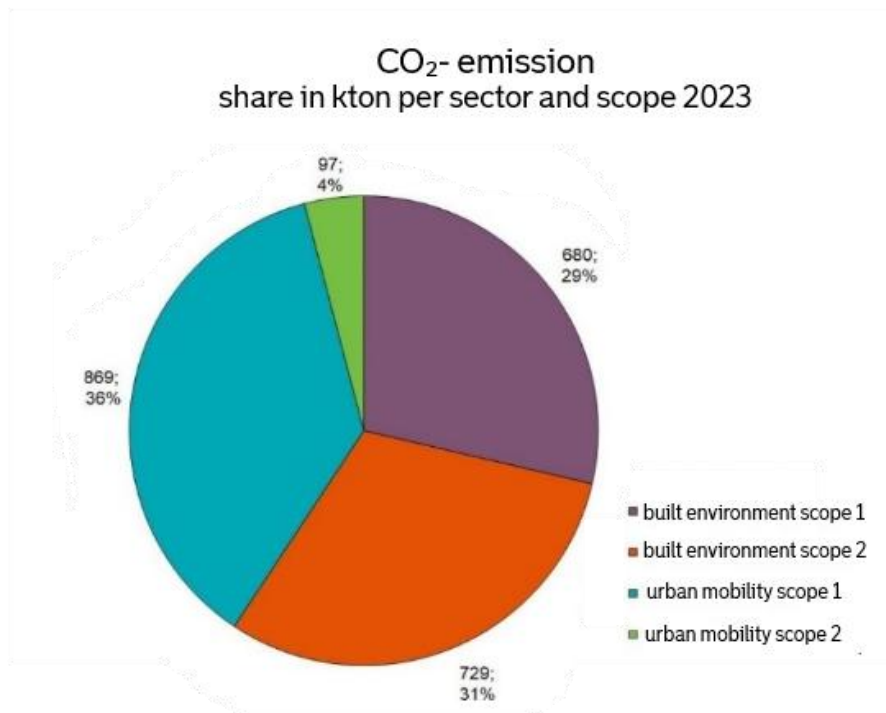


Figure 3: Share for urban sectors, built environment and mobility, by scope.

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 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.

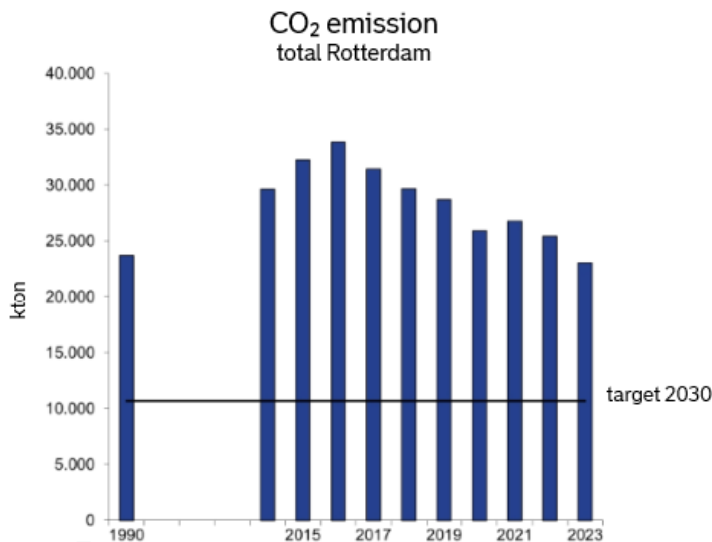


Figure 4: Trend scope 1 CO2 emission Rotterdam.

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.

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

Table 3 CO2 emissions by sector in 2023 compared to 2022.

Rotterdam's CO2 emissions will be 2.4 Mton lower in 2023 than in 2022 (**Table 3**). 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.

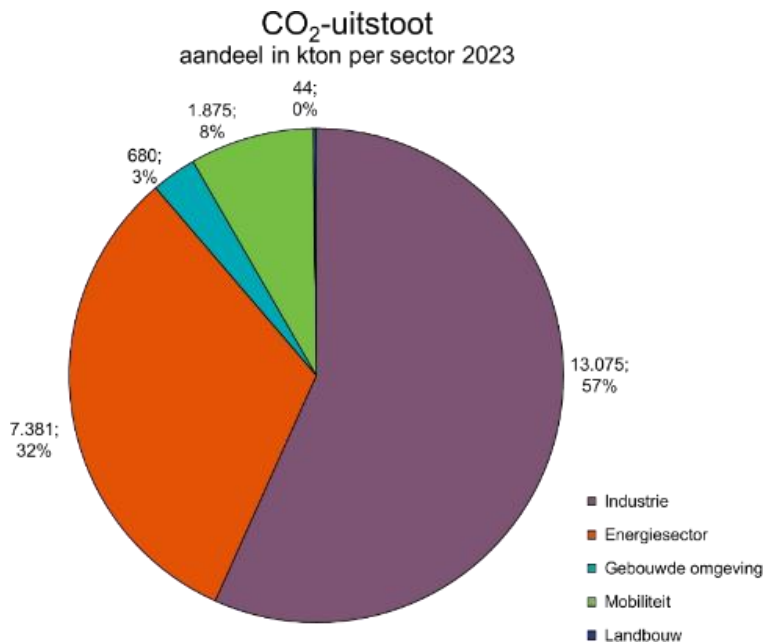


Figure 5: CO₂ emissions of different sectors in Rotterdam: Port & Industry, Energy sector, Built environment, Mobility and Agriculture

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.

Subsector	Scope 1 [kton CO₂]	Scope 2 [kton CO₂]	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	

Table 4: Built environment emissions 2023 by subsector, scope 1 (direct emissions) and scope 2 (indirect emissions).

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.

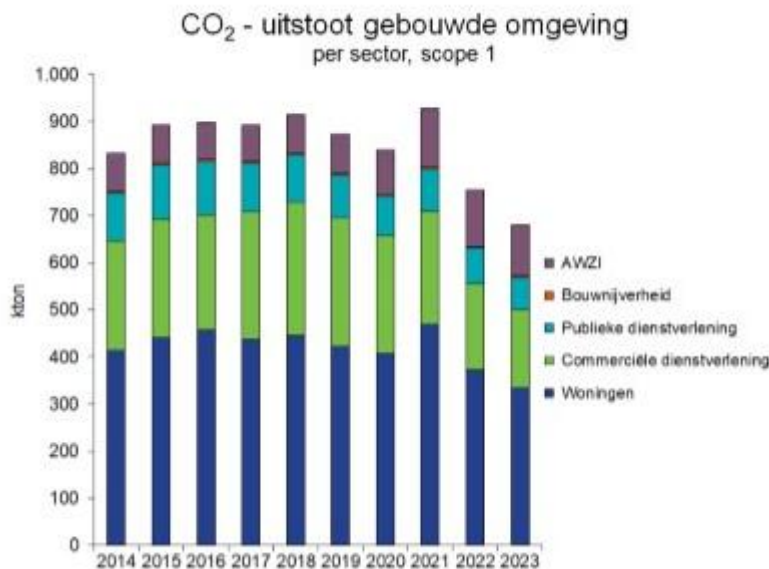


Figure 6: Trend in CO₂ emissions scope 1 for the subsectors in the built environment: Wastewater (AWZI), Construction (bouwnijverheid), Public services, commercial services, residential).

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.

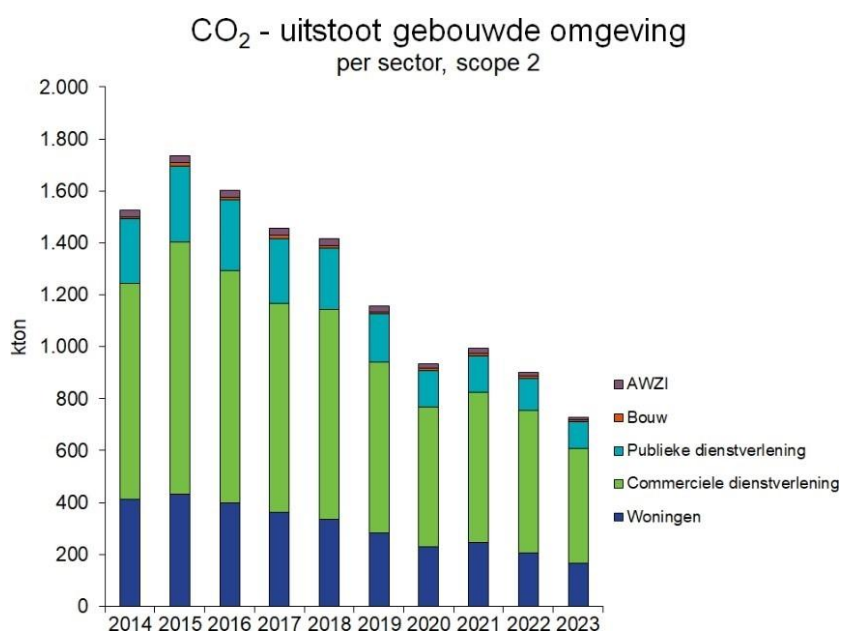


Figure 7: 13 CO₂ emissions trend for subsectors in the built environment (scope 2).

Scope 2

For indirect CO₂ emissions (Figure 7), 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.

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	

Table 5 Mobility emissions in 2023 by mode, scope 1.

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.

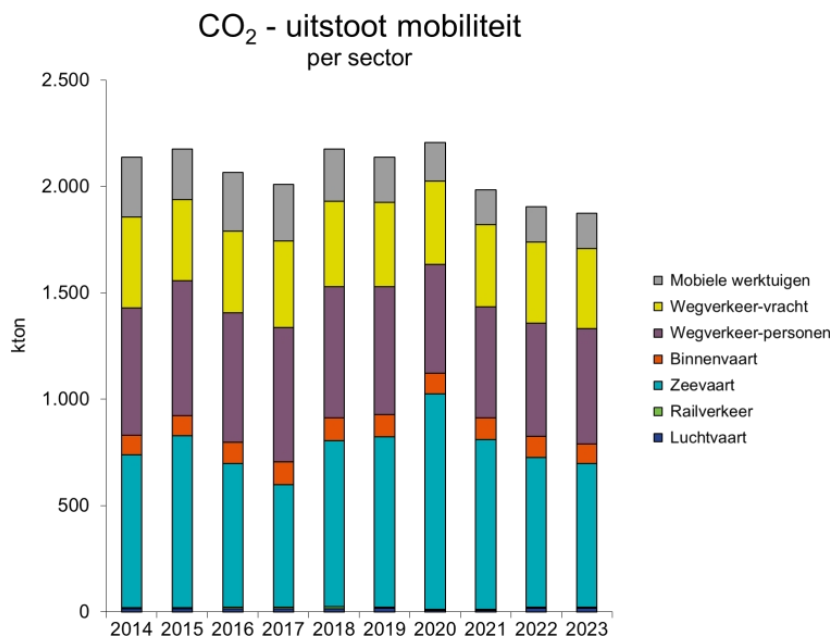


Figure 8: Trend for the different modes of mobility.

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.

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

Table 6 Industry emissions by subsector in 2023.

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.

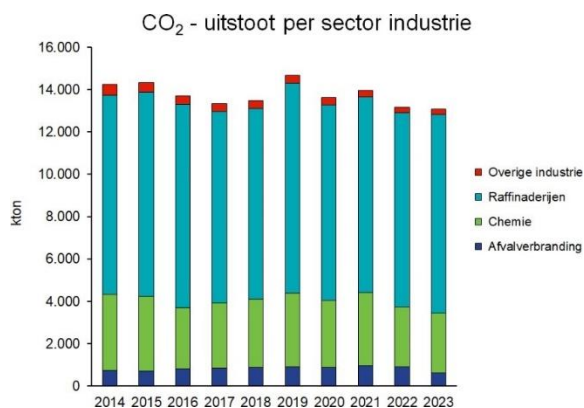


Figure 9: Industry emissions by sector: other industry, Refineries, Chemical, Waste Incineration.

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.

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	

Table 7 Energy sector emissions by subsector.

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.

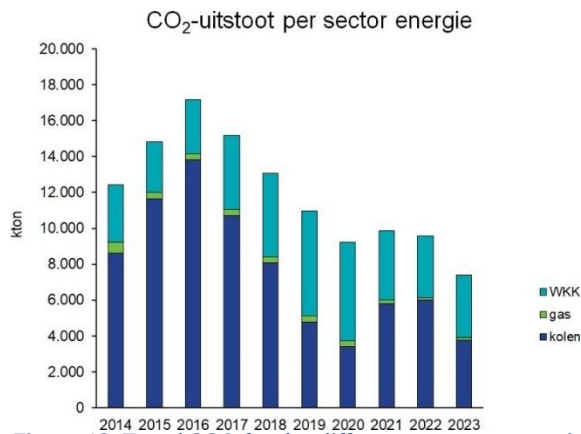


Figure 10: Trend CO₂-for the different components within the energy sector (hydroelectric power (WKK), gas & coal).

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.

Industrial Processes and Product Use (IPPU) and other greenhouse gasses

As said, in the current reporting on CO₂-emissions makes no distinction between energy and non-energy CO₂-emissions which all fall under the category industry. While not in statistics separately accounted for a calculation has been made of the remainder of the emissions for those industry part of the port. For the rest of the city, these are not accounted for but estimates based on the type of sources known.

Industrial process and product use (IPPU) emissions in Rotterdam are dominated by the port and industrial complex (HIC). According to DCMR figures, methane (~0.2 Mton CO₂-eq), nitrous oxide (~0.1 Mton CO₂-eq), and fluorinated gases (~0.1 Mton CO₂-eq) together account for about 0.4 Mton CO₂-eq of certain emissions in the HIC. In addition, fumigation with sulfuryl fluoride (SO₂F₂) could add up to another 1.3 Mton CO₂-eq, although it is uncertain whether this should be attributed to Rotterdam. This means that extra IPPU-emissions on top of what's reported in the HIC (Port Industrial Complex) ranges between 0.4 and 1.7 Mton CO₂-eq in 2023.

Outside the port, the city area contributes a much smaller share of non-CO₂ IPPU emissions. These emissions mainly come from the underground wastewater treatment plant at Dokhaven (nitrous oxide, ~50–100 kton CO₂-eq), diffuse emissions of fluorinated gases from refrigeration and air-conditioning systems in buildings and supermarkets (~100–150 kton CO₂-eq), and smaller process industry such as food and metal production (~50 kton CO₂-eq). Together, these sources represent approximately 0.2–0.3 Mton CO₂-eq in 2023.

Module A-2 Current Policies and Strategies Assessment

Rotterdam has a long history of taking action to lower our CO₂-emissions. 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). On top the strategy has an important task to optimize usage of available heat sources (residual heat, geothermal, etc) so to prevent municipalities for unnecessary electrification of the demand for heat, which otherwise will lead to a rise of scope2 emissions and raising the need for extra renewable energy. In our very urban region this is especially the case since the current and future residual heat from the port is sufficient for Rotterdam and many other municipalities, while potential locations for wind- and solar farms are slim.
- **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 Heat 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 8** 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, enforce energy label 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)

Table 8: impact EU-regulations on local policies

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 (EPBD IV) and the Energy Efficiency Directive (EED) have been of importance for municipalities to act on.

Table 9: 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 standards performance standards for heavy-duty vehicles	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
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 aim 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	
EU regulation	EPBD		Build Environment				

Table 9: Overview of relevant European policies

A-2.2. National Policies

Hereby we present the main national policies.

Table 10: 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 11: 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 towards 2030 and beyond.	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.

Table 11: Overview of relevant regional policies

A-2.4. Municipal Policies

Hereby we present the most important local policies For a full overview please [visit our website](#).

Table 12: 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: <ul style="list-style-type: none"> - 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), - Zero Emission municipal fleet in 2030 (more than half of municipal vehicles are already zero emission), 			One of the targets in the Rotterdam Climate Action Plan is the realization of an emission-free urban mobility system in 2040.

- 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 first 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. In 2022 we started also to include scope2-emissions for (urban) built-environment and mobility. 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.

As explained earlier, we forecast as well for the city in total (including the Port Industrial Complex) as specifically for the urban area which is relevant for the purpose of the mission target for 2030. We will first show the effects for the whole city and after specific the effect relevant for this mission.

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. This means that actions we are not aware of done by other parties themselves (for example waste treatment facility) or targeting non-energy related emissions have not yet been included and underestimate the impact. While these could have been included by doing things like desk research, we decided to only include those plans and actions of stakeholders that are involved in our common process towards climate neutrality in terms of commitments, collaboration and participation in monitoring, updating and executing our local action plan (KAR). This also leaves room for strengthening our cooperation with these stakeholders to have the necessary impact.

The measures in our portfolio are distinguished according to their status: certain, expected and intended. This way we keep track of the progress on implementing those measures and take additional action when needed.

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).

Overview

In **table 13** we will first show the projections for Rotterdam in total including the port for scope 1 emissions. In **table 14** the projections are shown for the city urban area for scope 1 and 2 emissions.

Domain	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

Table 13: CO2 emissions in kton and estimated results for 2025 and 2030. Source: 'Effect Klimaataanpak Rotterdam 2023' (DCMR).

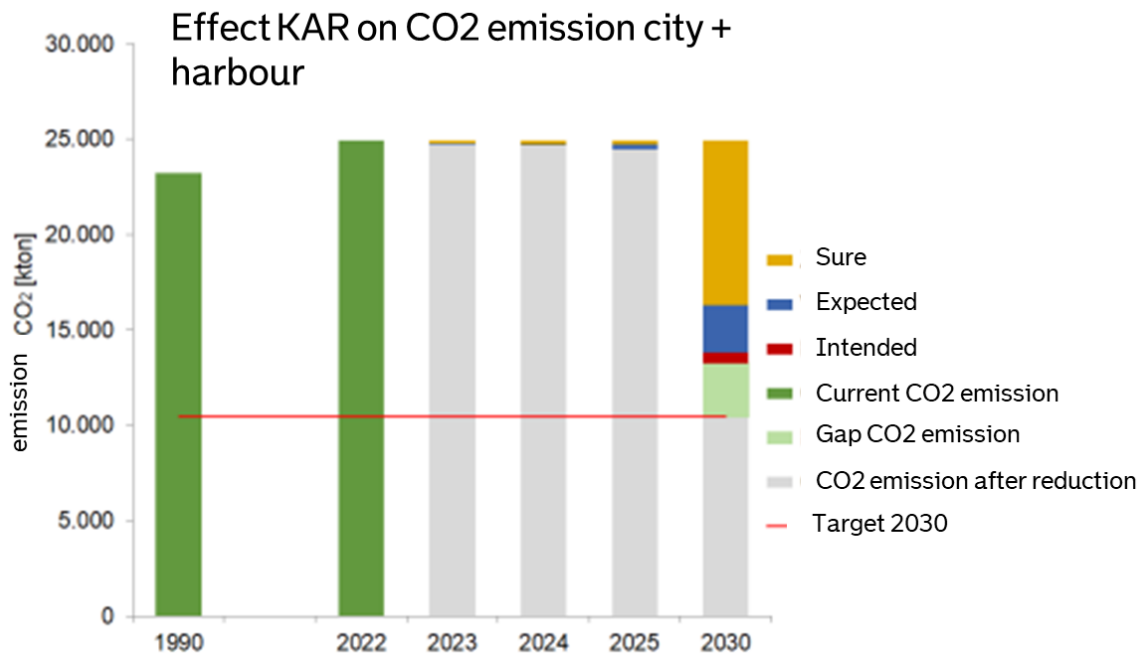


Figure 12: Effect climate actions Rotterdam on CO2 emission (scope1).

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.

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 target for 2025 (target value is a maximum of 2,578 kton of CO2).

Forecast 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.

Most impactful 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.

The 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.

Forecast 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 ktonnes for the urban area in 2025 compared to current CO₂ emissions (which are 2,816 ktonnes 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 2,375 ktonnes. This will meet the college target for 2025 (target value is a maximum of 2,578 ktonnes of CO₂) but not the desired effect in 2030.

CO2 emissions [kton]	1990	2022	2023	2024	2025	2030
effect built environment scope 1	1.088	763	13	23	35	102
impact built environment scope 2	1.268	914	-1	-2	-5	-20
effect mobility city scope 1	987	1038	127	158	197	419
impact mobility city scope 2	94	101	-11	-12	-15	-16
Total impact KAR city			128	167	213	485
Autonomous reduction due to green gas			2	5	10	92
Autonomous reduction through grid sustainability			85	152	271	677
Remaining emissions City scope 1 + scope 2	3.437	2.816	2.601	2.492	2.323	1.559
college target city 2025					2.578	

Table 14: forecast urban emissions (scope 1+2)

Table 14 shows the expected effect of KAR implementation for the 2023, 2024, 2025 and also for 2030 vision years. The autonomous effect of the (national) sustainability of the gas mix and electricity mix adds up. For target year 2025, the calculated effect of the KAR in the urban environment is 213 ktonnes; that of rural developments for gas and electricity together (10+271=) 281 ktonnes. In total, the expected reduction in 2025 is then, after rounding, 493 ktonnes. Current emissions (2,816 ktonnes) will therefore fall to 2,323 ktonnes. This is lower than the college target of 2,578 ktonnes and this therefore seems achievable through implementation of the current KAR package.

N.B. By implementing the KAR, scope 1 emissions decrease but there is an increase in scope 2. Such as by connecting homes to the heat grid or switching from fossil to electric vehicles. For mobility, this concerns only the reductions in the city. The reduction in the port is therefore not considered here. For 2030 the current package will achieve a reduction in 2030 for the city of 55% CO2 (scope 1+2) compared to 1990.

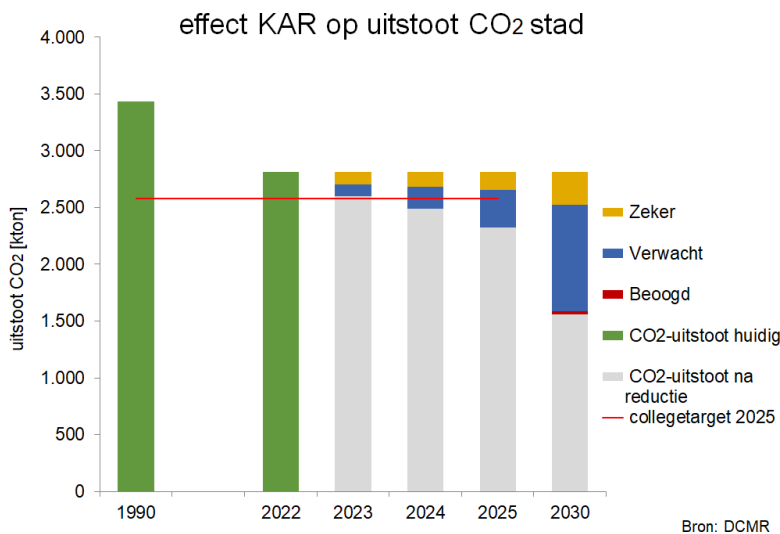


Figure 13: effect current climate action plan scope 1+2 urban emissions

Figure 13 shows the CO2 effect per status of the measures for the intermediate years 2023 and 2024, for target year 2025 and provides a look ahead to 2030. These effects are partly the result of European and national policies, such as the modification of the car fleet based on European standards and the (national) sustainability of the electricity grid. Making the electricity grid more sustainable (status 'expected') will make a major contribution to reducing scope 2 emissions in 2025 and thus to achieving the college target. In 2030, this contribution is further increased. The (nationwide) blending of green gas (also status 'expected') also reduces (scope 1) emissions in 2030. In 2025, this contribution is still limited. The assumption has been that green gas will only be used in the built environment.

The national goal for the electricity grid is that it will be totally renewable in 2035, which will make scope-2 emissions for electricity less of a concern to become climate neutral. Still we take actions to contribute towards this goal, as we will show in the next paragraph. The scope 2 emissions for heat is linked directly to the Combined Heat and Power (CHP) plant which is supplied with residual heat from the waste incinerator as well as industrial processes (Shell).

Renewable energy

For clean energy (wind and solar), there are not so much targets for the CO2 effects to be achieved as for the total installed capacity. This installed capacity then generates electricity from sun and wind and this translates into avoided CO2 emissions in scope 1, because less production of 'fossil electricity' was thus required. The installed capacity in Rotterdam contributes to the greening of the national electricity mix. To prevent double accounting the impact is here offered separately.

The following starting points and assumptions were used:

- The premise is still that production by wind and solar will replace deployment at gas-fired power plants.
- In determining avoided emissions, the emission factor of a gas-fired power plant was used, 369 g/kWhe.
- There may be a slight overestimate of the calculated avoided emissions due to the fact that not all sustainably generated energy can be utilised due to grid congestion.
- To determine production by wind, SDE++202312 was used for categorisation. Rotterdam largely falls into cat. 4; that means 7 m/s. For Maasvlakte 2, cat. 2 applies; that is 8 m/s.
- For solar, production is based on 950 full-load hours for standard PV panels, 808 hours (15% less) for facade systems and 1045 hours for solar-following systems.

Avoided emissions kton CO2	2023	2024	2025	2030
Total	94	147	179	297

Table 15: avoided emissions from renewable energy solar PV+ Wind)

Conclusion on the emission gap for 2030

To assess how close a mission city is to become climate neutral in 2030 the mission in first instance focuses on scope 1 emissions. **The following table** gives an overview of our current trajectory towards 2030, taking into account only the energy-related CO2-emissions for the built environment, mobility and energy.

Source (GHC-protocol)	1990 (kTon CO2)	2022 (kTon CO2)	2030 (kTon CO2)	Reduction compared to 1990 (%)
Built Environment	1.088	763	661	39%
Mobility	1.166	1.352	488	58%
Total	2.254		1.149	49%

If we only look at the first two, then 49% CO2 compared to 1990 is reduced in 2030 if all our current actions are further implemented and executed, leaving us with 1.149 kTon to address with further actions.

But this is not a complete picture:

- *Industry*: the category 'other industry' (263 kTon) is currently not sufficiently split between what is located in the port and what we have to address in the urban area for this mission;
- *IPPU*: other than CO₂-emissions due to industrial processes (including those from the water treatment facility) are currently not sufficiently accounted for outside the port due to lack of reliable and complete data sources;
- *LULUCF*: No reliable data exist for our local situation. Experts judge, acknowledging the lack of farmland, type of soil, etc estimate that this would probably be negligible, but a definitive assessment has to be made in the next update to confirm this.
- *Solid waste*: the waste-incinerator (AVR) which is contracted to process Rotterdam's household waste is located in the Port Industrial Complex and its emissions are excluded from the urban area for this mission. The reasons for this exclusion is it's falling under the ETS-regime operating on an international scale and intrinsically part of the Port industrial Complex by providing energy to the CHP-plant and for its future netzero ambitions depended on other plans there concerning CSU/CCU and utilisation. What is included are the indirect emissions caused by local waste. But currently there is no reliable calculation of the scope 3 emissions yet for Rotterdam's solid waste (or other). A rough estimate suggest that Rotterdam's residual household waste processed at AVR Rozenburg (after post-separation of recyclables) could currently lead to around 0.15–0.20 Mt of CO₂ emissions annually, plus smaller amounts of CH₄ and N₂O. In addition, a substantially larger share of the plant's input consists of commercial and industrial waste collected on a European scale. For commercial and industrial waste in Rotterdam no data is presently available to make a calculation. Order-of-magnitude estimates indicate this could possibly concern several hundred thousand tonnes of commercial waste per year, resulting in a further 0.4 - 0.5 Mt CO₂. Together, household and business waste could therefore account for a significant portion of Scope 3 emissions linked to Rotterdam's waste flows. The effect of current municipal actions plus the plans from the waste-incinerator (AVR) on these emissions in 2030 is expected to substantially lower these emissions. Plans and actions to cut the amount of waste by half in 2030 are in place, waste collection is increasingly electrified, reducing tailpipe CO₂ though upstream electricity use remains relevant. At AVR, part of the captured CO₂ is utilised (CCU) in horticulture and industry, with future volumes intended for offshore storage (CCS) before 2030. By 2030, Scope 3 emissions from waste are therefore expected to decline, yet the balance between CCU, CCS, unabated stack emissions, and the contribution of non-CO₂ gases remains uncertain as what remains to be targeted.

Concerning the Energy sector and their CO₂-emissions, these are all located and falling under the emissions for the port and excluded for the reasons mentioned earlier. One exception is the one gasplant (139 kTon) not located in the port, but also not part for the scope of this mission for the urban area, because it falls under the ETS-regime, we have no jurisdiction, and with its plans to utilize hydrogen from the Port Industrial Complex to replace natural-gas, heavily depends on the progress of actions there. So, while for the scope 1 of the mission not relevant, monitoring and targeting scope 2 is for us, categorising renewable energy as avoided emissions.

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 change. 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.

Development of energy mix in Rotterdam (PJ)

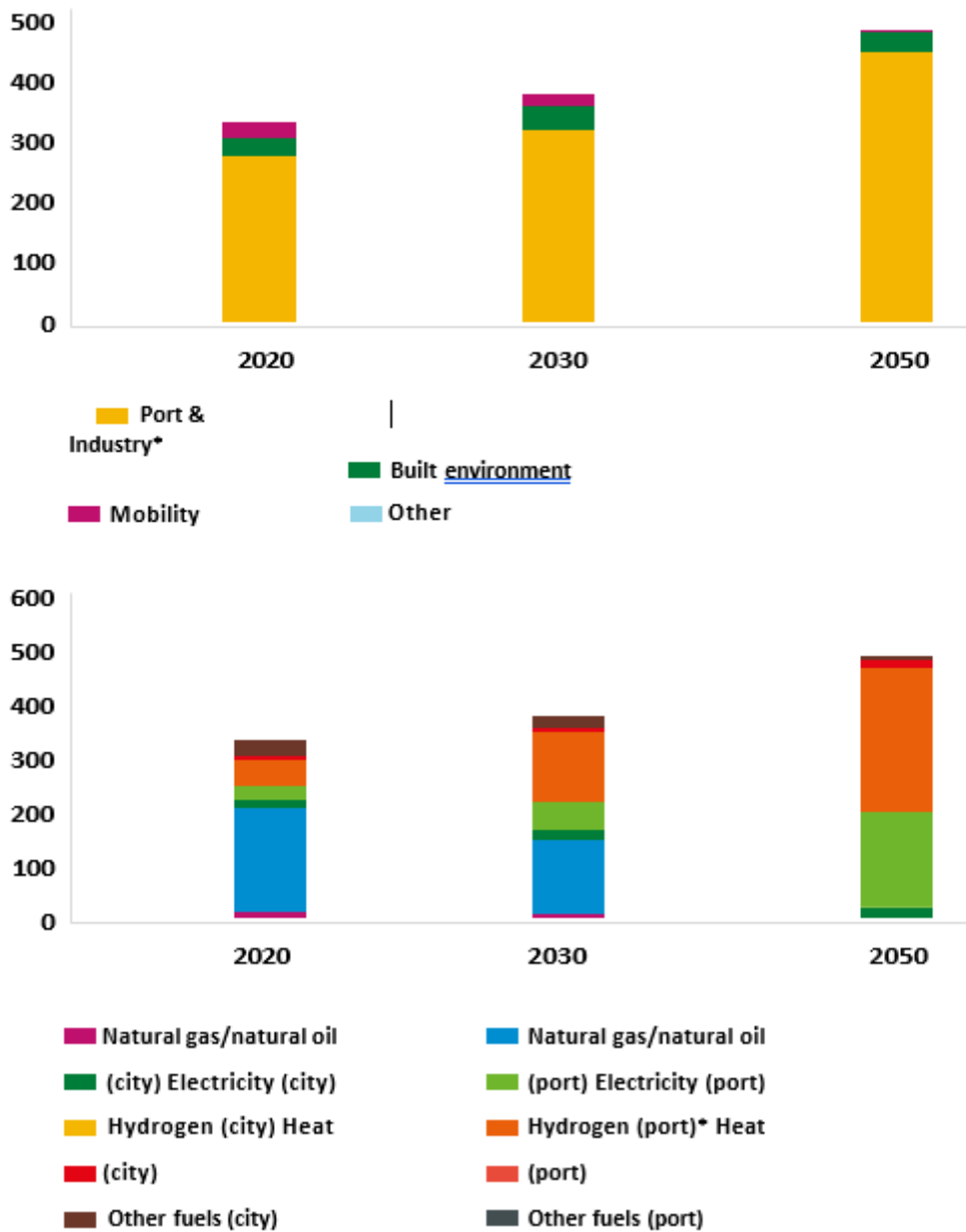


Figure 14: Development of energy mix in Rotterdam.

- 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.

The energy transition and the Rotterdam energy system

Multiple transitions side by side

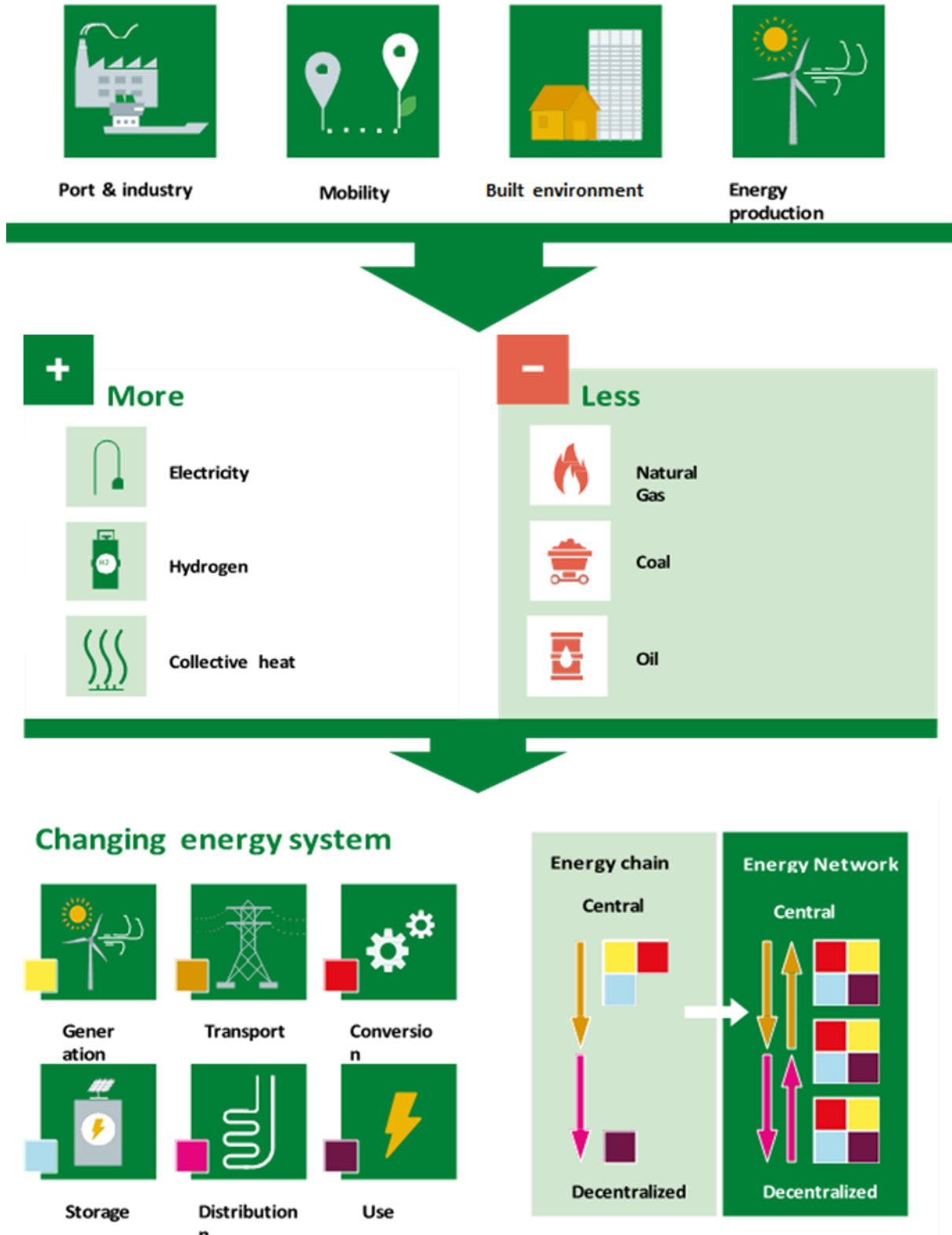


Figure 15 Overview of the energy transition and Rotterdam energy system.

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 Rotterdammers. 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. The same announcement has been done by the local grid operator Stedin, which currently results in waiting lines to be connected to the electricity grid, slowing down also actions towards electrification replacing fossil usage for all sectors.
- TenneT and Stedin are working hard to expand capacity, but that will not provide a structural solution until 2030 at least.
- 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 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 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 heat companies 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 government 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 enterprises (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 16 multi-level decision-making process concerning the energy system, illustrates the coherence between different sectors, spatial planning and investment.

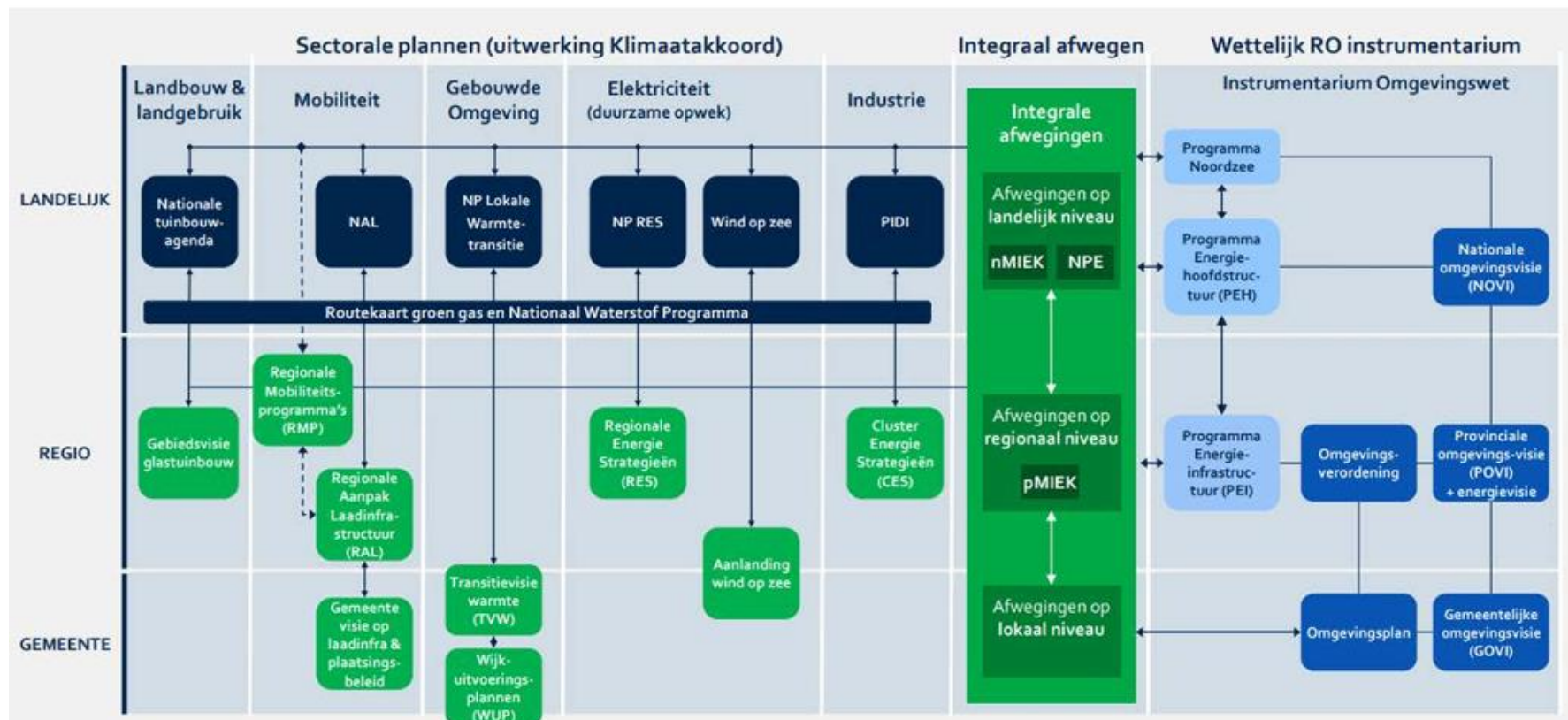


Figure 16: Relationship between different sectors and spatial planning on the national, regional and municipal level

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 16.

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 "Resilient 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 CO₂ 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, emphasizing 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 analysing 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, which we intent to fix in the next update:

- 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 to become climate neutral .
- Emissions inventory is not complete and/or detailed enough: other greenhouse gasses and the emissions from industry not part of the Port Industrial Complex are currently not accounted for in the urban scope and/or almost totally imputed to the port and industry. While these are being targeted by several climate actions, we have to establish a more clearer picture of those exact emissions and relate them to our current and future actions. This means that **table 1** will be updated (and underlying reporting practices) so no emissions that are not part of the transition of the port-area are excluded from the urban scope.
- The list of actions or projects which are presented in the annual Budget, KAR, and the calculations on CO2-emmissions are not always one-on-one relatable, due to separate administrative procedures, which we are currently digitalizing in a common data environment, so we don't have to separately report and increase coherency.
- Wastewater is currently not included in our portfolio of actions or forecast, although the public Water Authorities responsible are well on track to become at least energy neutral this year and reduce material usage with 50% in 2030 and cooperating with the municipality on innovations towards climate neutrality.
- Although a goal is set to reduce resource consumption including (solid) waste by 50% in 2030, and reduce the CO2-emmissions from collection, etc, clear monitoring and forecasting has yet to be established to establish its impact on CO2-emmissions.
- The contribution which greening the city can play in compensating emissions is insufficiently accounted for. Also, while AFOLU emissions are expected to be almost non-existent, this is not yet sufficiently accounted for in our monitoring.

B-1 Climate Neutrality Scenarios, Impact Pathways

Current projections (if all current actions will be executed) as shown in A-2, show a reduction of 49% (Scope 1) and 55% (scope 1+2) in 2030 compared to 1990, with our current portfolio is expected. This leaves a significant amount of emissions to be addressed with further actions (with in mind all the deficiencies in our current reporting to be addressed) as stated in section A-1 and A-2.5). As mentioned, we are currently revising our KAR and are preparing an updated package of actions and strategy for the urban area aimed at 2030 to be decided on by the next administration next year according to our policy cycle.

For this purpose and to address the earlier mentioned shortcomings, 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.

We started with addressing the shortcoming of clear pathways for all domains. 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. The mayor areas where we see room for extra impact by local actions are circularity, renewable energy and addressing the emissions as a result from business (minor industrial) activities outside the port of Rotterdam area.

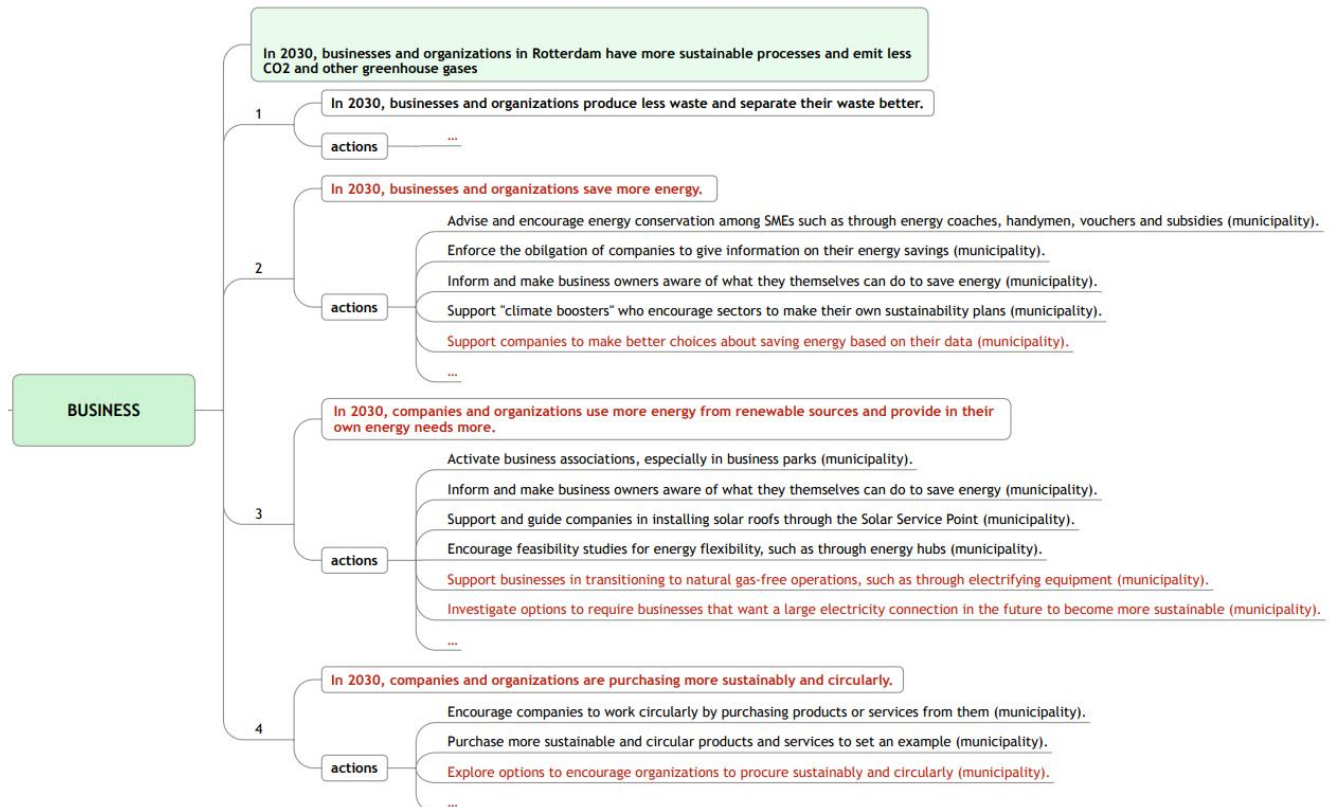


Figure 17 Business transition pathways + actions.

ENERGY SYSTEM

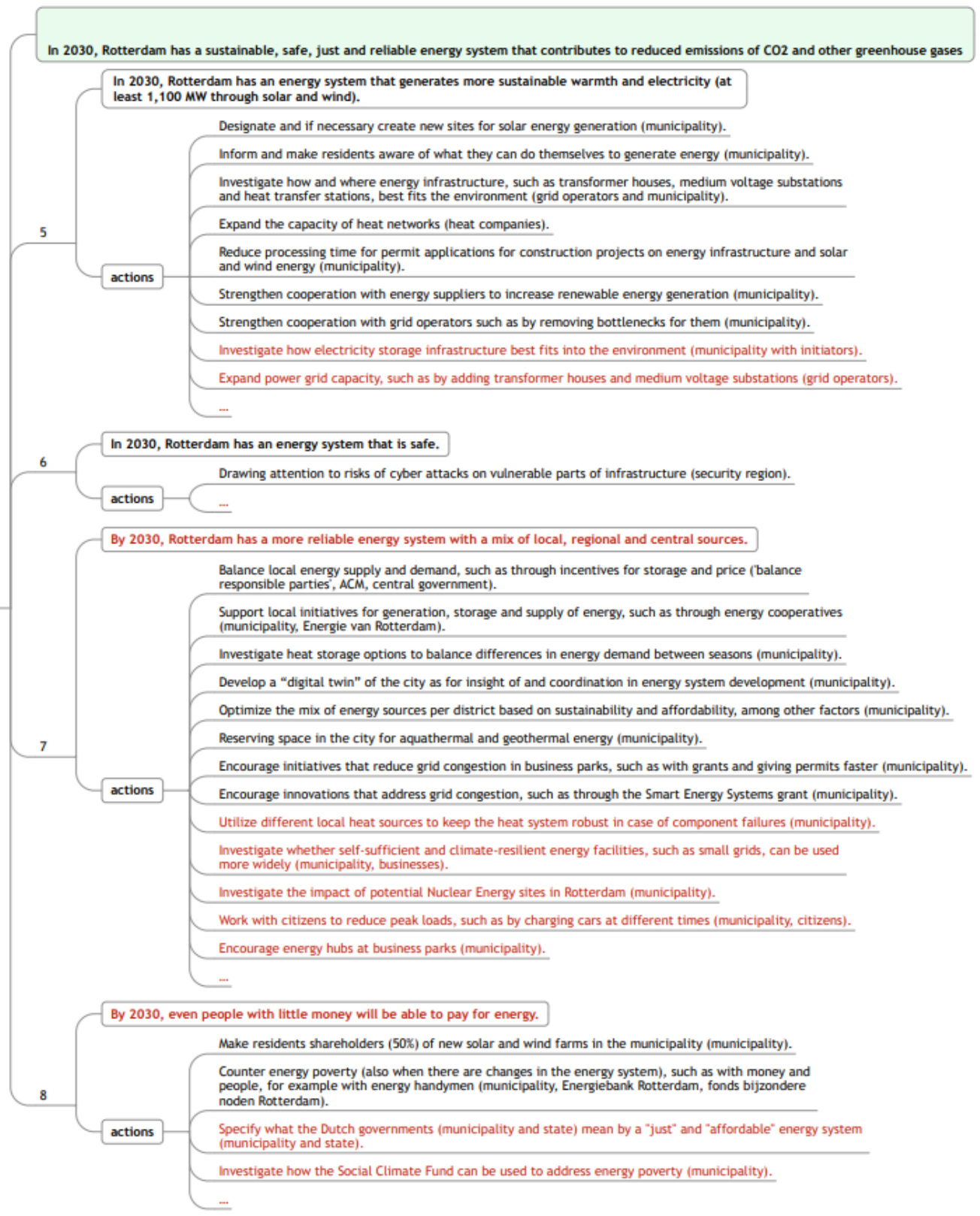


Figure 18 Energy system transition pathways + actions.

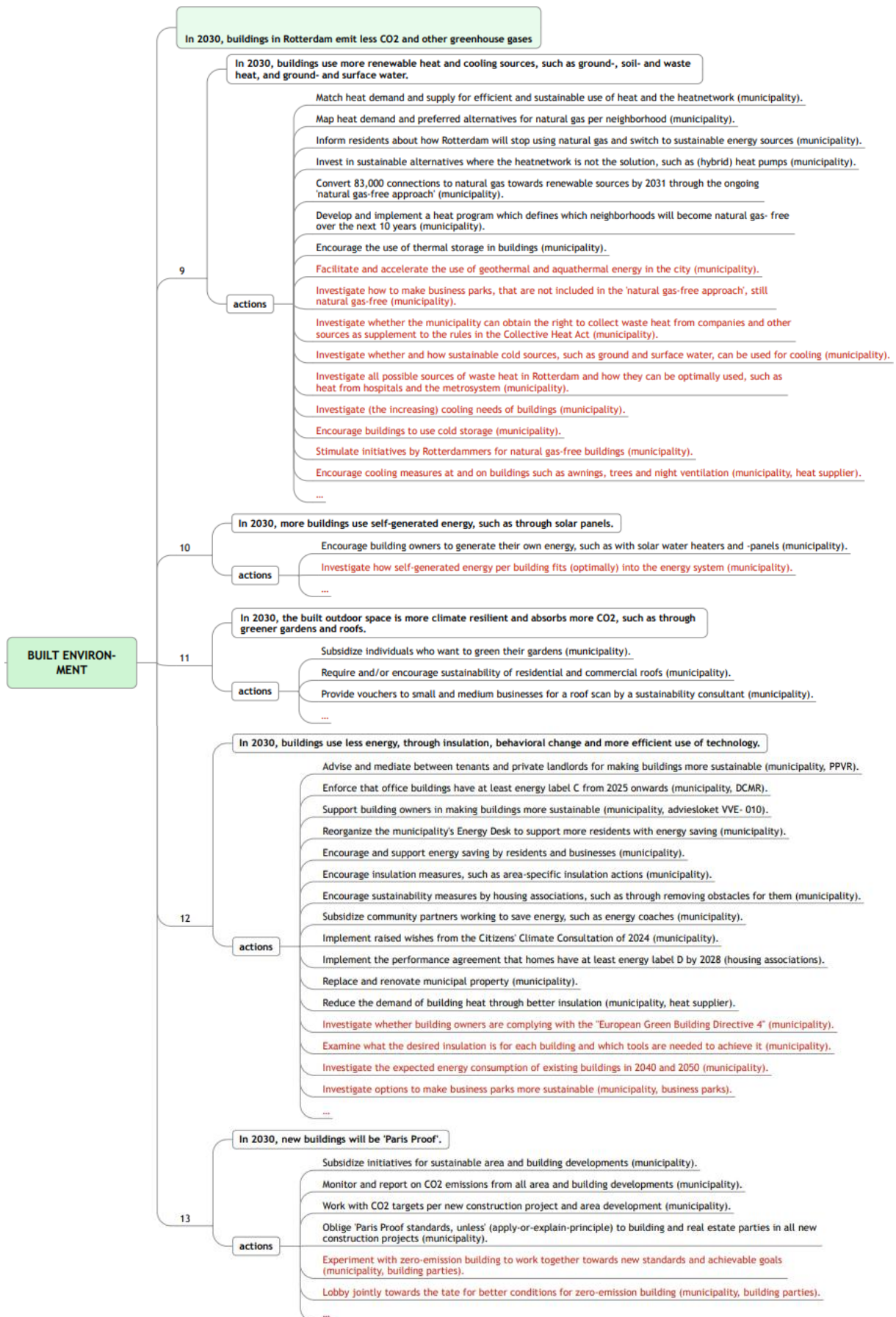


Figure 19 Built environment transition pathways + actions.

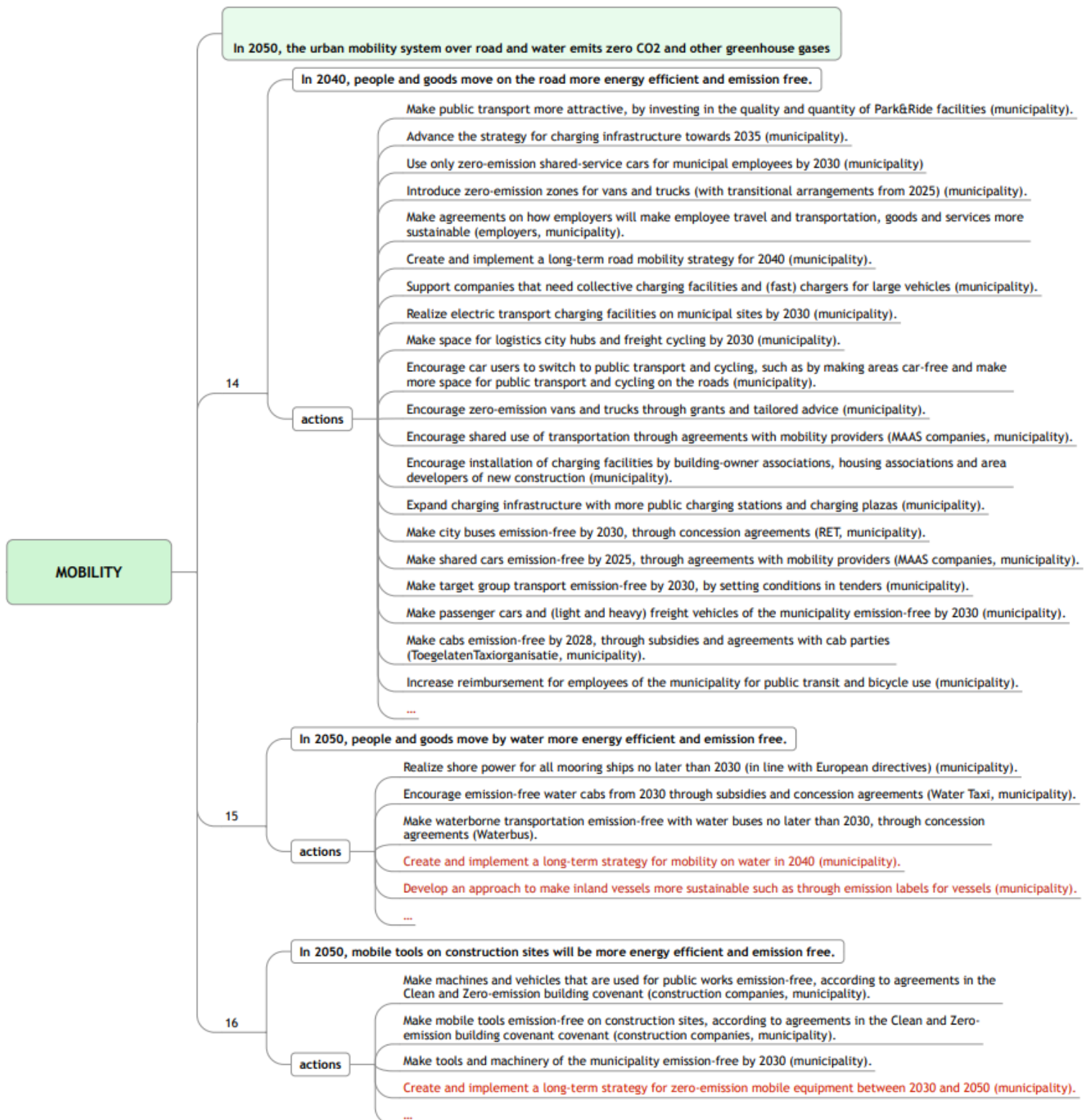


Figure 20: Mobility transition pathways + (potential) actions.

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 base for updating our new climate neutrality portfolio design is shown above, while details about or current pathways (with the mentioned deficiencies) 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 indicators shown in this section. The updating mentioned in the previous section of the pathways will lead to an updated proposal for the next administration.

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 km ² 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.

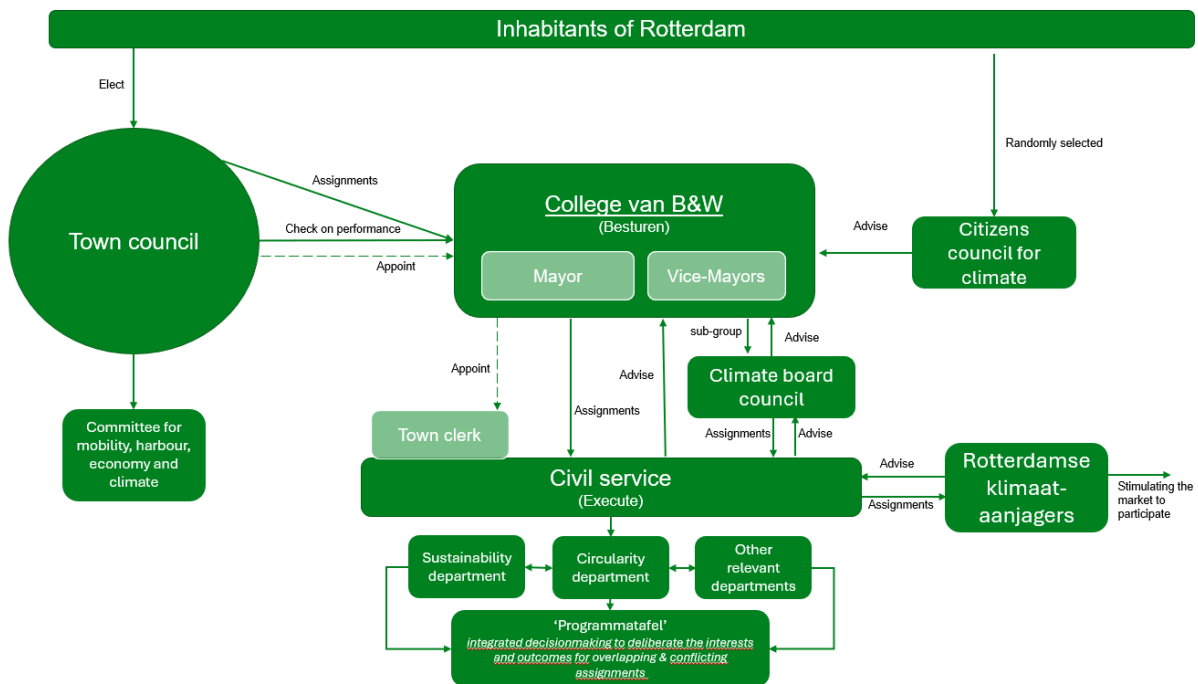


Figure 21 Governance structure Rotterdam.

Municipality

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 (which is led 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 be 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

Throughout this action plan we have shown the way Rotterdam is periodically and continuously monitoring, forecasting and looking for new ways to accelerate towards a climate neutral city. We have concluded in section A2 that there is still a gap between the reduction of emissions in 2030 and becoming a climate neutral city. In section B we have identified the shortcomings and room for more climate actions, as well shown (some of) the steps we are currently taking to address these.

For these preparations we are also fully prepared to utilize the means and advice the European Commission offers by this mission. Besides steadily improving data & monitoring, exchanging good practices, utilizing the grants and giving feedback on the EU-policies, we see as a major opportunity to explore ways to be less financially depended on the national government for funding local climate actions involving institutions like the European Investment Bank (EIB) and private sector involvement (which in the IP is more elaborated on).

In reply to some suggestions offered we did not (yet) fully explore:

- Natural carbon sinks: Rotterdam is a very dense urban area without any significant agriculture land and nature areas on its territory. We limit our exploration therefore to the contribution greening the urban area can make.
- Carbon credits: Rotterdam is hesitant to utilise these since it will only buy time to become effectively climate neutral and lead to resources utilised for climate actions elsewhere. Also the current market for carbon credits is not fully matured and is experiencing some reliability issues. Still carbon credits is a broad term and we can envision some specific schemes in which it can help to compensate residual emissions without these points of criticism. But this will have to be backed up by EU and/or national regulations for this purpose.
- Technological sinks: these are mainly being implemented for the industry (and including waste). For example the waste inceneration facility is planning to storage carbon and utilize carbon for greenhouses (CCU) before 2030.

For the future update this means the following: A new proposal for an urban target for 2030 is currently prepared as well as additional measures to ultimately reach climate neutrality. Expected is that the new city board will be deciding on a new target in the second half of 2026, the budget and start discussing and adopting a new package of climate actions in 2027 to be included in our next update of the CCC.

Appendix

1. Climate Action Plan Rotterdam (KAR)
2. Portfolio of Actions KAR
3. Forecast KAR 2030

The Rotterdam Climate Action Plan

Climate change is one of today's biggest problems. It is also a challenge for Rotterdam. That is why the City of Rotterdam is working hard to make the city ready for the future. The Rotterdam Climate Action Plan shows what we are doing and what still needs to be done. We are achieving good results in the transition to clean energy and sustainable use of raw materials. And making the built environment, mobility and the port more sustainable is gaining momentum.

Read on for more information or click on one of the themes above for more details.



What can you find in this document?

To keep an overview, you can consult the overview at any time to quickly and easily navigate to the different topics.

[Click here for an overview](#)

Working together

The municipality invests in a sustainable city for now and later. We do so together with residents, businesses and other public authorities. By putting our shoulders to the wheel together, the climate goals for this municipal term and for 2030 and 2050 will become achievable step by step. We are happy to share the positive developments, but are also honest about the steps we still need to take to achieve our goals as a city. Here's what we stand to do:



Climate in 2025
25% less CO₂ emissions



Climate in 2030
55% less CO₂ emissions



Climate in 2050
Completely climate neutral

Main tasks by theme

Clean, sustainable and robust energy supply



In the future, we will no longer use fossil fuels such as natural gas, coal and oil. Then we will use solar and wind energy, for example. We call this the energy transition.

This is what we are working on:

By 2026, there will be 3.2 km² of solar panels in Rotterdam. At least 350 megawatts of wind power will be generated in the region and port by 2030.

- By 2050, an alternative heat system will replace natural gas to heat our buildings and tap water. The energy system must be smart and reliable. New residents and businesses should not have to queue for a socket.

[Read more](#)

Built environment



By 2050, the built environment must be climate neutral.

This is what we are working on:

With urban and area-based approaches, we promote insulation and energy saving by residents, owners and entrepreneurs.

- We help lower-income Rotterdammers save with additional measures such as the energy handyman to combat energy poverty.
- Unions receive advice and support to reach sustainability decisions and investments.

We make agreements with housing associations to accelerate sustainability measures.

In six neighbourhoods, we are taking the steps to move from natural gas to district heating switch.

- For new homes, our ambition is to focus on environmentally friendly and future-proof construction, over and above the legal requirements.
- Small and medium-sized businesses get help when switching to clean energy.

[Read more](#)

Mobility



Transport in Rotterdam now accounts for 30% of CO₂ emissions and 25% of air pollution. The municipality wants to achieve that by 2040 all transport in the city no longer emits harmful substances.

This is what we are working on:

Easy electric vehicle charging for everyone in Rotterdam. All passenger transport (buses, shared cars, taxis) will be electric.

From 2025, only business vans and lorries with no pollutants will be in the city centre (zero-emission zone).

- Cleaner inland navigation.
- Companies are encouraged to use emission-free tools, such as bulldozers and excavators.

[Read more](#)

Port of the future



The port of Rotterdam is very important in the world. To make the port stronger, it must become sustainable. The goal is to be climate neutral by 2050. By 2050, the port's industry will also be fully circular. A big challenge.

This is what we are working on:

Companies will use biofuels and hydrogen as (renewable) energy sources.

Closing two Maasvlakte coal-fired power plants by 2030. Investigating whether gas power plants can use sustainable gases. Cleaner and more sustainable transport by:

- Encourage greater use of renewable fuels.
- Encourage more vehicles to go electric. Promote smarter transport.

[Read more](#)

Resource transition



Much of Rotterdam's CO₂ emissions come from the use of raw materials and materials. That is why Rotterdam is working on the raw materials transition: a change in the way we use raw materials.

The circular economy is one way to make that change. We try to use fewer materials and use them better, longer and re-use them.

In this way, we will eventually have a fully circular economy by 2050. This will make Rotterdam greener and more sustainable. But also cleaner, healthier and economically stronger.

[Read more](#)

Climate adaptation



Rotterdam is located below sea level, in the middle of several rivers. This makes our city very vulnerable as the climate changes. Climate change is also reducing the number of plant and animal species that live here.

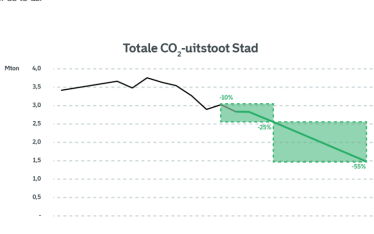
In Rotterdam, we have already started to adapt the city to a changing climate. We are planting more greenery in the city. In doing so, we pay attention to biodiversity: we make sure different species of plants and animals can live there.

We deal with this in a smart way: when we make adjustments in the city, we immediately think about how we can make these changes compatible with climate change. The Rotterdam WeatherWord programme shows what steps we can take to achieve this.

[To rotterdamsweerwoord.nl](https://www.rotterdamsweerwoord.nl)

How are Rotterdam's climate targets progressing?

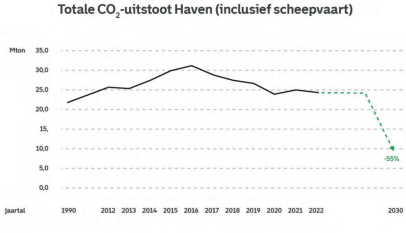
The goal of the energy transition is to reduce CO₂ emissions by 55% by 2030 compared to 1990 levels. We have made a good start and have already achieved results. As a result, the rise in CO₂ emissions has stopped. The graph shows the downward trend, which is a great achievement. But there is still a considerable amount of work ahead of us to do.



Reference date: August 2023 - source: [DCMR CO₂ Monitor Rotterdam 2022](#)

The graph above shows the national target of 55% CO₂ reduction by 2030 translated to the city. We want to achieve at least 25% CO₂ reduction by 2025 in this parliamentary term. The black line shows the evolution of CO₂ emissions in recent years. The green line shows the required reduction in CO₂ emissions towards the targets.

Totale CO₂-uitstoot Haven (inclusief scheepvaart)



Reference date: August 2023 - source: [DCMR CO₂ Monitor Rotterdam 2022](#)

The graph shows the national target of 55% CO₂ reduction translated to the port of Rotterdam. The black line shows the course of CO₂ emissions in recent years. The green dotted line shows the required reduction in CO₂ emissions towards the 2030 target.

[Read more](#)

Resource transition

[Read more](#)

How are we going to do it?

[Read more](#)

Energy transition

- Clean, sustainable and robust energy system
- Built environment
- Mobility
- Port of the future

[Read more](#)

How are we going to do it?

[Read more](#)

[Read more](#)

[Read more](#)

[Read more](#)

How are we going to do it?

[Read more](#)

[Read more](#)

[Read more](#)

Making metres for climate and people in the city



The first 8,000 homes are off natural gas. Only circular sewage pipes are going into the ground. 45% of household waste is already separated. Rotterdam won an international award for its good charging infrastructure.

We are making considerable headway for the climate and people in the city. We can be quite proud of that. With everyone's efforts, we have managed to ensure that CO2 emissions in the city are no longer rising; they have started to decline. We have made a good start, but the task in the coming years is big, very big. By 2030, CO2 emissions must fall by 55% and by 2050 we must be climate-neutral. The year 2030 seems far away, but it is fast approaching. A future-proof city starts now. To insulate a house the day after tomorrow, get an energy bill down, put ships on shore power or find well-qualified staff, we have to act today.

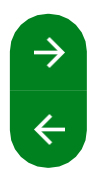
We care about the many Rotterdammers who experience health problems due to air pollution. For the families struggling with energy poverty. To the residents of neighbourhoods where it gets 8 degrees hotter in summer than in green neighbourhoods. 7 out of 10 Rotterdammers are concerned about climate change, according to the 2022 Omnibus Survey.

Rotterdam wants to lead the way because its residents cannot be left behind. By investing in the energy and raw materials transition, we create opportunities. A port city that relies less on fossil energy can strengthen its leading position in the world and remain a major job engine. An insulated house with solar panels geeh residents less financial headaches. With smart actions around pollutants, noise and waste, we can soon pass on a cool, dry and clean city to our children and grandchildren.

The Rotterdam Climate Action Plan (KAR) maps out what we have all already achieved, but is also honest and transparent about what we all still have to do. The urgency is high. In this document we list the main issues. It makes clear that many new initiatives and additional investments are needed. Only then can we achieve the goals set for this parliamentary term, 2030 and 2050. Some goals are still missing and require decisions.

It is clear that we all have to put our shoulders to the wheel to make the KAR a reality; Rotterdammers, housing corporations, energy companies, the port, businesses and schools, as well as the central government and the European Union, are key players.

The municipality itself is putting its best foot forward. It is not always easy, as strong choices are required around space, money, capacity and priority. With an eye and ear for everyone's interests. The college is making every effort to do the maximum from all portfolios. Exactly what this college stands for: we are one city. Together we can do this.



**One planet,
one city,
one college,
one KAR**

For city and residents



The municipality of Rotterdam is making the KAR for all Rotterdammers and for their (grand)children. The municipality is investing in a sustainable city for now and later. For example, for an increasing number of Rotterdammers energy poverty is unfortunately a daily reality and struggle. This requires quick actions in support, but also structural solutions. The energy and resource transition reduces their vulnerability to price increases in the longer term. We also seize the opportunity to invest in homes, neighbourhoods and businesses. In doing so, we serve the city and the port with its (future) residents and workers.

The municipality wants to work innovatively and boldly to achieve climate goals. By making its own, municipal organisation and operations more sustainable. For the city, we provide clear frameworks where necessary and give room to experiments where possible. We make agreements and come up with schemes to stimulate sustainability in the city. A consistent policy line is important. Therefore, we build on the line initiated by the city council 2018 - 2022. The following principles are guiding when making plans and taking decisions:

- We keep the energy transition affordable for everyone and prevent and fight 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 resource transition as a flywheel for entrepreneurship and additional jobs (especially for people distant from the labour 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 climate change mitigation. Think: 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 the resource transition, we are committed to reducing 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 holdings from our shareholder role. And specifically for the Port of Rotterdam Authority to support the port of Rotterdam in their commitment to combating climate change.

We keep the energy transition affordable for everyone



"We all eventually want to save on (high) energy costs. Sustainability is a complicated topic, but when you talk about how much cost you can save, it's a lot more concrete. Especially for people on small incomes, the priorities are different."

Rieks Weerman

Flywheel for entrepreneurship, additional jobs and enhanced competitiveness

"I want to make clean energy accessible to everyone, as well as let people without jobs benefit from the employment opportunities that the energy transition offers."

Josee van Linschoten



Through our commitment to the resource transition, we are committed to reducing CO₂ emissions elsewhere in the world



"I want to show that taking small steps also makes sense. I think it is important to contribute to more sustainable and fair clothing."

Daisy Kroon

We prevent and combat energy poverty

"We visit people and see what is needed. That goes beyond energy transition. If we see a pile of unopened envelopes, we start talking about it. If there are debt issues, we provide assistance."

Houria Tourich



As a municipality, we lead by example



"Rotterdam wants to be a reliable, credible and inspiring municipality. If we show that we take sustainability seriously, others will too. And that means energy consumption in our office locations, public lighting or our vehicle fleet. Basically everything from pens and pencils to major projects."

Richard van der Steen

We ensure maximum involvement of residents

"On two gym roofs in the Prinsenland - Lage Land district, 344 solar panels have been installed. These generate around 122,000 kWh per year. It is fantastic to now be able to see concretely that a joint residents' action leads to the production of local sustainable energy. An indispensable link in Rotterdam's energy transition!"

Donald van den Akker



Energy and resource transition go hand in hand

The KAR focuses on the energy and raw materials transition, as these two transitions are closely linked. The energy transition requires a lot of materials to make wind turbines, solar panels, batteries and insulate homes. This causes a hefty environmental footprint, including CO₂ emissions.

In addition, the increasing scarcity of raw materials poses a risk. Slowing down material use is important for both the climate and our economy. At the same time, we need many raw materials to (quickly) implement the energy transition. Energy and raw materials transition are thus inextricably linked.

Environment vision is guiding

The energy and resource transition make a big claim on city space. In implementing our climate plans, the environmental vision is leading. Dealing well with the limited space is a precondition for achieving set goals. The required interventions are at the same time an opportunity for a quality impulse in the sustainable, good growth of the city.

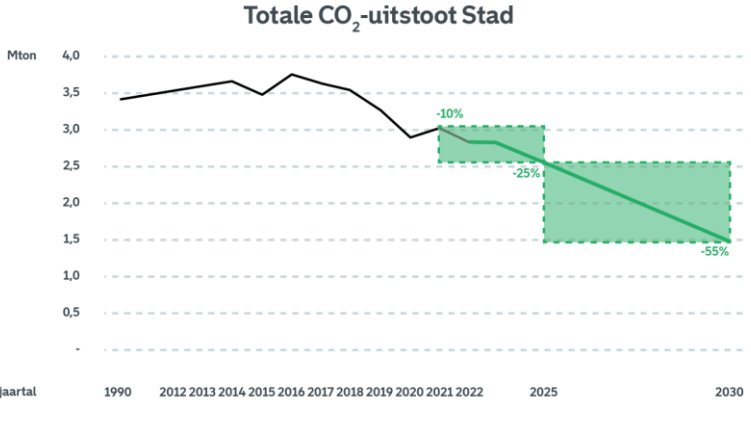
Where we can, we also ensure cleaner air, for example, for the city more resilient to climate change. The air quality implementation plan will follow in the course of 2024 when it will be clear when the new air quality standards will be known. Currently, the European air quality directive is being reviewed. Meanwhile, we are already taking measures to improve air quality in Rotterdam.



Energy transition



The energy transition goal: 55% CO₂ reduction by 2030. We got off to a flying start, halting the rise in CO₂ emissions. The graph shows the movement downwards. That is a wonderful achievement, but there is still much to do.



In the port and in the city, we are pulling out all the stops to realise our ambitions. In the port, the ball is in the court of the big companies and the State. For this, see the 'port' section in the KAR.



In the city, the role of the municipality is greater. By directing, setting frameworks and driving, in the coming years we will continue the initiated reduction to -25% in 2025. That means 0.51 Mton of urban emissions in 4 years. Implementing the current plans is not enough, because only with additional actions will we reach the targets in 2030. To know whether we are and remain on the right track, the DCMR calculates all measures towards 2030 once a year.

The DCMR also establishes once a year what the actual emissions were in the previous year. The latest report can be found below. Once the new calculations are ready, we will incorporate them into the KAR.

[DCMR Reports](#)

For the college, energy transition is not about technology, but about making the city future-proof for its residents. How we will give hands and feet to this, you can read in the sections below.

Clean, sustainable and robust energy supply

In Rotterdam, the number of solar panels and wind turbines is growing rapidly. The energy system must develop along with them to avoid grid gridlock. Rotterdam is investing now to reap the benefits in the future.



[Read more](#)



Built environment

Rotterdamers want to live, shop and work in buildings that are pleasant, healthy and affordable. By 2050, every building should be natural gas-free and CO₂-neutral. The municipality, businesses, owner-occupiers, private landlords and housing corporations put their backs into this goal.

[Read more](#)

Mobility

Rotterdam is a city on the move. Working towards the climate goals must simultaneously improve accessibility, air quality and spatial quality. This requires a different mobility system for people and goods.



[Read more](#)



Port of the future

On the world stage, the port of Rotterdam is a major player. To remain significant, it must develop into a sustainable port with a 55% CO₂ reduction by 2030 and CO₂ neutrality by 2050. But also a fully circular industry by 2050. This is a major challenge, as the industry is now mainly petroleum-based.

[Read more](#)

Commodity transition



The Circular programme focuses on developing a circular economy: an economic system in which Rotterdam uses raw materials, materials and products as efficiently as possible throughout the chain. Much of Rotterdam's CO₂ emissions are caused by the use of raw materials and materials. A circular economy therefore contributes significantly to reducing CO₂ emissions. By 2030, the municipality aims to reduce the use of minerals, metals and fossil raw materials by 50%. By 2050, Rotterdam will be fully circular.

What have we already done?

- We are working on three main chains: Construction, Organic Streams and Consumer Goods(s), and we are targeting three user groups: Municipal clients and buyers, Entrepreneurs and Rotterdammers. We expect to make the biggest impact within these agendas. Here are some examples of projects we have implemented: We introduced material passports, enabling the reuse of materials from construction projects.
- We carried out life-cycle analyses to show the environmental impact of products purchased by the municipality.
- We started clean collection of leaf waste, which is used to make bokashi.
- We have conducted experiments to reduce food waste, such as the "The New Ash" programme.
- The Circular Counter is ready to help companies with questions about circular business.

We collaborated with chain partners in textile production, repair and recycling.



What are the ongoing projects?

We are working to use raw materials less, better, longer and again. For example:

- We look at vegetation in the M4H area and in Reyerood to see which plants grow well on different types of soil. This helps with saving management costs and so we use fewer plants, resources, water, soil and transport.
- We are working with Rotterdam schools on 'circular craftsmanship', through which students learn more about designing and maintaining products so that fewer raw materials are needed.
- We help SMEs, start-ups and scale-ups that (want to) innovate circularly with information, advice networking and access to (co)fundes.

We also support initiatives by people in the neighbourhood, such as repair cafes, clothing swaps and second-hand sales.

For more projects, see the Rotterdam Circular 2023 - 2026 programme plan:

[To rotterdamcirculair.nl](https://rotterdamcirculair.nl)

What remains to be done?

Rotterdam Circular promotes circular thinking and action in the city, both within our own organisation and beyond. Our projects serve as tools to achieve this goal: we carry out projects with the aim of making circular thinking and acting the standard. To this end, we join forces with partners in the city. By getting to work practically, we learn what does and does not work in practice. We will increase this movement in the coming years.

Do-thought approach

Projects also help us to find new ideas that ensure we can use resources less, longer, better and again. We use what we learn from our practical experience to make the big changes that are needed. We call this the Do Thinker approach. With this approach, we try to make circular thinking and doing more widely known and more firmly embedded. In short: we want circular thinking and acting to become normal.



Project overview

Click here for the overview of all projects.

[Project overview](#)

Municipality sets good example



Of course, we are also reducing our own footprint. Our ambition is to reduce CO₂ emissions by 55% by 2030. This starts, among other things, with the sustainable management of our real estate and vehicle fleet. As a next step, we as a municipality also want to make agreements with partners, such as suppliers and contractors, to make the chain more sustainable.

The [CO₂ Performance Ladder](#) shows annually what we have achieved within the real estate managed by the municipality. The public figures on energy consumption and CO₂ emissions stimulate us to make continuous improvements.

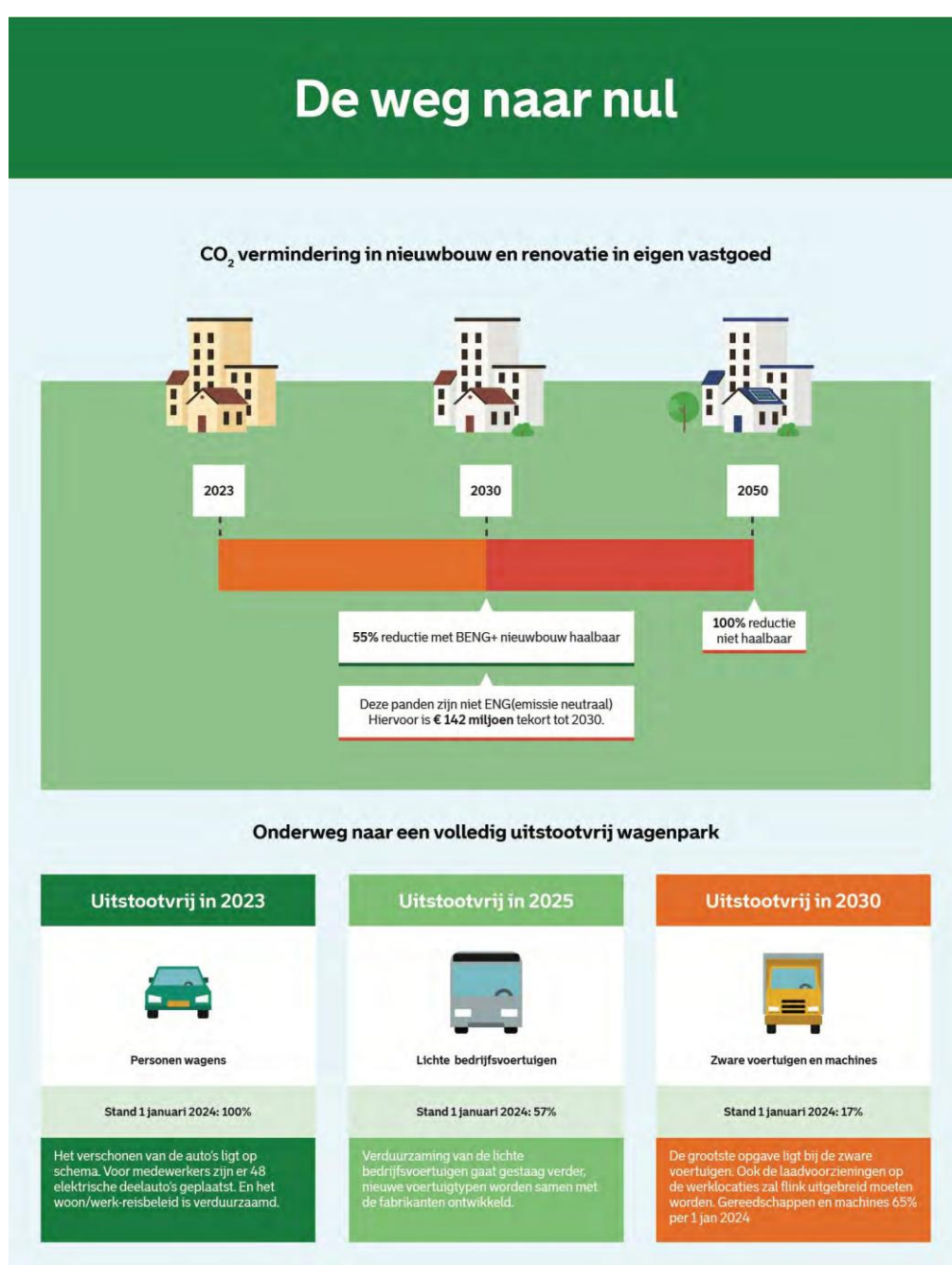
Municipal property

The municipality uses many buildings. We have two goals for making our real estate more sustainable:

1. By 2030, we aim to reduce CO₂ emissions by 55%. We will replace or renovate around 250 municipal buildings to extend their lifespan. Especially buildings with a poor energy label will be tackled. But beware, these new and renovated buildings are not yet energy-neutral. We do want to achieve that by 2050.
2. By 2050, we want to achieve a 100% reduction in CO₂ emissions. This is currently not possible 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).

What have we already done?

The Property Department heeh created a list of sustainable criteria and added it to the Property Framework Memorandum. To ensure that sustainability becomes an important part of projects, we should use this list at the beginning of the project to make decisions about which sustainable goals best fit what we want to achieve.



Own fleet

The municipality's vehicles are highly visible in the city. By 2030, we want to operate with a zero-emission vehicle fleet, this will also improve air quality, which is why we are accelerating. We are doing this in three steps:

- End 2023: all passenger cars (including two-wheelers) emission-free. By 1 January 2024, 100%* emission-free
- End 2025: all light commercial vehicles zero emissions. By 1 January 2024, 57% were emission-free.
- End 2030: all heavy vehicles tools and tool carriers zero emissions. By 1 January 2024, 17% of all heavy vehicles were emission-free. Of all tools and tool carriers, 65% are emission-free by 1 January 2024.

* except for a few hybrid cars.

Emission-free vehicles that fall under the 'heavy' category are pricey. Yet the municipality considers it a worthwhile investment for climate and city. Especially as we expect companies to comply with rules in the Zero Emission City Logistics (ZES) zone.

How are we going to do it?



Joining forces

The climate goals are very challenging. Making plans is good, but making plans happen is better. If all parties involved join forces, it will succeed. Thus, the Rotterdam Climate Boosters challenge organisations to start concrete projects around sustainability and circular economy.

Involving residents

We make our city more sustainable together. Residents are involved through the Rotterdam Citizens' Climate Council and neighbourhood councils. The municipality also supports resident initiatives, such as helping local residents with the energy allowance or teaching them how to apply window foil. Involved residents build with the municipality.



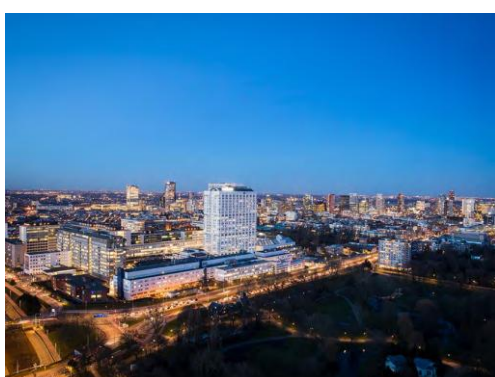
Money for green

Municipality geeh targeted money to accelerate sustainability. Technical innovation that stimulates employment. Greening that makes the city cooler. Insulation for homes that reduces energy bills. Driving circular economy that saves resources. The Sustainability Transition Budget (DTB) and the Energy Transition Fund (ETF) help Rotterdam move forward.



Sustainable jobs

Building a greener Rotterdam requires a lot of doing and thinking. The labour market shortage is a stumbling block. That is why the municipality is committed to sustainable jobs. Everyone is of value and welcome. Young people with a talent for technology, enthusiastic lateral entrants and people who can do more than they think.



Control of space

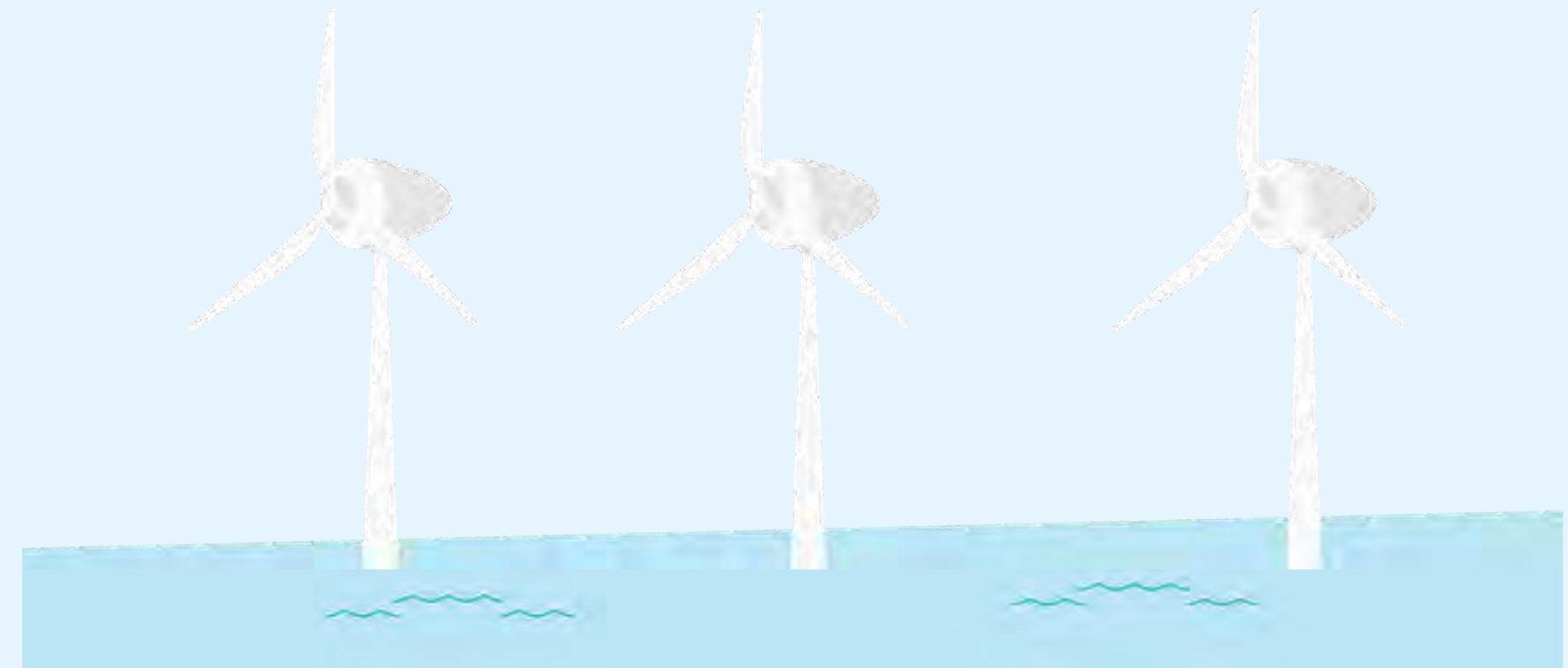
Space in the city is limited. Above ground and below ground. The municipality directs space so as to create coherence with other spatial tasks. For instance, the construction of the heat network is tackled together with sewer replacement or greening whenever possible. In this way, energy transition can be an accelerator for all tasks.

Lobby

The energy transition can only succeed if the government and the EU create the right framework conditions. As far as we are concerned, affordability for the Rotterdammer comes first. The municipality regularly visits The Hague to achieve the best for residents and city. In addition, Rotterdam cooperates with other European cities and we are one of the 100 Climate Neutral Cities.



Continuing with the KAR



The Rotterdam Climate Action Plan (KAR) shows how the municipality is working towards a climate-neutral Rotterdam by 2050. We are open about the results we are achieving. We are realistic about the things that still have to happen.

The KAR charts what we are already doing. The conclusion: the policy is ambitious and implementation is picking up steam, but to achieve our goals in 2030 and 2050, we need to roll up our sleeves even more. That is why we will make and implement more plans. We will do this together with the city, because the climate belongs to everyone.

The KAR is of and for the people of Rotterdam. Together, we keep our finger on the pulse. In the KAR we will include climate projects by the neighbourhood councils, the Rotterdam Citizens' Climate Consultative Committee and by the Rotterdam Climate Booster with partners in the city.

The KAR also makes it clear that the municipality has too few financial resources and powers to implement all plans properly and quickly. We use the KAR to try to influence new developments from the central government and the European Union, so that they provide maximum support for the projects in Rotterdam.

The KAR is a living action plan, landing new ideas from the city and tracking the progress of projects. The KAR is updated regularly. This way, we keep each other on our toes and together we can achieve the best for residents and city.

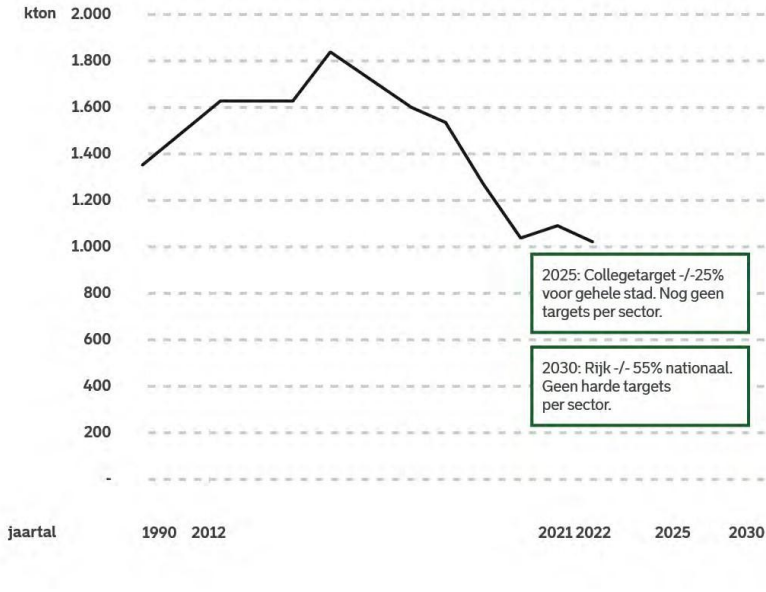


Clean, sustainable and robust energy supply

Indirect CO2 emissions from our urban electricity and heat use decreased sharply in recent years after peaking in 2016. This is because we in the Netherlands started producing more electricity with green energy sources and divested fossil energy sources.

Wind and solar projects in Rotterdam have contributed to the greening of this national energy mix in recent years.

CO₂-uitstoot stedelijke elektriciteit & warmtegebruik



The energy transition is happening at breakneck speed. Rotterdam not only wants to follow the developments closely, but above all wants to be a leader. In the city and the port, we are already generating green energy with 389,000 solar panels and 88 wind turbines. In addition, heeh Rotterdam has a strong starting position in the further development of the district heating network and we have many alternative heat sources at our disposal. We are also working together with heat companies and network operators on a reliable and smart energy system.

This way, all Rotterdammers can reap the benefits of the energy transition. This is how we turn threats into opportunities for the city.

The role of the municipality

For a clean, sustainable and robust energy supply, the municipality encourages and facilitates the development and use of renewable energy sources. In addition, we encourage production and transport of green hydrogen and investigate the possibilities for nuclear energy. We do this together with residents and companies in the city and in the port. With grid manager Stedin, we are working on a strategic agenda to prevent grid congestion or reduce its effects. We encourage innovations in the energy system to take the final step towards implementation in Rotterdam.



Solar

Rotterdam wants to become a leader in solar energy. If we push hard, we will almost reach our contribution to RES 1.0 (3.4 km² panels in 2030) by 2026.

Read more

Wind energy

It has been agreed with the region and the port that we want to generate at least 350 megawatts of wind power by 2030.

Read more

Heat system

Heating buildings and tap water with natural gas will no longer be allowed from 2050. That is why we are working on alternative heating systems.

Read more

Energy system

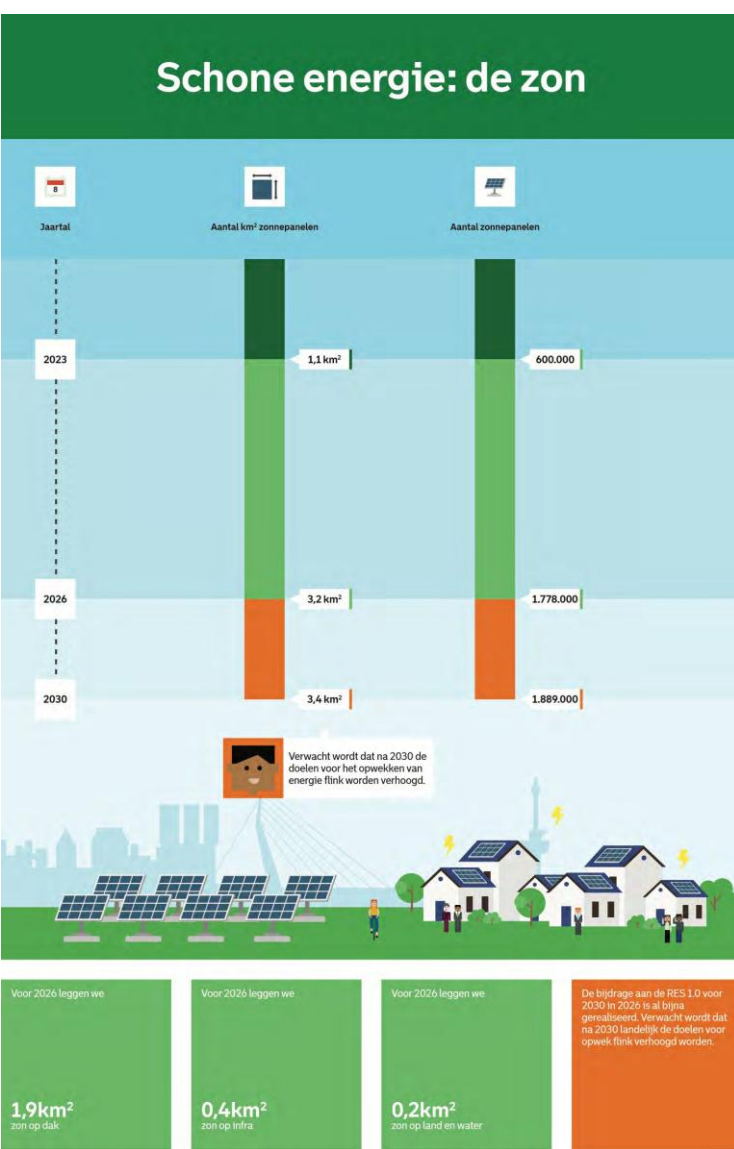
We are building a clean, smart, reliable and equitable energy system, of which the electricity grid is an important part.

Read more

Solar

Rotterdam wants to become a leader in solar energy. These are the steps we (will) take:

- March 2022, the counter stood at 0.7 km² → 389,000 solar panels.
- March 2023, the counter stood at 1.1 km² → 600,000 solar panels.
- The target for 2026 is 3.2 km² → 1,778,000 solar panels.
- The target for 2030 is 3.4 km² → 1,889,000 solar panels.



If we push hard, we will achieve our contribution to the Rotterdam Den Haag Regional Energy Strategy. Hague (3.4 km² panels by 2030) as early as 2026. It makes sense to get a head start, as national targets for solar energy are likely to be raised after 2030.

We can realise the solar ambition by adding many new locations; on company roofs, along highways, along municipal infrastructure and on car parks. We also encourage residents' initiatives in cooperatives and small-scale projects.

What have we already done?

Initial successes have been achieved on several fronts:

Sun on roofs and facades

[Servicepunt Zon voor Bedrijven](#) opened, accelerating the installation of 60,000 (0.11 km²) solar panels, six collective rooftops with solar panels, [Energie Van Rotterdam](#) supported, 26,000 solar panels have so far been installed on municipal real estate, two pilots with solar facades have been carried out and a collective solar panel purchasing campaign was launched in early 2024.

Solar on and along infrastructure

The preliminary study on solar energy along the A15/A38 stretch has been completed. As for solar carports, a permit application has been submitted for the car park of a sports club, and we are also in talks about possible solar carports at some other locations.

Sun on land and water

Solar farm Oranjepolder under development, construction start Schiebroek solar farm early 2024.

Which projects are still ongoing?

The Solar Energy in Rotterdam 2022 - 2026 programme aims to help citizens, businesses and institutions install solar panels. An important point of attention is making solar energy accessible to Rotterdammers without a roof or with a small budget. We also stimulate collective roofs with solar panels by energy cooperatives, which residents can join.

The Rotterdam solar ladder geeh direction of the municipality's commitment:

- Sun on roofs and facades: yes.
- Solar on and along infrastructure: Yes, if safe and responsible.
- Solar on water and land: No, unless...

These are the opportunities we can exploit for 2026, totalling as much as 3.2 km² solar panels:

- 1.5 km² on roofs and facades: company roofs, collective roofs, schools, municipal properties, housing associations, VVEs and private individuals.
- 0.4 km² on and along infrastructure: Let the Sun Shine, Solar Carports and OER.
- 0.2 km² on water and land: Oranjepolder, Schiebroek.
- 1.1 km² existing solar panels

What is left for us to do?

Sometimes citizens or businesses encounter barriers when installing solar panels. That is why the municipality is creating the optimal preconditions for all parties who want to contribute with the Solar Energy in Rotterdam 2022-2026 programme.

Points of interest:

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

Project overview

Click here for the overview of all projects.

[Project overview](#)

Project overview

Solar

Reading guide Table:

- ETB - Energy Transition Budget - this is a fund that finances the acceleration of the energy transition in Rotterdam focused on projects mainly implemented between 2020-2022.
- DTB - Sustainability Transition Budget - this is a fund that finances the sustainability transition in Rotterdam focused on projects to accelerate the right innovations in the region, support entrepreneurs, and thus promote earning capacity for the city and employment for Rotterdammers between 2023-2026.
- RKA - Rotterdam Climate Agreement. These are projects that were started under the Rotterdam Climate Agreement and some are continued from the Rotterdam Climate Boosters.
- SES - Smart Energy Systems - SES is an existing innovation programme aimed at accelerating and facilitating innovations in the energy transition.
- ETF-R - Energietransitiefonds Rotterdam - this is a fund for sustainable investments that contribute to reducing CO2 emissions, air quality, reducing the use of primary raw materials and strengthening a 'green' economy in Rotterdam.

What have we already done?

Soort project/DO-akkoord	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Opwek zonnepanelen in de stad (programma)	Het programma Opwek zonnepanelen in de stad omvat onderzoek naar een experimenteel met de opwekbaarheid van het gebied aan zonnepanelen binnen de bebouwde omgeving en op of langs het huisdak. Het programma richt zich op zonnepanelen op de daken, op zonnepanelen op parkeervolledingen en opwek zonnepanelen op lange huizen.	In september is project A15 (een lange ondergrondse garage met bevestiging van zonnepanelen) gestart voor het onderzoek Solar Carports bij locatie Club Rotterdam.	n.v.t.	gereed	De toekomstige effecten worden ingeschat door de DCMR**
RKA	Partnerschappen vooropgezet met zonnepanelen-dak (Klimaatdeal #42)	Partnerschappen die geschikt zijn voor het overnemen van zonnepanelen, worden gesticht en daarna worden ontworpen. Daarbij kunnen ook andere functies ingevuld worden, zoals elektrische laadpalen. Aandacht zal worden besteed aan de afstemming van de afmetingen van de zonnepanelen en de afmetingen van de dakconstructie.	Onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam. Dit onderzoek richt zich op de afstemming van de afmetingen van de zonnepanelen en de afmetingen van de dakconstructie. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
RKA	Ontwikkeling van productie van duurzame energie uit de haven (Klimaatdeal #38)	Er wordt onderzoek gedaan naar nieuwe mogelijkheden om tot 2030 zijn om in het havengebied te ontwikkelen van zonnepanelen. Dit is een eerste stap in het proces om de haven te ontwikkelen tot een duurzame energiezone.	Er is, in samenwerking met het Havenbedrijf en Portuwaterland, een onderzoek gedaan naar de mogelijkheden voor opwek van zonnepanelen op de daken van de haven. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
ETB	Werk maken van zon	Klimaatfonds Rotterdam heeft werk voor zonnepanelen, voor een maatschappelijke instelling die de aansluiting van 4500 zonnepanelen financieel kunnen ondersteunen.	Voor bedrijven is een gemeentelijk servicopwek gepoogd naar zonafhankelijk advies van de gemeente Rotterdam. Dit advies wordt gebruikt voor de afstemming van de afmetingen van de zonnepanelen en de afmetingen van de dakconstructie. Door dit werk zijn meer dan 50.000 zonnepanelen veldvrij gemaakt.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
RKA	Zon op bedrijfdaken in het stedelijk gebied (Klimaatdeal #43)	Om alle beschikbare daken op bedrijfdaken te voorzien van zonnepanelen is er een onderzoek gedaan naar de mogelijkheden om de daken te voorzien van zonnepanelen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	In 2020-2022 zijn er zes bedrijfdaken met zonnepanelen ontwikkeld. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
ETB	Zon op gemeentelijk vastgoed	Onderzoek welke daken gemeentelijk vastgoed geschikt zijn voor zonnepanelen.	In afgevoerd.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
RKA	Zonnepanelen in woonwijken (Klimaatdeal #41)	Er wordt onderzoek gedaan naar de mogelijkheden om zonnepanelen te installeren op daken van woonwijken. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	De realisatie van woonwijken met zonnepanelen is een belangrijk onderdeel van de transitie naar een duurzame energiezone. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
RKA	Zonnepanelen op bedrijfdaken in het havengebied (Klimaatdeal #37)	Veel bedrijven in het havengebied overwegen zonnepanelen op hun daken, berekend door de DCMR**.	Veel bedrijven in het havengebied overwegen zonnepanelen op hun daken, berekend door de DCMR**.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**
SES	LEMS	LEMS heeft met behulp van subsidies een onderzoeksprogramma opgezet voor zonnepanelen op daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Het project omvat een haalbaarheidsstudie met als resultaat: productie van duurzame energie, met name op 31 huizen, berekend door de DCMR**.	n.v.t.	gereed	De effecten zijn berekend door de DCMR**

What are we working on?

Soort project/DO-akkoord	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
SES	Dataveen lokale elektriciteit	De Dataveen energieopslag maakt het mogelijk voor bewoners van de wijk de Witte Haven om zonnepanelen te gebruiken voor de opslag van elektriciteit. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Het project omvat een haalbaarheidsstudie met als resultaat: productie van duurzame energie, met name op 31 huizen, berekend door de DCMR**.	n.v.t.	31-12-2025	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Innovatie circulaire zonnepanelen	Onderzoek naar potentiële voor zonnepanelen in de regio van de gemeente Rotterdam en stimuleren van de aansluiting van zonnepanelen op de daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	n.v.t.	31-12-2024	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Innovatie dataverzameling monitoring van	De zonnepanelen brengen jaarlijks in beeld hoeveel zonnepanelen er in de regio van de gemeente Rotterdam zijn. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Jaarlijkse analyse van het aantal zonnepanelen dat er in de regio van de gemeente Rotterdam is. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	31-12-2026	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Innovatie zon op gevels	Het Solarbedrijf Rotterdam en de gemeente Rotterdam hebben een pilot opgezet om zon op gevels te installeren op daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Leren van de innovatie in de pilots, en de markt inspiceren om op meer plaatsen zonnepanelen te installeren.	n.v.t.	31-12-2026	Impact is + 0,1 Mton. Zie rapport DCMR voor details**
SES	SES-Rabij	Rabij (project 13) ontwikkelt een innovatief zonnepanelensysteem voor zonnepanelen op daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Het project omvat een haalbaarheidsstudie met als resultaat: productie van duurzame energie, met name op 31 huizen, berekend door de DCMR**.	n.v.t.	31-12-2024	De toekomstige effecten zijn ingeschat door de DCMR**
SES	SES-Rabij zon op parkeervolledingen	Rabij ontwikkelt een innovatief zonnepanelensysteem voor zonnepanelen op parkeervolledingen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Het project omvat een haalbaarheidsstudie met als resultaat: productie van duurzame energie, met name op 31 huizen, berekend door de DCMR**.	n.v.t.	31-12-2024	De toekomstige effecten zijn ingeschat door de DCMR**
SES	SES-ZEF Meth-Gas	Zem Emission Free (ZEF) ontwikkelt innovatieve zonnepanelen die zonnepanelen combineren met waterstof. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Het project omvat een haalbaarheidsstudie met als resultaat: productie van duurzame energie, met name op 31 huizen, berekend door de DCMR**.	n.v.t.	31-12-2024	De toekomstige effecten zijn ingeschat door de DCMR**
SES	Wetlab Solar	Wetlab ontwikkelt de Solar Flare, een innovatief zonnepanelensysteem voor zonnepanelen op daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Het project omvat een haalbaarheidsstudie met als resultaat: productie van duurzame energie, met name op 31 huizen, berekend door de DCMR**.	n.v.t.	31-12-2024	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Zon op daken bedrijfdaken	Gemeentelijk Servicopwek Zon voor bedrijven.	Eind 2024 is er 1,6 Mw / 315 Mw aan zon op bedrijfdaken, waar nodig wordt het aantal zon op bedrijfdaken.	n.v.t.	31-12-2026	20 Mton
ETB	Zon op daken coöperatieve daken	Energie van Rotterdam realiseert 90 coöperatieve daken. Via het ETB wordt er in 2024 gestart met de realisatie van coöperatieve daken. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Eind 2024 is er 0,13 Mw aan coöperatieve daken.	n.v.t.	31-12-2026	Impact is + 0,1 Mton. Zie rapport DCMR voor details**
Overig	Zon op daken scholen	Schuldbestuurder ontvrijgt en ondersteunt scholen voor gemeentelijke Rotterdam bij de aanleg van zon op daken.	Eind 2024 is er 0,09 Mw aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2025	1 Mton
Overig	Zon op daken voor WbCo-particulieren	Gemeente ondersteunt WbCo's bij de aanleg van zonnepanelen op daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	Eind 2024 ligt er 0,13 Mw aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2026	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Zon op infra OER	Onderzoek zonnepanelen op infrastructuur.	Er wordt 0,1 Mw / 27 MW aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2030	23 Mton
Overig	Zon op infra Solar Carports	De gemeente faciliteert de aanleg van solar carports.	Het doel is om meer te zorgen dat het aantal solar carports in Rotterdam wordt verhoogd. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	n.v.t.	31-12-2026	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Zon op infra water van de gemeente Rotterdam	In het 2023 is een studie ingezet naar het aantal zonnepanelen op daken van woningen. Dit onderzoek heeft geleid tot de realisatie van partnerschappen in de regio van de gemeente Rotterdam.	In juni 2023 is de definitieve rapportage opgesteld. In eerste instantie zijn er 1,6 Mw aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2024	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Zon op land en water Hoek van Holland	De realisatie van zonnepanelen Hoek van Holland - Offshoreprojecten.	Er wordt 0,13 Mw / 20,25 MW aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2026	8 Mton
Overig	Zon op land en water Schiedamschen	De realisatie van zonnepanelen Schiedamschen.	Er wordt 0,01 Mw / 27 MW aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2024	1 Mton

What else is in the pipeline?

Soort project/DO-akkoord	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
Overig	Zon op land en water Slufter OER	De realisatie van zonnepanelen op land en water Slufter OER.	Eind 2024 ligt er 0,13 Mw aan coöperatieve daken, berekend door de DCMR**.	n.v.t.	31-12-2030	39 Mton

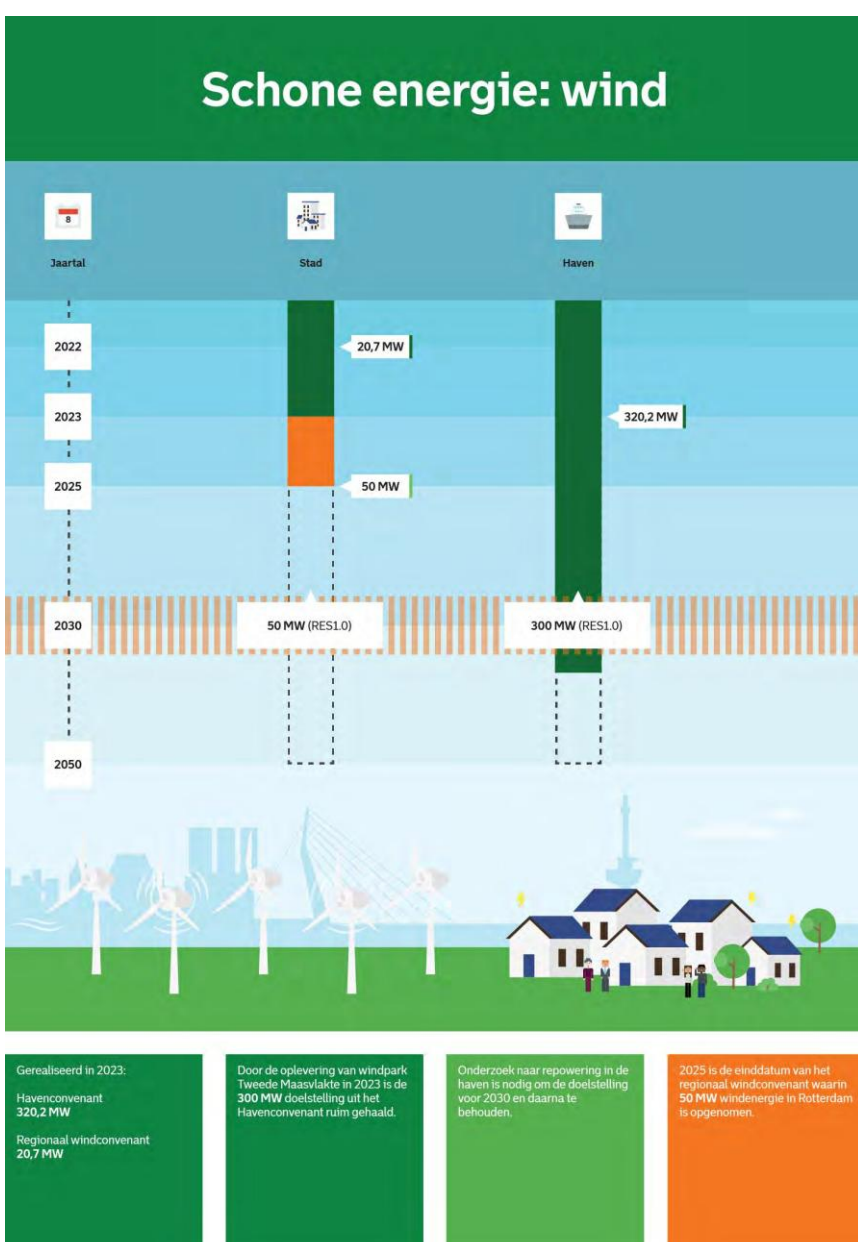
* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Wind energy

The municipality of Rotterdam heeds a preference for energy from wind at sea. We honour existing agreements to allow five wind farms on Rotterdam territory. Wind turbines in the city already generate 20.7 megawatts annually. In the port 320.2 megawatts. This is equivalent to the energy output of 560,500 solar panels.



What have we already done?

The city-regional covenant (2012) and the port covenant (2009) contain agreements to generate at least 350 megawatts of wind energy. These targets are also part of the regional ambitions for sustainable generation in 2030, as set out in the RES 1.0 (1 July 2021). Our preference is for offshore wind farms, but we honour these existing agreements on onshore wind.

Which projects are still ongoing?

How will the 350 megawatts of wind energy by 2030 (set out in RES 1.0) be realised? The city-region covenant is to deliver 150 megawatts annually by 2025, of which wind turbines with a total capacity of at least 50 megawatts are planned on Rotterdam's territory. Divided into five locations: Hoeksebaan, Charloisse Poort, Rozenburg, Beneluxplein and Nieuwe Waterweg.

Naam Windpark (VRM)	Voorziene aantal turbines	Potentiële MW naar verwachting*	Status
Hoeksebaan (voorheen Uitbreiding Nieuwe Waterweg)	2	12	Vergunningsaanvraag van Eneco wordt verwacht begin 2023
Charloisse Poort	1	3	Studie
Uitbreiding Landtong Rozenburg	1	6	Vergunningsaanvraag ingediend door Pondera eind 2022
Beneluxplein	NTB	10	Studie
Nieuwe Waterweg	6	24	Gerealiseerd in 2019
	Potentieel	55	

*The final number of MWs depends, among other things, on the number of turbines and the (available) turbine type. On the one hand, various studies, including in the field of environment, spatial impact and external safety will determine the installed wind power capacity, and on the other hand, the tender outcome of the market party when purchasing the turbines.

The port covenant includes an agreement to generate at least 300 megawatts of wind power. The port area now has 320.2 megawatts of installed capacity.

Wind turbines affect the environment. To achieve good integration, the municipality considers process participation (with neighbourhood councils, focus groups, residents and other stakeholders) and financial participation (local ownership and energy cooperatives) important.

What is left for us to do?

Environmentally aware wind energy development requires additional municipal effort for the wind farms in procedure and those yet to be developed. In doing so, we focus on a combination of public participation and communication. The Stredam in Hoek van Holland is an example of a RES 1.0 research location.

The new national standards for onshore wind placement were published in draft form at the end of 2023. We take their impact on wind farms under development into account. A c h i e v i n g a stable electricity grid requires agreements with grid operators, the Port Authority and other stakeholders.

Project overview

Click here for the overview of all projects.

[Project overview](#)

Project overview

Wind energy

Reading guide Table:

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3. RKA - Rotterdam Climate Agreement. These are projects that were started under the Rotterdam Climate Agreement and some are continued from the Rotterdam Climate Boosters.
4. SES - Smart Energy Systems - SES is an existing innovation programme aimed at accelerating and facilitating innovations in the energy transition.
5. ETF-R - Energietransitiefonds Rotterdam - this is a fund for sustainable investments that contribute to reducing CO2 emissions, air quality, reducing the use of primary raw materials and strengthening a 'green' economy in Rotterdam.

What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Haalbaarheidsonderzoeken kleinschalige windenergie winning	Dit project betreft de co-financiering van haalbaarheidsonderzoeken naar kleinschalige opwekking van stroom uit windenergie.	Is afgerond.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
Overig	Repowering Landtong Rozenburg	De 10 windturbines uit 2007 zijn vervangen door 9 efficiëntere turbines. In totaal staan er nu 12 turbines en 34 MW aan opgesteld vermogen waarmee ruim 117 GWh aan groene stroom kan worden opgewekt.	34,2 MW	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Regionale versnelling windenergie winning op land (Klimaatdeal #38)	Voor een viertal windenergieprojecten plaats gemeente, ontwikkelaars en grondeligenaren handtekeningen onder de afspraken. Doel is realisatie uiterlijk in 2023. Voor deze versnelling zijn lopende processen rondom creëren sociaal draagvlak en participatie randvoorwaardelijk.	In 2021 is versnelling binnen de deal door samenwerking met grondeligenaren en ontwikkelaars bereikt.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Ketinstimulatie van elektriciteit uit windenergie winning op zee (Klimaatdeal #39)	De koppeling tussen de vraag naar hernieuwbare elektriciteit en aanbod door nieuwe windparken op zee moet zorgen voor een belangrijke stimulans in de verdere ontwikkeling van het Rotterdamse offshore windcluster. Doel van de deal was een lobbybrief waarin de afzenders de rijksoverheid oproepen om ervoor te zorgen dat er duidelijkheid komt wanneer welke infrastructuur waar beschikbaar is tussen nu en 2030, met een doorkijk naar 2050 en indien nodig te versnellen en/of wettelijke kaders aan te passen	De dealpartijen en bredere organisaties hebben in 2020 een lobbybrief verstuurd aan het ministerie van EZK met daarin steun voor een beleidsversnelling als het gaat om vraag/aanbod koppeling en de rol van elektrificatie daarbij. Mede naar aanleiding van de aanbevelingen van het Afry-rapport zet het ministerie van EZK in op vervolgstappen met de sector (o.m. omzetten naar aanbestedingscriteria).	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Aanlanding elektriciteit uit windenergie op zee (Klimaatdeal #40)	In de regio Rotterdam speelt aanlanding van deze elektriciteit een grote rol in de ambities voor de verduurzaming van het havengebied. Deze Klimaatdeal is onderdeel van de gezamenlijke lobby-agenda vanuit regionale partijen richting de rijksoverheid (Klimaatdeal #39)	Op dit moment is in de Rotterdamse haven de aanlanding van drie windparken op zee voorzien of al in procedure (ministerie van EZK) Het doel voor de aanlanding wordt bereikt. Daarmee is deze deal met succes afgerond.	Afgerond. Deze Klimaatdeal is onderdeel van de gezamenlijke lobby-agenda vanuit regionale partijen richting de rijksoverheid (Klimaatdeal #39)	gereed	De effecten zijn berekend door de DCMR*
Overig	Windenergie winning harde en zachte Zeewering	Windmolens zijn afgebouwd en worden moment ingeregeld en getest. Oplevering voorzien voorjaar/zomer 2023.	116 MW	Windmolens zijn afgebouwd en worden moment ingeregeld en getest. Oplevering voorzien voorjaar/zomer 2023.	gereed	De effecten zijn berekend door de DCMR*
SES	SES: KuneVerda	Samen met Woonstad gaat KuneVerda onderzoeken of energie opwekking door middel van windturbines, al dan niet in combinatie met andere duurzame opwekking, breed inzetbaar is op de woningen en gebouwen. Het primaire doel van het onderzoeksproject is het in kaart brengen van omgevingsinvloeden en plaatsingslocaties van de turbines op de te verwachten opbrengst.	Dit project beoogt een haalbaarheidsstudie met als resultaten: een model voor optimale windturbineplaatsing op gebouwen, advies over montage en vermogen, vier turbines op gebouw 'De Snor' van Woonstad, overzicht van omgevingsinvloeden, en marktanalyse. Deze bevindingen ondersteunen toekomstige beslissingen en investeringen na het subsidietraject.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*

What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETF-R	Bargemaster	(gepatenteerde) beweging-compenserende oplossing voor de offshore windindustrie.	Techniek die windenergie op zee ondersteunt.	Doorzetten wind op zee (wordt aan voldaan). Voor Bargemaster zijn de belangrijkste uitdagingen i) het handhaven van de continue verhuur van de feeders en gangways (voor 2024 en 2025) en ii) effectieve kostenbeheersing bij nieuwe projecten met die (heavy) feeders. Op korte termijn staan de aandeelhouders voor een strategische beslissing betreffende de toekomst van Bargemaster om te kiezen tussen autonome groei of het laten toetreden van een strategische partner/investor. Als grootste aandeelhouder (29%) zal ETFR hierin een leidende rol nemen met het beslepen van deze strategische richting.	19-11-2024	De toekomstige effecten zijn ingeschat door de DCMR**
ETB	Intensivering Windenergie Winning programma	De Rotterdam Offshore Wind Coalition (ROWC) is een coalitie van de koplopers binnen het offshore windcluster in de regio Rotterdam. De coalitie bestaat uit 18 partijen, waaronder Van Cord, SIF, Boskalis en het Havenbedrijf. Gezamenlijk wordt ingezet op dialoog, marketing, opleiding en training, beleid, lobby en innovatie. Met betere samenwerking, koppeling van vraag en aanbod en concrete innovatieve investeringsprojecten als resultaat. Gemeente en Havenbedrijf bieden ondersteuning, expertise en een bescheiden bijdrage.	De realisatie in 2022 bestaat uit de gemeentelijke bijdrage voor het Rotterdam Offshore Wind Coalition (ROWC), procesbegeleiding en arbeidsmarktcampagne HBO ROWC.	n.v.t.	31-12-2026	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Uitbreiding windenergie Landtong Rozenburg	Aan de oostzijde van de bestaande windmolens wordt het windpark uitgebreid. In 2021 heeft een aanbesteding plaatsgevonden. Als ontwikkelende partij is gekozen voor de samenwerkingspartijen bestaande uit Ponslera Development, Rebel Group en Enercon.	6,4 MW	Naar verwachting in 2024, buigt de Raad van State zich over de ingestelde beroepen inzake de voorgenomen plaatsing van een turbine. Ook wordt in 2024 verder onderzoek gedaan naar de verplaatsing van de modelvliegtuigclub op de landtong, ten behoeve van de plaatsing van deze turbine.	31-12-2025	7 kton
Overig	Windenergie winning bedrijventerrein Innocent	Betreft twee windturbines van 4,2 MW op het terrein van sap-fabrikant Innocent in de haven. De opgewekte energie wordt gebruikt voor de productieprocessen van Innocent. Voor de turbines zijn alle benodigde vergunningen verleend en onherroepelijk.	8,4 MW	n.v.t.	01-05-2025	10 kton
Overig	Windenergie winning Charloisse Poort	De afgelopen jaren zijn een reeks van acties ondernomen voor de realisatie van windmolens op deze locatie. Dit is niet makkelijk gebleken als gevolg van een combinatie van (veel technische en inpassings-) risico's versus de commerciële haalbaarheid.	5 MW	Momenteel wordt een optie onderzocht omdat een geïnteresseerde marktpartij zich heeft gemeld. Dit betreft de realisatie van een waterslostmolen waar bij windenergie rechtstreeks wordt omgezet in groene waterstof en zo kan worden ingezet voor duurzaam transport.	31-03-2027	5 kton
Overig	Windwinning Beneluxplein	Beneluxplein is één van de VRM locaties in het stadsregioconvenant. In 2023 wordt gestart met een plan-MER om mogelijke opstellingen, omgevings- en milieueffecten voor windenergie te onderzoeken. Eerdere scenario's, zoals 3 lage of 2 hoge turbines, worden meegenomen. Alle scenario's worden doorgerekend op financiële haalbaarheid en vervolgens op alle onderdelen met elkaar vergeleken.	ntb (raming convenant 6 MW)	De NRD wordt uiterlijk in de zomer van 2024 verwacht.	30-06-2029	9 kton
Overig	Windwinning Hoeksebaan	Eneco/FMT heeft in oktober 2023 een omgevingsvergunning voor twee windturbines aangevraagd. De ene turbine staat op het terrein van Renewi en de andere op het terrein van Hoogheemraadschap van Delfland.	12 MW	Het ontwerpbestemmingsplan heeft t/m 18 januari 2024 ter inzage gelegen. De daarop binnengekomen zienswijzen worden momenteel beoordeeld.	31-12-2025	150 kton

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Energy system

Rotterdam's energy system is going through a sea change in the coming years. We are building a clean, smart, reliable and fair energy system, of which the electricity grid is an important part. The 'One City' coalition agreement has a clear ambition: new residents and businesses should not have to queue for a power socket. Meanwhile, that is unfortunately the case for part of our city and port. The high gas price is one of the factors accelerating the switch from fossil fuels to renewable energy sources. It is an extra motivation to work with grid operators and companies to make Rotterdam's energy system grow along with the transition.

What have we already done?

We have a clear picture of what the future energy system must meet. Network operators and companies are already building the system. As a municipality, we encourage innovation and new applications in the energy system through the Smart Energy Systems programme.

Which projects are still ongoing?

To prevent clogging of the electricity grid, the municipality heeh drew up a Strategic Action Agenda together with grid operator Stedin. This also calls for new technology. That is why we are reopening the innovation subsidy scheme of the Smart Energy Systems programme twice in 2024. Because there are many entrepreneurs with smart ideas to tackle the problems in the energy system. Funds have also been made available from the DTB to help entrepreneurs deal flexibly with their energy consumption.

We are working with partners and co-governments to shape the Energy System of the Future. We do this in the Regional Energy Strategy (RES), by facilitating landfall of offshore wind and participating in the provincial and national Multiyear Energy and Climate Investment Programme (MIEK).

For the possible construction of two new nuclear power plants, the State is conducting research and starting a participation and communication process. The municipality will contribute as part of the EIA commissioned by the central government.



What is left for us to do?

Rotterdam faced power grid tightness 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. Hard work is being done by TenneT to expand capacity, but this will only provide a structural solution from 2030 onwards.

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 staff are needed. Sometimes laws and regulations are a bump in the road. Municipality and grid operators need to strengthen and improve their cooperation so that together they can meet the challenges.

Project overview

Click here for the overview of all projects.

Project overview

Heat system

Heating buildings and tap water with natural gas will no longer be allowed from 2050. That is why we are working on alternative heating systems. One example is the district heating network. New and existing sources, such as geothermal heat and residual heat, feed this network. Rotterdam has a good starting position. We have many heat sources and the municipality has been working on heat networks since 2006. Now we need to expand the heat grid and expand the number of sustainable heat sources so that we can connect more and more homes and buildings. The [WAT map](#) geeh by neighbourhood what the best alternative to natural gas is. In cooperation with TNO, we are sharpening this map.

What have we already done?

Further development of the heat grid is challenging. In 2006/2007, the municipality issued several concessions for the construction, management and operation of the network in part of Rotterdam. However, time has not stood still. Therefore, we are in talks with heat companies and developers to determine the best route for the future. This is especially important in the light of the new Collective Heat Supply Act (Wcw).

As a municipality, we can often be found at the Ministry of Economic Affairs in The Hague. Thinking along about good preconditions at the national level is important. Our knowledge and experience in making neighbourhoods natural gas-free is valued by the government when drafting laws, regulations and financial instruments.

The New Heat Road (DNWW) supplies the heat network with residual heat from the port area and AVR. This pipeline was owned by Warmtebedrijf Rotterdam (WbR), but was sold to Vattenfall in autumn 2022.

Which projects are still ongoing?

The municipality is working on a smart strategy for the development of the heat and cold system in Rotterdam. In it, we safeguard public interests, address the challenge of finding sufficient space above and below ground and make clear the financial consequences of choices.

We are also preparing for new legislation expected in 2025: the Collective Heat Supply Act (Wcw) and the Municipal Instruments Heat Transition Act (Wgiw).

This new legislation involves a lot of work. For instance, a Plot Plan must be drawn up that divides Rotterdam into heat plots. A heat plot is a defined area for which the municipality appoints a heat company that must connect all buildings in the plot to a heat network. Adapting all current concessions, agreements and contracts to the Wcw is also a big job.

So we will need to adopt some policies in this area. Future policy documents:

- WAT map 3.0 - understanding heat demand, alternatives to natural gas (2025).
- Rotterdam Plot Plan (2025).
- Resource and infrastructure strategy (2025). Transition
- paths (2025).
- Heat programme 2026 (2026).

What is left for us to do?

In the coming years, it is important to expand the heat network and make it more sustainable. This requires different legislation as well as substantial investments in new sources, building infrastructure, insulating buildings and replacing existing natural gas connections with a clean alternative.

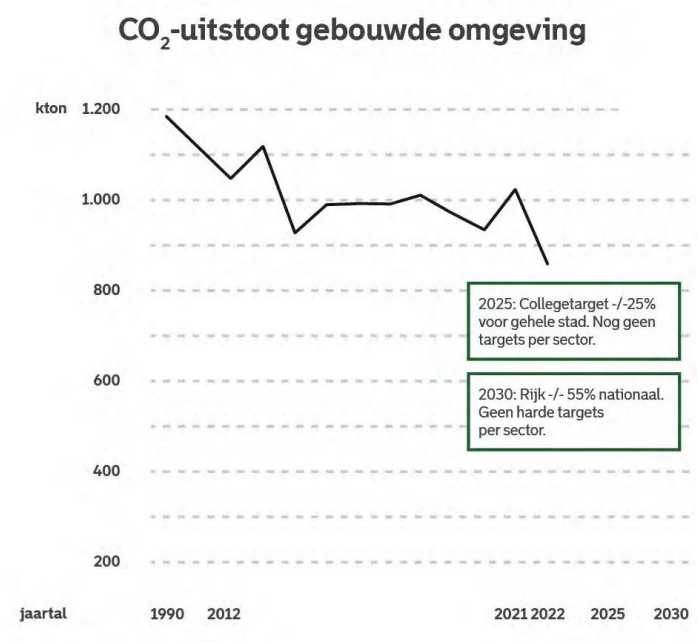
For this, a contribution from the state is indispensable.

Built environment

Homes, shops and offices must be liveable, healthy and affordable. By 2050, the built environment must be natural gas-free and climate-neutral. The necessary measures are costly and far-reaching. Not only in the outdoor space, but also behind the front door. This requires proper consultation with residents, owners and entrepreneurs. Higher gas prices are an extra incentive to speed up. Rotterdammers want to press on for lower energy bills and a healthy and affordable home, but they also want inconvenience to be limited and the city to remain accessible.

CO₂ in the built environment

For the built environment, CO₂ emissions are decreasing compared to 1990 by better insulating buildings, making them natural gas-free or replacing them with new construction. New construction is already natural gas-free as standard today.



The role of the municipality

The municipality of Rotterdam is doing a lot to make the city natural gas-free and climate-neutral. To this end, it is working with the city on plans and projects.

The municipality encourages people to use less energy, insulate their homes and become natural gas-free. The municipality geeh information and subsidies and helps where necessary. But in the end, people decide whether they want to change their homes, as the owner decides.

Natural gas-free

By 2050, natural gas should no longer be used to heat buildings and domestic hot water.

Read more



Energy saving

The built environment must be climate neutral by 2050. By 2030, 97,000 homes must be insulated by owners (based on the National Insulation Programme).

Read more

Energy poverty

The municipality seeks to alleviate energy poverty with a wide range of help on saving, remodelling and changing.

Read more

New building

By 2030, Rotterdam must build 55,000 new homes to solve the housing shortage. It is important that these new homes are sustainable and energy-efficient.

Read more

SMEs, businesses and offices

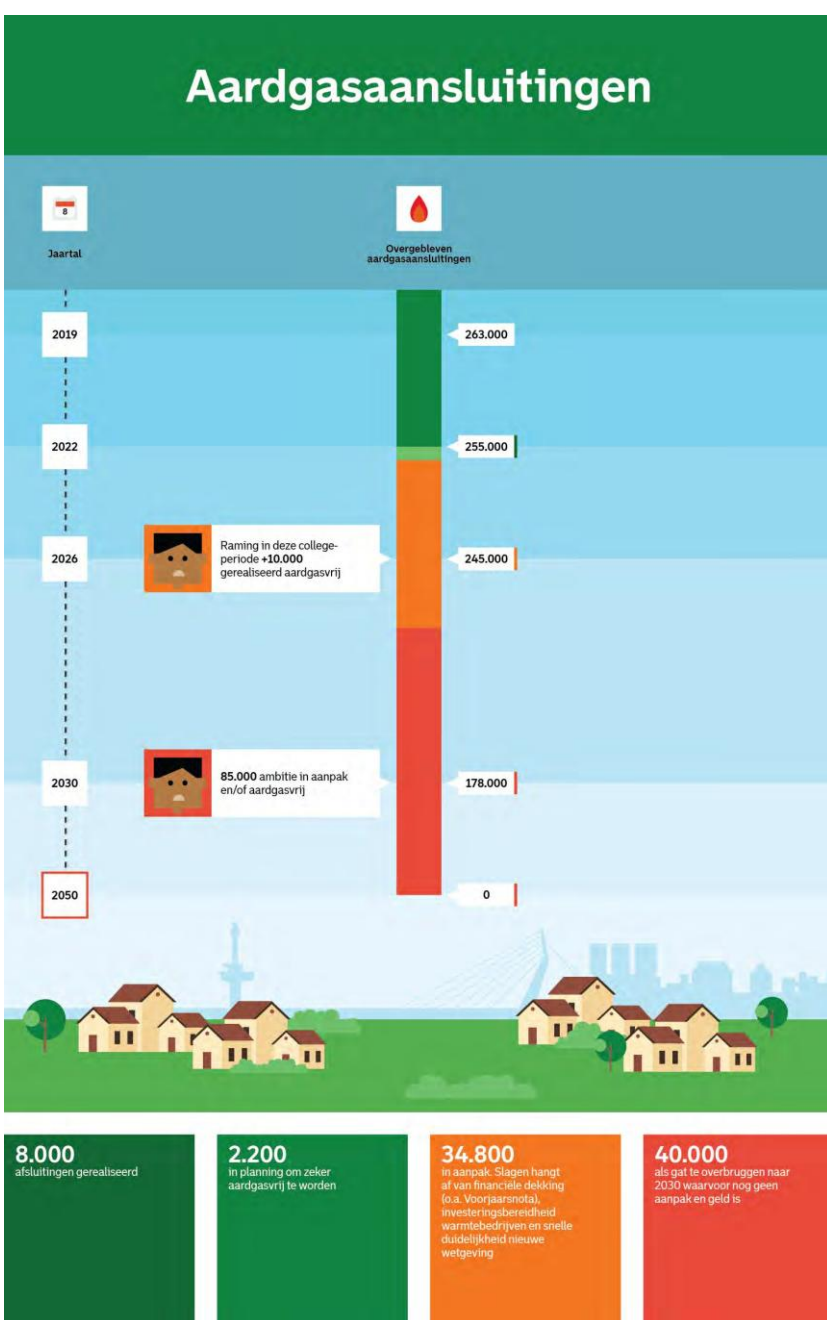
Rotterdam heeh about 20,000 SMEs spread across 43 business parks (excluding sea and airport parks) and 47 shopping areas. To meet the targets for the built environment, the municipality must provide maximum encouragement and support to SMEs in the energy transition.

Read more

Natural gas-free

By 2050, natural gas should no longer be used to heat buildings and tap water. Cooking on natural gas is also no longer allowed. As of 2019, 8,000 connections have been replaced. Still 255,000 natural gas connections to go. Our estimate is that 10,000 homes will go off gas this college term. This is in area approaches and beyond, for example through housing associations taking homes off gas and demolition and new construction.

In 2021, the council heeh adopted the Rotterdam Heat Transition Vision (RTVW). This states in which parts of the city the municipality can make big steps. To stay on track, around 85,000 homes must be in a natural gas-free approach by 2030. With ongoing plans and market initiatives, we have over 37,000 homes in approach. A gap of 40,000 connections will be closed.



What have we already done?

Making existing neighbourhoods natural gas-free is a challenging job. The municipality heeh gained useful experience in several neighbourhoods:

- In Heindijk, around 300 homes will have been addressed by 2022. The remaining homes will be connected to district heating in 2024.
- In Bospolder-Tussendijken, about 600 homes have been connected so far. Another 800 homes will follow in 2024- 2025.
- In Pendrecht-Zuid and Reyeroord-West, building owners received offers to switch to district heating in 2021. Both approaches have been on pause. P a r t l y due to developments around De Nieuwe Warmteweg (DNWW) and Vattenfall's investment freeze due to the Collective Heat Supply Act (Wcw). Before the summer, implementation will start in the first clusters. Discussions are still taking place with Vattenfall about the remaining clusters. We expect clarity on this soon.
- Prinsenland-Het Lage Land is undergoing a tender process. This process has temporarily stopped because we are waiting for talks with Eneco about new agreements on heat in a larger area. More clarity on this will be available during 2024.
- In Rozenburg, we are relaunching the area approach after it has long heeh stalled due to the sale of DNWW. We are doing so according to the new Wcw with an exploration of a more public route.

Want an inside look at area approaches? Then you can read more [here](#).

What current projects are there?

There is still a lot of work to do, but new projects need extra money. The coalition programme states that we will finish ongoing area approaches to natural gas-free and start new ones only when the government comes up with funding. Therefore, many areas from the Heat Transition Vision are on pause.

Meanwhile, the municipality does support market initiatives in Oude Noorden-Agniesebuurt, Schiebroek, Ommoord and the Kop van Feyenoord. We are also preparing for the introduction of new legislation on making neighbourhoods natural gas-free. See the [Heat System](#) chapter.

What remains to be done?

Natural gas-free approaches face headwinds. With the new Collective Heat Supply Act (Wcw), do heat companies still want to invest? How much delay is caused by Vattenfall and Eneco's investment freeze? Can we still use interconnection opportunities? Or only reserve space underground for a future heat network? Are there enough professionals to c a r r y out the work? And will the central government come up with enough money to make natural gas-free affordable for everyone?

At the same time, we have gained a lot of experience from ongoing area approaches and are poised to m o v e forward. Our partners in the city also want to move forward. With the right framework conditions, we can go ahead with this.

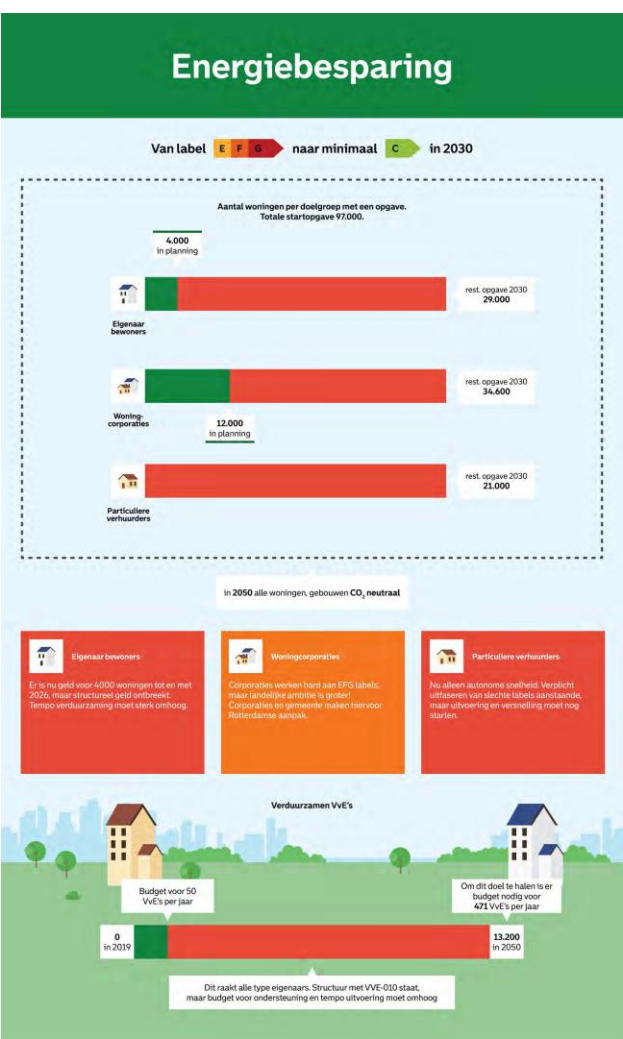
Project overview

Click here for the overview of all projects.

Project overview

Energy saving

The built environment must be climate neutral by 2050. This means a big task for the housing stock. There are 321,500 homes in the city. By 2030, 97,000 homes must be insulated (based on the National Insulation Programme). This large task must be met by three target groups: owner-occupiers (33,000 homes), housing associations (43,000 homes) and private landlords (21,000 homes). The intermediate targets for 2030 are very challenging. In recent years, owner-occupiers and private landlords have taken the first (tentative) steps in the field of energy saving. To meet the 2030 targets, an acceleration by a factor of 10 is necessary. Housing corporations are working hard to save energy and improve at EFG labels, but the national ambition is greater! Corporations and municipality are making a Rotterdam approach for this.



In Rotterdam, there are over 13,200 Associations of Owners (VvE), about a third of Rotterdam's housing stock is in a VvE. This is a special target group, as all the above-mentioned target groups occur within a VvE. This makes taking joint decisions difficult, also because sustainability is not (yet) part of the official tasks of VvEs. This is why the municipality offers targeted help.

What have we already done?

In recent years, the municipality has taken many actions to help the four aforementioned target groups make their homes more sustainable.

Owner-occupiers

The municipality heeh has been working on insulating homes in recent years with small projects such as Save the Homes, Power for your Home and an approach targeting specific areas. Results have been positive, but we need to accelerate to meet our 2030 target.

Private landlords

By private landlords we mean persons or parties who rent at least one dwelling in Rotterdam. The municipality has not yet started any sustainability projects for this target group.

Housing associations

The central government and the municipality impose strict requirements on housing corporations when it comes to making their homes more sustainable. Besides making their properties more sustainable, the housing corporations have many other tasks, such as the availability of affordable housing, new construction and maintenance of homes. A tough task in which every euro must be weighed up.

Owners' associations

VvEs are supported by the municipality in various ways. They can approach the VVE-010 counter for questions, webinars and courses. VvEs with a clear desire for sustainability are offered advice and support. Since 2023, there has been an insulation subsidy for VvEs from energy poverty.

Which projects are still ongoing?

In 2024, the municipality intensifies the approach towards the four target groups.

Owner-occupiers

We continue with area-specific insulation actions, both in areas with natural gas-free plans and beyond. We focus especially on neighbourhoods with many homes with a poor energy label. There will be an extra subsidy from the municipality. We also want to cooperate with residents' initiatives here.

We are organising a city-wide collective insulation campaign. The aim is to get at least 4,000 owner-occupiers to invest in at least one insulation measure.

The council's Energy Counter is being redesigned so that we can help all residents and owners. From people who want to do odd jobs themselves to those who want to be completely unburdened.

Private landlords

In 2023, Rotterdam City Council and a number of private landlords established the Platform Particuliere Verhuurders Rotterdam (PPVR). We are exploring options to accelerate sustainability. We do this by, among other things, mediating between landlords and tenants, providing advice and support for private landlords, and developing communication tools that can be widely used.

Housing associations

Together with housing corporations, we are working to implement performance agreements on insulating their homes. In addition, housing associations and the municipality are working together on an action plan to remove obstacles to sustainability.

Owners' associations

We are going to further develop the VVE-010 advice desk so that we can support VvEs even better with their sustainability plans. Unions that need help in making their buildings more sustainable can come here for answers, information and an advice and support process.

What is left for us to do?

It is clear that there is a lot to be done leading up to 2030 and 2050. Below are the challenges by target group.

Owner-occupiers

Owner-occupiers are not yet required to insulate. That geeh a high degree of non-commitment. Nevertheless, the municipality wants to get this target group moving. To do so, money must be available over a longer period of time, so that we can give them a helping hand on a multiannual basis, per area and for the whole city.

For the area-based approach to energy saving, we only have money for 2023 and 2026. For the following years, we expect money from the state, but that will not be enough for the task ahead. By the way, owner-occupiers have to pay for a large part of the measures themselves.

Private landlords

The central government is working on legislation to gradually ban EFG labels from private landlords. How this will take shape and who will enforce it is still unclear.

Housing associations

The central government and the municipality are placing stringent demands on housing associations when it comes to making their homes more sustainable. Housing associations are struggling with all the tasks, but they say they will meet the 2050 targets.

Owners' associations

The need to relieve the burden on owner-occupiers is high. Good financing opportunities for sustainability are lacking and there is no safety net for residents who cannot afford the extra financial contribution. We are in talks with the government to remove the obstacles.

Project overview

Click here for the overview of all projects.

[Project overview](#)

Project overview

Built environment: Energy saving

Reading guide Table:

1. ETB - Energy Transition Budget - this is a fund that finances the acceleration of the energy transition in Rotterdam focused on projects mainly implemented between 2020-2022.
2. DTB - Sustainability Transition Budget - this is a fund that finances the sustainability transition in Rotterdam focused on projects to accelerate the right innovations in the region, support entrepreneurs, and thus promote earning capacity for the city and employment for Rotterdammers between 2023-2026.
3. RKA - Rotterdam Climate Agreement. These are projects that were started under the Rotterdam Climate Agreement and some are continued from the Rotterdam Climate Boosters.
4. SES - Smart Energy Systems - SES is an existing innovation programme aimed at accelerating and facilitating innovations in the energy transition.
5. ETF-R - Energietransitiefonds Rotterdam - this is a fund for sustainable investments that contribute to reducing CO2 emissions, air quality, reducing the use of primary raw materials and strengthening a 'green' economy in Rotterdam.

What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
ETB	Isolatiesubsidie kleine VvE's	VvE's (met maximaal 7 appartementen) konden subsidie aanvragen voor het isoleren van hun gebouw. Een VvE moest minimaal één gebouwdeel laten isoleren, zoals het dak, de gevel of de begane grondvloeren.	VvE's, met maximaal 7 appartementen, kunnen deze subsidie aanvragen voor het isoleren van hun gebouw. Een VvE hoeft slechts één gebouwdeel laten isoleren. Denk aan het dak, de begane grondvloeren, een gevel of ramen. We stellen eisen aan de isolatiewaarde, de mittelelementen en de isolatiematerialen en er zijn enkele aanvullende eisen voor een gezond binnenmilieu. De VvE krijgt de subsidie vooraf aan het nemen van de maatregelen. De subsidie bedraagt maximaal € 1.500,- per appartement en maximaal € 10.000,- per kleine VvE, tot een maximum van 50% van de kosten. In totaal zit er € 450.000 in de subsidiepot	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Verduurzamingspakketten	Met dit project hebben we een ontzorgingsproces ingericht waarbij Rotterdammers met isolatieplannen van eerste idee tot en met uitvoering geholpen werden.	Project is afgesloten. 136 woningen bereikt 163 maatregelen uitgevoerd. Dit is zonder zonnepanelen (33 woningen).	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Energiemaatregelen en verduurzaming door VVE Netwerk Rotterdam (Klimaatdeel #5)	Het VVE Netwerk Rotterdam opgericht in 2020, wil Verenigingen van Eigenaren met elkaar in contact brengen om van elkaar te leren. Met deze klimaatdeel wordt bevorderd dat Verenigingen van Eigenaren in Rotterdam hun woningcomplexen gaan verduurzamen.	Afgerond. Integraal onderdeel van programma verduurzaming VVE's.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Efficiente en intelligente straatverlichting	De openbare verlichting bestaat in Rotterdam uit 106.900 armaturen (lampen). Deze verlichting verbruikt op jaarbasis 22,7 miljoen kWh. Dit komt overeen met het gemiddelde elektriciteitsverbruik van ruim 9.100 huishoudens. Nu is wordt jaarlijks 6 miljoen kWh elektriciteit bespaard (het elektriciteitsverbruik van ruim 2.400 huishoudens). Als alle openbare verlichting is omgebouwd naar led, inclusief een dimregime, dan wordt ten opzichte van het huidige verbruik circa 30% energie bespaard.	RUGGEDISED project R11. Vervangen straatverlichtings armaturen in heel R'dam door LED ind remote monitoring-sensoren. Inmiddels zijn per juni 2022 zo'n 60.000 armaturen vervangen en wordt daarmee nu 6 miljoen kWh elektriciteit bespaard per jaar, wat overeenkomt met het elektriciteitsverbruik van ruim 2.400 huishoudens. Opname voor komende 3 jaar is om alle 100.000 armaturen vervangen te hebben. Er is een versnelling ingezet omdat deze operatie anders nog 25 tot 30 jaar zou duren. Planning is dat er jaarlijks 15.000 armaturen worden vervangen.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Participatie platform (Klimaatdeel #14)	Doel van het overlegplatform is het stimuleren van de uitvoering van initiatieven op bijvoorbeeld het gebied van verduurzaming, schone energie, circulariteit en werkgelegenheid. Zo worden deze initiatieven kansrijker en wordt de energie Transitie versneld en opgeschaald.	De klimaatdeel is met succes afgerond. Het deze partijen is geprovoceerd over hoe ze betrokken kunnen zijn bij uitvoering van het klimaatbeleid. Als gevolg is er een VvE-platform uit voortgekomen.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Isolatiesubsidie grote VvE's Penderrecht aanvragen	Het project betreft een financiële tegemoetkoming voor VvE's die energiebesparende maatregelen nemen, al dan niet gecombineerd met onderhoudswerkzaamheden. Veel VvE's in Penderrecht zijn niet kaptaalkrachtig en hebben te maken met achterstallig onderhoud. Daarom kiezen we voor een aanpak waarbij zowel het uitvoeren van onderhoudswerkzaamheden als het nemen van duurzame maatregelen worden gestimuleerd. Als een VvE in Penderrecht isolatiemaatregelen laat uitvoeren aan het gebouw, al dan niet gecombineerd met onderhoudswerkzaamheden, kan een deel van deze kosten vergoed worden. Daarnaast begeleiden we de VvE's bij de verduurzaming of onderhoud van hun panden. De regeling voor Penderrecht is maatwerk en wijkt af van de regeling voor VvE's in de rest van Rotterdam. We gaan onderzoeken of de Penderrechtse aanpak meer stimulerend werkt	Subsidieaanvragen konden worden ingediend tot en met 31 oktober 2023. De subsidiabele activiteiten moeten uiterlijk 30 september 2024 zijn gereiseerd en de subsidieregeling vervalt op 30 november 2024. 1 VvE heeft een subsidie aanvraag van €20.000 ingediend. Deze is goedgekeurd en in december 2023 uitbetaald.	Gezien de omvang van de investeringen hebben de VvE's behoefte aan meer voorbereidingstijd in meer vergaderingen met de leden. De besluitvorming om aan de slag te gaan duurt jaren, mede vanwege financiële tekorten. Door de subsidieregeling te vervangen en laagdrempeliger te maken, vinden wij VvE's de gelegenheid geven alsnog een aanvraag te doen. Met deze regeling konden wij de VvE's middels een subsidie tot €20.000 van de totale kosten tegemoet komen. In de praktijk is gebleven dat €20.000 een druppel op een hete plaat is en niet toereikend genoeg als de cruciale onderhoudswerkzaamheden die bij voorkeur opgepakt moeten worden een budget nodig hebben van enkele tonnen tot meer dan een miljoen euro.	gereed	De effecten zijn berekend door de DCMR*

What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
DTB	0% lening verduurzamen VvE's	Een 0% rente lening voor VvE's in de focuswijken stedelijke vernieuwing, zodat bij de aanpak van het verduurzamen van de particuliere woningvoorraad eigenaren in VvE's er voor kiezen om ook verduurzamingsmaatregelen te nemen.	65 leningen (500 woningen)	De leningafzetting is uitgewerkt en gepubliceerd in juli 2023. Bekendmaking loopt via VVE10. Tevens wordt de lening betrokken bij de projecten uit programma aanpak Particuliere voorraad.	2023	De toekomstige effecten worden ingeschat door de DCMR**
ETB	Advies & ondersteuning voor VvE's bij verduurzaming	VvE's worden begeleid bij het maken van een duurzaam Meerjarenonderhoudsplan (MJOP), inclusief de daarvoor benodigde besluitvorming binnen de VvE, marktvraag en financiering. Per jaar nemen 50 VvE's met in totaal circa 1.000 appartementen (20 grote (8 of meer woningen, gemiddeld 30 woningen), 20 kleine (7 of minder woningen) deel aan een advies- en ondersteuningstraject verduurzaming.	50 VvE's (30 grote (8 of meer appartementen) en 20 kleine (7 of minder appartementen)) nemen per jaar deel aan een advies- en ondersteuningstraject verduurzaming (n. 1.000 appartementen). Daadwerkelijke realisatie van verduurzamingsmaatregelen is afhankelijk van positieve besluitvorming hierover door de VvE.	In 2022 is gestart met de begeleiding. Eind 2023 is de laatste VvE gestart met de begeleiding. Daadwerkelijke realisatie van verduurzamings maatregelen is afhankelijk van positieve besluitvorming hierover door de VvE.	2023	De toekomstige effecten worden ingeschat door de DCMR**
ETB	Leenfonds verduurzaming en verbeteren van panden/woningen ETF-G	Het energietransitie leenfonds is een financierings-instrument van de gemeente. Vanaf 2021 zijn de energietransitie leningen die bedoeld zijn voor een pandverduurzaming en -verbetering beschikbaar. Particulieren woninggelegen, VvE's, kleine bedrijven en maatschappelijke organisaties kunnen een lening aanvragen.	Het doel is om de financieringsdrempel voor pandeigenaren te verlagen, doordat bewoners, VvE's (groot en klein) en o.a. kleine bedrijven de mogelijkheid hebben om tegen een relatief lage rentetarief geld te lenen voor het duurzame onderhoud van hun pand.	n.v.t.	2027	De toekomstige effecten worden ingeschat door de DCMR**
DTB	Verduurzaming VvE	VvE's worden begeleid bij het maken van een duurzaam Meerjarenonderhoudsplan (MJOP), inclusief de daarvoor benodigde besluitvorming binnen de VvE, marktvraag en financiering. Per jaar nemen 50 VvE's met in totaal circa 1.000 appartementen (20 grote (8 of meer woningen, gemiddeld 30 woningen), 20 kleine (2 of minder woningen) deel aan een advies- en ondersteuningstraject verduurzaming.	50 VvE's (30 grote en 13 of meer appartementen) en 20 kleine (12 of minder appartementen)) nemen per jaar deel aan een advies- en ondersteuningstraject verduurzaming (n. 1.000 appartementen). Daadwerkelijke realisatie van verduurzamingsmaatregelen is afhankelijk van positieve besluitvorming hierover door de VvE.	n.v.t.	05-06-2026	De toekomstige effecten worden ingeschat door de DCMR**
Overig	Prestatieafspraken corporaties	Samen met de woningcorporaties met woningen in Rotterdam werken aan het verduurzamen van hun woningen. Dit kan zijn door (aardgasvrij) isoleren, zonnepanelen, aanpak op te hoge energietarieven, circulair, adaptatie en -laken. Daarnaast werken woningcorporaties en de gemeente samen aan een actieplan om de laatste voor verduurzaming weg te nemen.	De afspraken zijn te vinden in prestatieafspraken en afsprakenovereenkomsten. De algemeen concrete resultaten op aantal zijn 3.500 woningen met een E, F, G-energie label, 10000 m2 zonnepanelen en 10.000 zonnepanelen op dakken installeren.	n.v.t.	21-12-2025	De toekomstige effecten worden ingeschat door de DCMR**

What else is in the pipeline?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
DTB	Gebiedsgerichte aanpak isolatie (GAI) koopwoningen	We willen als gemeente dat woningen sneller, slimmer en sociaal worden gebouwd. Hiervoor gaan we twee dingen doen: 1. Eigenaren via gebiedsgerichte aanpakken isolatie helpen. In 2023 starten we met drie aanpakken. We willen ongeveer 2.000 woningen bereiken. Als onderdeel van een langetermijn-aanpak waarin we willen dat tot 2030 circa 16.000 eigenaar bewoners hun woningen isoleren. Focus op gebieden die voldoen aan de volgende eisen: - gebieden met woningen met relatief veel slechte energielabels (E, F en G); - gebieden die niet in de nabije toekomst worden aangesloten op het warmtenet - gebieden waar relatief veel kopers wonen met een smalle beurs. 2. Eigenaren in de gebiedsaanpakken en verkenningen aardgasvrij een aanbod doen om hun woning te isoleren. Dit is nodig om alle woningen in Rotterdam voor te bereiden op midden temperatuur of soms lage temperatuur warmte-oplossingen. Daarnaast is isolatie van belang om energie te reduceren. Zo krijgen bewoners meer grip op hun energierekening, kan de warmte voor meer woningen worden gebruikt en zetten we stappen naar toeleveringsketen wonen. Bij de lopende gebiedsaanpakken doen we dit als onderdeel van een aardgasvrij aanpak in de verkenninggebieden is het de eerste stap naar aardgasvrij, omdat er nog geen investeringsbudget is. We willen ongeveer 2000 woningen doen. Als onderdeel hiervan willen we ook een aantal alternatieve/ out-of-the-box isolatiemethodes uitbesteden om de drempel voor eigenaren om te isoleren zo laag mogelijk te maken. Denk aan het beschikbaar stellen van vloerisolatie tegel met het aanleggen van stadsverwarming of door met een vrachtwagen isolatiekorrels een wijk in te rijden en dan spouwmuuren te vullen op verzoek, waarbij we ook het aanvragen van de subsidie ontzorgen.	4000 woningen een isolatiemaatregel, 2000 in drie gebiedsgerichte/collectieve isolatie-aanpakken en 2000 in de isolatieaanpakken in de aardgasvrijgebieden. Start in 2023 met een looptijd van minimaal 12 maanden. Hoeveelheid besparing is afhankelijk van soort en aantal isolatiemaatregelen per woning.	Kwartiermaker is gestart. Financiering beschikbaar voor t/m 2026. Een groot aandachtspunt is dat per (einde) 2026 niet alles stiva't, dus deel van het geld (oud of nieuw) trachten in te zetten voor 2027, zodat komende collegeperiode voortgebouwd kan worden op lopende zaken.	31-12-2026	De toekomstige effecten worden ingeschat door de DCMR**

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Energy poverty

Energy poverty has long been on the municipality's radar as a growing problem. The sharp rise in energy prices - partly due to the war in Ukraine - heeh worsened the situation for many households. TNO research shows that energy poverty has increased in Rotterdam over the past two years. Energy poverty is particularly high in IJsselmonde, Charlois, Delfshaven, Feijenoord and Noord.

The municipality seeks to alleviate energy poverty with a wide range of help on saving, remodelling and changing.

What have we already done?

In recent years, much attention has been paid to saving energy costs, as this directly reduces household bills. The results over 2023 are:

- More than 8,000 households were visited by an energy handyman.
- More than 1,200 low-income Rotterdam households received an energy-efficient appliance through the white goods fund.
- 161 households have been helped with a central heating system that is better balanced with the 'water-side adjustment' project. This results in a reduction in heating costs of 5 to 15% per household.
- Almost 400 flats have already taken advantage of the subsidy scheme for VvEs with a maximum WOZ value of €300,000.

When it comes to insulating or renovating homes, it is mainly the housing corporations that are in charge. About 70% of Rotterdam's energy-poor households live in a housing corporation's house. Therefore, the municipality heeh together with seven housing corporations drew up an agreement to reduce the energy consumption of their tenants. This is done by launching additional projects and accelerating existing ones. This has already helped more than 2,300 households. The municipality heeh earmarked €9 million from state funds for this purpose.

Which projects are still ongoing?

With financial support from the central government, the municipality is continuing its ongoing projects and starting some new initiatives. All projects have been discussed with the municipal council and approved by the college. Here are some targets for 2024:

- Provide support to 17,500 households with an energy handyman in 2024 and 2025. Starting this year, the energy handymen will also perform tasks such as water-side adjustment, hanging curtains, replacing old ventilation boxes and installing soil foil.
- Use an energy poverty crisis fund to finance initiatives by informal organisations that directly address energy poverty.
- Provide support to 17,500 households with an energy handyman in 2024 and 2025. Starting this year, the energy handymen will also perform tasks such as water-side adjustment, hanging curtains, replacing old ventilation boxes and installing soil foil.
- Explore options to re-provide energy-efficient white goods using SPUK funds. The city council will be informed by the end of the first quarter.
- Continuing to offer energy coaching. The current contract runs until the end of April 2024, after which we are working on a new tender to extend the contract.
- Provide support to 75 - 100 Owners' Associations with a subsidy for insulation measures.
- Reach more than 5,000 tenants at housing associations with projects resulting from the covenant for the period from 2023 to 2025.



What is left for us to do?

To tackle energy poverty, we should focus on three tracks: saving, rebuilding and changing.

Until now, the main focus has been on savings. For a sustainable approach to energy poverty, we also need to invest in large-scale insulation of homes of households in energy poverty (remodelling). Here, housing associations are important partners.

Poor housing quality can lead to other problems, such as damp and mould, health problems and social isolation. Sustainable housing and an affordable energy system bring other positive changes besides lower energy costs.

By 2025, government funding for energy poverty will be exhausted. However, the municipality remains committed to fighting energy poverty in the city. After 2025, new budget is needed to ensure that this group is not forgotten. So far, nothing extra has been done for owners of ground-level housing affected by energy poverty. This concerns about 10% of the group of Rotterdammers who experience energy poverty.

Project overview

Click here for the overview of all projects.

Project overview

Project overview

Built environment: Energy poverty

Reading guide Table:

1. ETB - Energy Transition Budget - this is a fund that finances the acceleration of the energy transition in Rotterdam focused on projects mainly implemented between 2020-2022.
2. DTB - Sustainability Transition Budget - this is a fund that finances the sustainability transition in Rotterdam focused on projects to accelerate the right innovations in the region, support entrepreneurs, and thus promote earning capacity for the city and employment for Rotterdammers between 2023-2026.
3. RKA - Rotterdam Climate Agreement. These are projects that were started under the Rotterdam Climate Agreement and some are continued from the Rotterdam Climate Boosters.
4. SES - Smart Energy Systems - SES is an existing innovation programme aimed at accelerating and facilitating innovations in the energy transition.
5. ETF-R - Energietransitiefonds Rotterdam - this is a fund for sustainable investments that contribute to reducing CO2 emissions, air quality, reducing the use of primary raw materials and strengthening a 'green' economy in Rotterdam.

What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Energiearmoede bestrijden door coaching	Uithelen van 32000 Energieboxen aan Rotterdammers die meest gevoelig zijn voor energiearmoede, waarvan 15000 inclusief adviesgesprek of energiekusser.	De uitvoering is volledig conform plan uitgevoerd: 15.000 boxen uitgedeeld op evenementen en 585 keer aan huis coaching.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	ETB: Energiebesparing programma bij particulieren; inzet energiecoaches	Opleiden van energiecoaches.	200 gezinnen gecoacht en 17000 Energieboxen uitgedeeld	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Gebiedsaanpak Pendrecht Energiecoaches	Doel van het project is om de energietransitie laagdrempeliger te maken door de inzet van zogeheten energiecoaches uit de wijk. Naast professionals kunnen energiecoaches ook buurtbewoners zijn die andere buurtbewoners snelle energiebesparingsadviezen geven. Zij worden hiervoor opgeleid.	Diverse werkaanbieden zijn uitgevoerd in de wijk Pendrecht in het kader van bewustwording energiebesparing. Werkaanbieden 2022. 1. Groepsvoortlichting energiebesparing aan 6 laaggroepen (60 personen) en 1 groep Jeminitische vluchtelingen (15 personen). 2. Radiatorfolieactie in 55 woningen gratis materiaal aangebracht. Nog eens 210 personen hierover specifiek voortlichting gegeven. 3. Deur tot deur actie bij 348 adressen een tochtstrip gratis aangeboden, geplaatst en voortlichting over energiebesparing gegeven. 4. Twee-wekelijks sprekkour over energiebesparing gedrag in huiskamer aardgasvrij Pendrecht.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Energievouchers voor huurders	Het project richtte zich op huurders en bood energiebespaarpakketten en energiebespaaradvies aan huishoudens. Voor deze groep is in bestaande landelijke en lokale regelingen weinig aandacht. Doel is naast bewustwording dat huurders kleine energiebesparende maatregelen (ledlampen, radiatorfolie etc.) of energiebespaaradvies toepassen en bewuster omgaan met hun energieverbruik.	Dit budget is besteed aan het bereiken van 2222 huurders met een energiebespaarpakket (zoals LED-lampen, tochtstrips en radiatorfolie). Of een energiebespaaradvies ter waarde van 90 euro. Het budget is ingezet als aanvulling op het budget vanuit de Rijkssoevereïteit via de Regeling Reductie Energiegebruik gezien deze alleen op huiseigenaren gericht was. Het overgrote deel van de huurders koos voor energiebesparende producten. Zij konden via een webshop zelf een bestelling plaatsen en/of zijn benaderd door lokale organisaties (o.a. de Energiebank en taal-/milieucoaches Stichting Pauw in de wijk Bospolder-Tussendijken) die zich inzetten voor energiebesparing i.c.m. tegengaan energiearmoede.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*

What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
Overig	Collectieve energiecoaching	Tijdens bestaande groepsbijeenkomsten krijgen Rotterdammers informatie over energiebesparing en krijgen daarnaast kleine energiebesparende producten mee naar huis.		n.v.t.	31-12-2025	0,1 kton
Overig	Convenant energiearmoede met woningcorporaties	Een aanzienlijk deel van de huurders die getroffen worden door energiearmoede woont in een corporatiewoning. De woningcorporaties en de gemeente spannen zich samen in het energieverbruik van de doelgroep te verminderen.	De gemeente stelt een bedrag van a 9.096.500 Euro uit de SPUK aan de corporaties beschikbaar via een subsidie. Dit bedrag wordt benut om de energielasten van deze huurders te verlagen middels verduurzamingsmaatregelen die de woningcorporaties extra of versnelt uitvoeren.	Sommige corporaties moeten nog voldoen aan het convenant dat zij ondertekend hebben.	31-12-2025	Impact is < 0,1 kton. Zie rapport DCMR voor details**
Overig	Energiekussers	Energiekussers bieden energiebespaaradvies en brengen kleine energiebesparende maatregelen aan bij Rotterdammers die moeite hebben met het betalen van hun energierekening en een inkomen hebben tot maximaal 200% van het sociaal minimum inkomen.	De energiekussers brengt voor gemiddeld €100 aan kleine energiebesparende maatregelen aan en bekijkt per woning welke mix van maatregelen het meeste impact heeft op de energierekening.	n.v.t.	31-01-2024	0,8 kton
Overig	Isolatiesubsidie appartementen tot 300000 euro		Toten met medio 2025 is er een subsidie beschikbaar voor het verduurzamen van VvE's die te maken kunnen hebben met energiearmoede. Deze subsidie regeling is alleen beschikbaar voor VvE's met een gemiddeld de maximale WOZ-waarde van 300.000 euro of lager. Begeleiding van VvE010 is een vereiste. Per maatregel wordt 1000 euro vergoed per appartement, met een maximum van twee maatregelen per appartement.	n.v.t.	31-12-2025	0,1 kton
Overig	Pilot stimuleren overstap elektrisch koken	Bij de energietransitie in de gebouwde omgeving gaat het onder meer over verwarmen, koken en warm tapwater. Door een combinatie van eigen investeringen, subsidie (voor verwarmen en koken) en leningen, willen we de kosten voor de Rotterdammer behapbaar houden. Bewoners zien het meest op tegen de overstap naar elektrisch koken. Veel bewoners hebben weinig financiële ruimte (60% van de woninggetenaren in Pendrecht heeft een laag inkomen). Met deze pilot ontzorgen we en bieden we subsidie aan bewoners in wijken waar er een ambitie is om aardgasvrij te worden.	Doel: 910 huishoudens de overstap laten maken naar elektrisch koken.	Er zijn 364 subsidies verstrekt tot en met eind 2022. Regeling is nog niet afgerond.	Er zijn 563 subsidies verstrekt tot en met eind 2023.	De toekomstige effecten worden ingeschat door de DCMR**

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

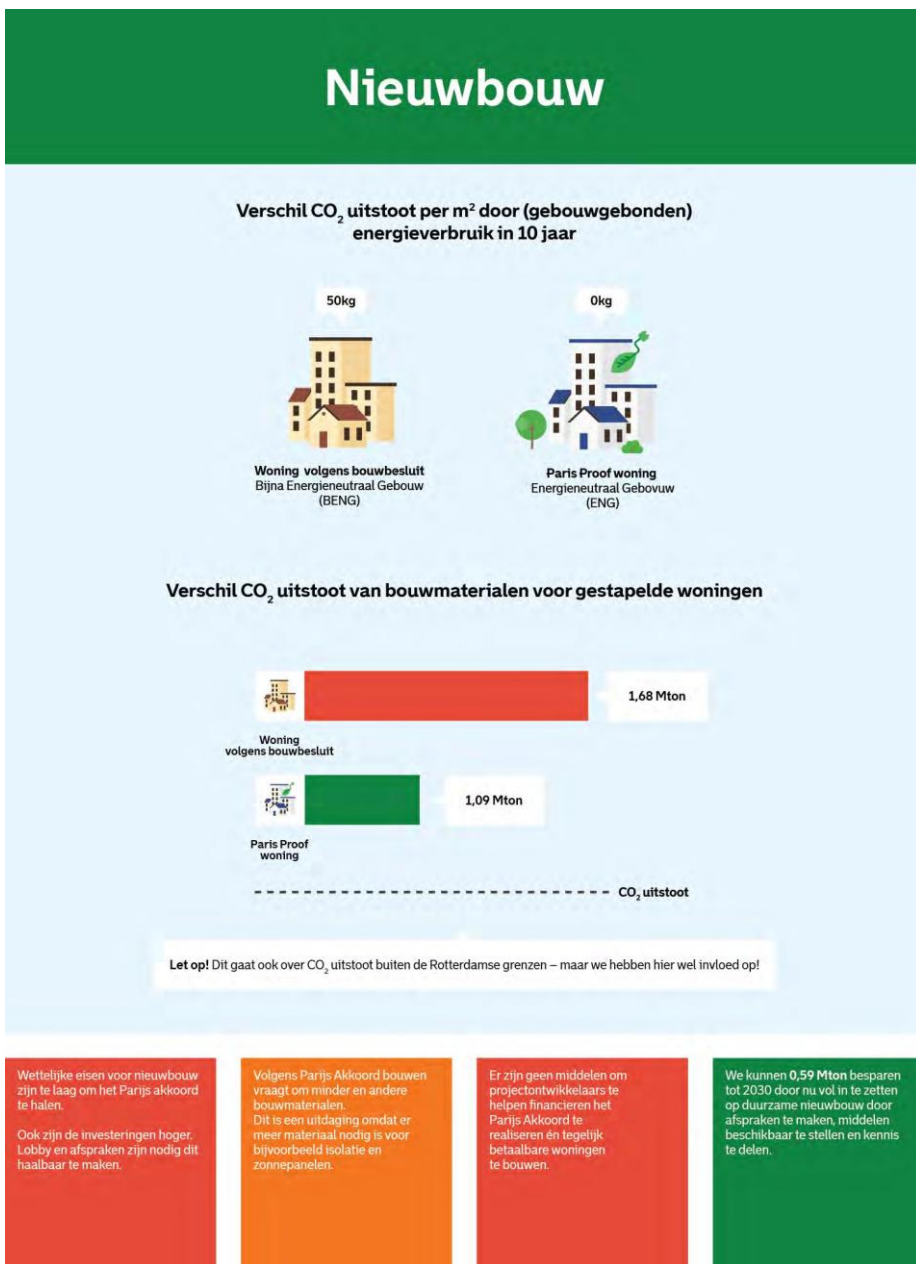
For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

New building

Rotterdam needs to build 55,000 new homes by 2030 to solve the housing shortage. It is vital that these new homes are sustainable and energy-efficient, which is not only comfortable for residents but also beneficial for the climate.

The material use and construction process of the houses 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 metre. To meet the goals of the Paris Agreement, we need to drastically reduce these emissions. For 'Paris-proof' construction, CO₂ emissions would have to be reduced to:

- 200 kg CO₂ per square metre for a single-family house; 220 kg
- CO₂ per square metre for a multi-family house.



If we build the 55,000 homes needed 'Paris-proof', we can reduce CO₂ emissions by 0.59 megatons. As a municipality, we want to build according to the Paris Agreement now, but at the same time this should not slow down the construction task.

What have we already done?

The Sustainable Area Development programme helps developers and project teams put and keep sustainability high on their agenda. For new construction projects, the municipality informs and encourages from the beginning to avoid delays further down the line.

In addition, the municipality heeh developed the Quickscan Sustainability, which gives project teams and developers insight into the municipality's sustainability ambitions. In 2022 and 2023, we supported around 80 new construction projects with tailored advice.

Which projects are still ongoing?

Following the Doorbouwakkoord, we are working together with construction and real estate parties in Rotterdam on a plan of approach 'Sustainable Continuous Building' with the aim of 'Paris-proof' building.

In the coming years, we will discuss opportunities and obstacles in the development process, find solutions together and calculate the CO₂ emissions of projects. We want to prepare for developments such as the EU Taxonomy and emission-free construction.

We have also signed the Clean and Emission-Free Construction Covenant and will work on the use of cleaner machinery and equipment on and around construction sites. At the same time, Rotterdam is exploring the possibility of setting a CO₂ budget per project and we want to experiment with a CO₂ budget at area level.

What is left for us to do?

The municipality will continue to share knowledge and provide advice. It is expected that legal requirements for new building plans in terms of sustainability will be further tightened in the coming years. Nationally, the scope for municipalities to set and require sustainability performance is drastically reduced. As the statutory sustainability requirements are lower than our sustainability ambitions, we need to lobby to retain this space or to help decide how and where this space could be limited, so that Rotterdam can continue to build future-proof and we retain 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 construction costs. Therefore, we are working on a subsidy scheme for initiators of sustainable building developments who could use a helping hand.

Project overview

Click here for the overview of all projects.

Project overview

Project overview

Built environment: New buildings

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What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
Overig	Gemeen telijk vastgoed	Reguliere vervangingsopgave van gemeentelijk vastgoed.	250 gebouwen vervangen of (levensduurverlengend) renoveren tot 2030	Op dit moment is er budget voor de vervangingsopgave volgens actuele wet- en regelgeving met een kleine duurzame plus. Extra financiële ruimte voor echt toekomstbestendig bouwen is afhankelijk van losse budgetten zoals programma's en subsidies.	31-12-2030	10,4 kton
Overig	Nieuwbouw duurzame gebiedsontwikkeling	Met het programma Duurzame Gebiedsontwikkeling helpen we planteam en ontwikkelaars om (bovenwettelijke) Rotterdamse duurzaamheidsambities concreet te maken en mee te nemen in hun projecten. We doen dat door integraal duurzaamheidsadvies bij projecten te geven, instrumenten te ontwikkelen en kennis te delen.	Duurzaamheid wordt vanaf het begin, integraal meegenomen in gebiedsontwikkelingen.	Wettelijke kaders liggen lager dan duurzaamheidsdoelstellingen. Projectontwikkelaars moeten zelf kosten op zich nemen voor bovenwettelijke maatregelen binnen duurzaamheidsdoelstellingen.	31-12-2029	De toekomstige effecten worden ingeschat door de DCMR**
DTB	Subsidieregeling duurzaam bouwen	Voor het realiseren van betaalbare woningen wordt het steeds lastiger om duurzame maatregelen op te nemen gezien de hoge bouwkosten. We zijn bezig met een subsidieregeling voor initiatiefnemers van duurzame gebouwontwikkelingen die een steuntje in de rug goed kunnen gebruiken.	1. Een doorlopende subsidieregeling waarmee duurzaam bouwen gestimuleerd wordt. 2. Tientallen duurzame nieuwbouwprojecten per jaar. Waarbij duurzaamheid integraal wordt meegenomen en het duurzame kwaliteitsniveau ver boven de wettelijke normen ligt. 3. Inzicht op de huidige CO ₂ -prestaties in relatie tot de (gewenste) Paris Proof woningen.	Marktverkenning wordt momenteel uitgevoerd om de meerwaarde van dit instrument te bepalen en vorm te geven.	01-07-2025	De toekomstige effecten worden ingeschat door de DCMR**

* DCMR reports on the CO₂ reduction effect of completed projects in the CO₂ monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

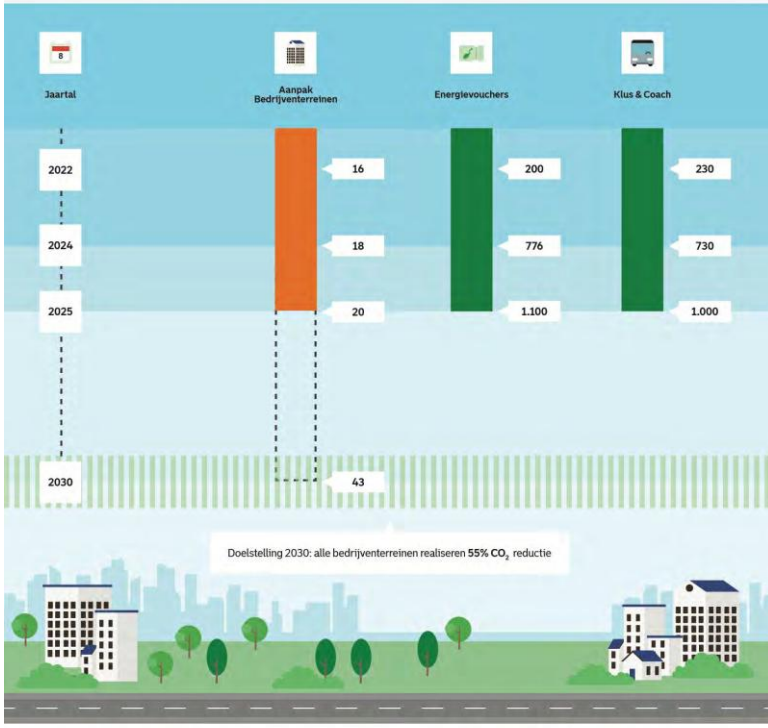
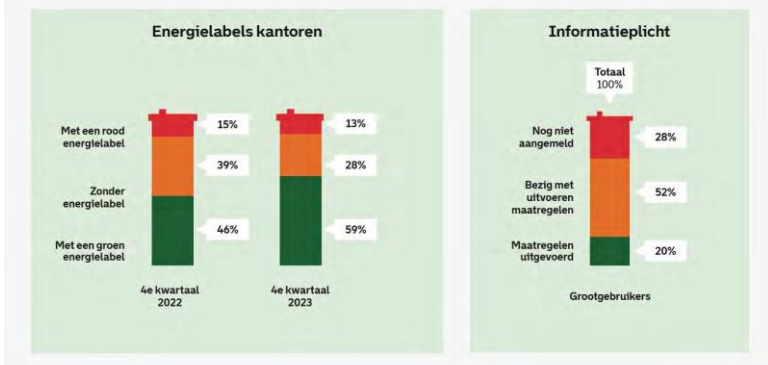
For the most up-to-date reports, see the DCMR website: [Reducing CO₂ emissions | DCMR](#)

SMEs, businesses and offices

Rotterdam heeh about 20,000 SMEs spread across 43 business parks* and 47 shopping areas. To meet the targets for the built environment, the municipality must provide maximum encouragement and support to SMEs in the energy transition. From 2023, offices in the Netherlands must have at least energy label C. According to the national measurement method www.waarstaatjegemeente.nl, the percentage Label C for offices in Rotterdam will increase from 46% to 59% by 2023. Three key measures the municipality is deploying for SMEs are: Aanpak Bedrijventerreinen, Energy Vouchers and Klus & Coach.

*excluding marine and airport sites

MKB, bedrijven en kantoren



Bedrijventerreinen

Bedrijventerreinen zonder ondernemersvereniging zijn moeilijk te activeren.

Energievouchers

Voucher is in 2023 al bijna 876 keer aangevraagd.

Klus & Coach

Ondernemers in de pilot zijn enthousiast en het speelt in op hun behoeften. In 2023 zijn er 500 klus en coach trajecten uitgevoerd

Grootgebruikers

DCMR mist de capaciteit om te handhaven. Personeel vinden is ingewikkeld en opleiden kost tijd.

Entrepreneurs who consume more than 50,000 kilowatt hours of electricity or 25,000 cubic metres of gas must report once every four years what energy-saving measures they are taking. This is the energy saving information obligation. The municipality of Rotterdam has delegated control of this information obligation to the Rijnmond Environmental Department (DCMR). By the beginning of 2023, an estimated 68% of these companies have met the information obligation. A large proportion of these businesses are now implementing energy measures. About 20% of the total number of companies heeh implemented all measures. The DCMR checks the reports submitted and can issue fines.

Enforcement is difficult because the DCMR does not get insight from the grid operator into which companies are wholesale consumers and due to a shortage of well-trained inspectors. The municipality and DCMR are urging the grid operator to share data on wholesale consumers so that DCMR can actively write to them.

If all SMEs that are large consumers fully implement the Environmental Management Act from now on, the estimated savings would be comparable to the annual production of 30 large wind turbines (of 3.5 MW) or 337 hectares of solar fields. So there is still a lot to achieve.

What have we already done?

Based on the coalition agreement, the municipality heeh undertook the following actions until 2023:

- **18 business parks** received support to take collective energy measures through Approach to Business Parks and Office Locations.
- **776 entrepreneurs** received the free Energy Voucher.
- The **Klus & Coach bus trial** has been scaled up and 730 entrepreneurs have had advice and energy measures implemented.
- According to the national measurement www.waarstaatjegemeente.nl, the percentage Label C for offices in Rotterdam will increase from 46% to 59% by 2023.
- Entrepreneurs, who are large consumers according to the Environmental Management Act, we have pointed out the **energy saving and information obligation**. The Central Environmental Management Agency Rijnmond (DCMR) conducts spot checks, mainly targeting companies that have not yet reported.

Which projects are still ongoing?

The ongoing approach Business Parks will be continued to support business associations in the purchase of solar panels and other means of energy saving. Provincial and national subsidies will be used for this, in addition to municipal efforts. By 2025, we aim to have tackled the helh of the 43 business parks.

Until 2024, a total of 1,000 SME entrepreneurs from all over Rotterdam can apply for an energy voucher. Budget is available for this from the Sustainability Transition Budget (DTB).

We are scaling up the neighbourhood-oriented approach Klus & Coach. The Klusbus visits shopping streets and helps entrepreneurs with energy-saving measures. By 2025, we will thus support 1,000 to 1,500 SMEs.

What is left for us to do?

For making buildings without residential use more sustainable, there is no additional legislation or regulation yet - besides the mandatory C label for offices. This will make it difficult to achieve the required CO₂ reductions on business parks before 2030.

With the introduction of the Environment Act, municipalities do have the option to make sustainable infill of company roofs mandatory. This will help speed up the task on business parks.

Project overview

Click here for the overview of all projects.

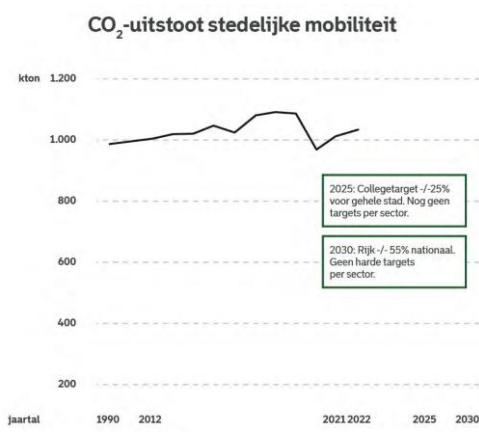
Project overview

Mobility

The coalition agreement is clear on the ambition for mobility. City growth must go hand in hand with improving accessibility, air quality, combating CO₂ emissions and enhancing spatial quality. This calls for considerable efforts and sharp choices, because 30% of CO₂ emissions and 25% of air pollution are caused by mobility. The ambition is for Rotterdam to have an emission-free mobility system by 2040.

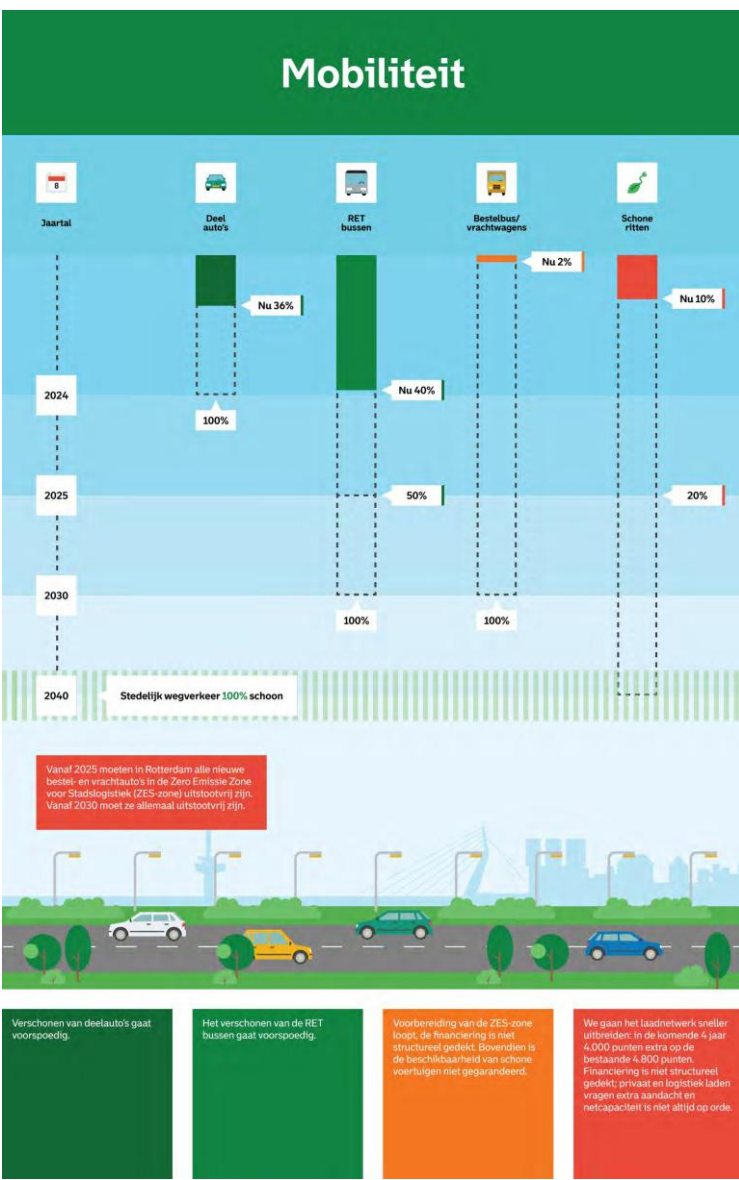
CO₂ in Urban Mobility

For urban mobility, CO₂ emissions have been on the rise compared to 1990 until 2020. This is mainly because Rotterdam has grown in population numbers but also because of economic growth. However, emissions have been declining in recent years and we are seeing more and more electric transport on the road or Rotterdam residents choosing cleaner alternatives such as cycling or public transport.



Making urban mobility emission-free requires three tracks:

- Making the city centre (centre and Oude Westen, Nieuwe Westen, Middelland and Oude Noorden districts) more car-free
- Clean driving and thus electric driving (energy transition) - making motorised traffic emission-free, including mobile equipment, vans and trucks. See infographic below.
- Invest and make public transport more attractive throughout the city, including investing in the quality and quantity of P&R facilities linked to the main urban public transport links.



The role of the municipality

The municipality of Rotterdam plays an important role in promoting clean mobility. It sets rules on vehicle emissions in 2025 and creates more space for pedestrians, cyclists and public transport. The municipality geeh advice and also provides charging stations and clean energy. Cooperation with Rotterdammers and businesses is essential.

Charging infrastructure as a prerequisite

Everyone in Rotterdam should be able to charge easily, where and when they need to. The municipality and the grid operator are working on charging infrastructure with more public charging stations and charging squares.

[Read more](#)

Passenger transport

Developments around the electrification of buses, shared cars and taxis are moving fast. We can only meet the targets if we scale up.

[Read more](#)

Freight transport and logistics

Goods transport is necessary, but also a burden on the city. In the city centre, Rotterdam will introduce a zero-emission zone for all business vans and trucks on 1 January 2025.

[Read more](#)

Other mobility

In 2022, several pilots were carried out to gain experience and encourage the market to use zero-emission mobile equipment. The municipality is working with the Port Authority to develop an approach to reduce harmful emissions from inland navigation.

[Read more](#)

Charging infrastructure as a prerequisite

Everyone in Rotterdam should be able to charge easily, whenever and wherever they need to. The challenge here is to realise the charging infrastructure with as little extra pressure on the city's electricity network as possible. The municipality and the grid operator are working on smart charging infrastructure with more public charging stations and charging squares, plus fast chargers for logistics and taxis. We challenge businesses, homeowners and tenants to join in.



What have we already done?

We keep expanding the public charging network; Rotterdam now has 5,400 public charging points. We also realised a number of smart bi-directional charging squares, fast chargers and a VvE counter, among other things.

Which projects are still ongoing?

For 2025, our goals are:

- 4,000 additional charging points.
- 100 extra points for fast charging.
- 4 extra heavy duty loaders for trucks.
- Advise 500 companies and prepare an area-based approach for all 45 business parks, with charging advice for each site.
- Make plan for charging infrastructure mobile tools.

Funding comes partly from government funds National Agenda Charging Infrastructure (NAL) and partly from DTB. Funding is covered through 2024.

What is left for us to do?

Rotterdam is well on its way, but to stay ahead, acceleration is needed. Central government is driving developments with the NAL and the municipality is also working together in a regional context to speed things up. The realisation of projects ultimately lies with the municipality.

These things need to happen:

- Accelerate construction of sufficient charging infrastructure, add 4,000 charging points in 3 years and a new concession is needed by 2025.
- Realise charging points for logistics in the ZES zone.

Encourage and help private parties (businesses in and around ZES zone, housing associations, landlords and VvEs) to realise more charging points.

- Devise solutions to electricity network tightness by, smart charging and, for example, using temporary storage of electricity to reduce peak loads on the grid.
- Establish robust multi-year budget beyond 2024.

Project overview

Click here for the overview of all projects.

Project overview

Project overview

Mobility: Charging infrastructure as a prerequisite

Reading guide Table:

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What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
DTB	Aanpak logistiek laden	In 2025 wordt de zero emissie zone voor stadslogistiek ingevoerd in Rotterdam met een overgangstermijn tot 2030. Voldoende laadinfrastructuur (voor logistiek) is een randvoorwaarde voor invoering van deze zone. Rotterdam heeft haar strategische visie op dit gebied vastgelegd in de Strategie Laadinfrastructuur 2021- 2030. Als onderdeel van dit strategische beleid is eind 2021 ambtelijk een separate aanpak opgesteld voor de logistieke doelgroep. Hiermee wil Rotterdam belemmeringen voor de realisatie van logistieke laadinfrastructuur wegnemen en de weg vrijmaken voor de transitie naar schone stadslogistiek.	Ontwikkelen en uitvoeren van een aanpak om te voorzien in voldoende private en publieke laadpunten voor de logistieke sector, i.v.m. de komst van de zero emissie zone voor bestel- en vrachtovertuigen. Resultaten: - 4 heavy duty laders - Circa 500 individueel geadviseerde bedrijven	Maatregelen zijn in uitvoering. Financiële dekking t/m 2024	31-12-2025	De toekomstige effecten worden ingeschat door de DCMR**
Overig	Laadvoorzieningen gemeentelijke terreinen	Alle gemeentelijke voertuigen, die elektrisch worden, moeten kunnen opladen. Hiervoor plaatsen we laadpalen en snelladers op de gemeentelijke terreinen. In een aantal gevallen moet de stroomaansluitingen worden uitgebreid.	Het aantal laadpunten volgt de vraag vanuit de verschoning van het eigen wagenpark	Laadpunten worden geplaatst, financiering van uitbreiding stroomaansluitingen is nog niet gedekt.	31-12-2030	Impact is < 0,1 kton. Zie rapport DCMR voor details**
DTB	Privaat laden	Om elektrische rijders die in een VvE of huurwoning wonen en parkeren te helpen met het realiseren van een laadpunt is een VvE-laadloket ingericht. Daarnaast voeren we lobby om de regelgeving voor het aanleggen van laadpunten in VvE's makkelijker te maken en we maken afspraken met woningcorporaties.	Ondersteuning besluitvorming bij VvE's tot aanleg laadpunten, afspraken met woningcorporaties, Rotterdams VVE010 als kennisportaal voor privaat laden	n.v.t.	13-11-2040	De toekomstige effecten worden ingeschat door de DCMR**
ETB; DTB; Overig	Publieke laadinfrastructuur	Plaatsing van publieke laadpalen en snelladers in Rotterdam om te voorzien in de (snelgroeiende) vraag. Voldoende laadinfrastructuur is noodzakelijk om elektrisch te kunnen rijden.	Dit gaan we realiseren: - 2.000 extra laadpalen - een nieuwe concessie - 100 snellaadpunten - Plan van aanpak laadinfra voor mobiele werktuigen en deelmobiliteit	Maatregelen zijn in uitvoering. Financiële dekking t/m 2024	30-12-2040	22 kton
Overig	Reststroom onderzoek RET	Onderzoek naar en aanvraag van vergunning om restvermogen van de metro te benutten voor het laden van elektrische voertuigen.	Pilot wordt in 2023 gestart voor het laden van gemeentelijke voertuigen	n.v.t.	15-11-2024	De toekomstige effecten worden ingeschat door de DCMR**

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Passenger transport

Developments around the electrification of buses, shared cars and taxis are moving fast. This is great, as it is better for the climate and produces a cleaner and quieter city.

Passenger transport on electricity comes through national agreements and tenders

- Electric share cars
- Public transport buses RET (national covenant and MRDH concession); Transport special target groups WMO (part of concession); Taxis (deal with Rotterdam taxi industry on electrification, in line with national covenant. To be included in taxi policy)



What have we already done?

- 36% of shared cars are clean.
- 40% of RET buses are clean.
- 50% of target group transport is clean.

Which projects are still ongoing?

Hellh of passenger traffic in and around the city consists of commuting and other business mileage. That is why the municipality is investing heavily in the Employers' Climate Alliance Sustainable Mobility approach. More than 100 major Rotterdam employers have now joined, representing more than 140,000 employees. They are going for 50% CO2 reduction by travelling less, cycling more, walking, emission-free vehicles and attractive mobility packages for their employees.



What is left for us to do?

We can only meet the targets if we scale up. Studies show where there are still gains to be made in passenger transport:

- Expansion into a more results-oriented employer approach.
- Mobility transition: smart thinking for all modes (bicycle, car, public transport, etc.) is needed to create a pleasant and accessible city stay.

Project overview

Click here for the overview of all projects.

Project overview

Freight transport and logistics

Goods transport is necessary, but also a burden on the city. In the inner city, Rotterdam will introduce a zero-emission zone for all business vans and trucks on 1 January 2025. This heeh the college established in 2020 in the ZES Covenant. The investment comes from state funds (SPUK) and the DTB. Funding is covered through 2024.

What have we already done?

Together with the 72 partners from the ZES Covenant and the Logistiek010 community, Rotterdam is working on introducing the ZES zone. With customised advice and subsidy schemes, we ensure that the zone is feasible for all entrepreneurs, from sole traders to multinationals. So far, 18 new concepts have been realised, such as cargo bikes for entrepreneurs and construction hubs. In September, the draft decision for the ZES zone was published.

Which projects are still ongoing?

To make the zero-emission zone work well, we pay attention to the following points:

- Sufficient availability of electric vehicles; Traffic decision in
- early 2024 to establish the zone; Making space in the city
- for logistics transshipment hubs;
- Cleaning of municipal vans and trucks;

What is left for us to do?

Studies indicate how we can reduce emissions further:

- Regional cooperation to make logistics cleaner;
- Cooperation with the Port Authority for (heavy) freight traffic around the city;
- Extension of the ZES zone to the whole city by 2040.
-

Project overview

Click here for the overview of all projects.

[Project overview](#)

Open review

Project overview

Mobility: Freight transport and logistics

Reading guide Table:

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What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
overig	Stimuleren slimme bouwlogistiek	Met de stimuleringsregeling bouwlogistiek stimuleren we efficiëntere, meer planmatige, en (zo mogelijk) emissievrije (zonder uitstoot van schadelijke stoffen) bouwlogistiek waarbij bouwers minder ritten door de stad maken om de Rotterdamse bouwplaatsen te bevoorraden.	Bouwvrachten in de stad nemen met 19% af.	n.v.t.	gereed	1 kton CO2-reductie (op basis van 950.000 km minder). Naar aanleiding van de emissiefactoren kan hieruit een NOxreductie van 2,6 ton berekend worden en een fijnstofreductie 60 kg. Per jaar.
RKA	Emissievrije beleving van bouwmaterialen (Klimaatdeal #23)	Transport van bouwmaterialen zoals betonstraatstenen vergt zware voertuigen, waarvoor nog geen emissievrije modellen op de markt waren. Een leverancier van bouwmaterialen heeft samen met zijn transporteur het initiatief genomen een emissievrije (= zonder uitstoot van schadelijke stoffen) trailer met trekker aan te schaffen, ten behoeve van de levering van bouwmaterialen voor de gemeente Rotterdam. Doel is het stellen van een voorbeeld, om ook in dit segment de gewenste transitie naar emissievrij binnenstedelijk transport op gang te brengen. Deze pilot is mede door de steun van de rijksoverheid en opdracht van de gemeente haalbaar geworden. De emissievrije beleving is succesvol van start gegaan en daarmee is deze klimaatdeal afgerond.	Pilot emissievrije beleving bouwmaterialen.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Bundeling ophalen bedrijfsafval (Klimaatdeal #24)	Er wordt een "white label" inzamelsysteem ontwikkeld, waarbinnen emissievrije voertuigen rendabel kunnen worden ingezet voor het ophalen van bedrijfsafval. Doel is het duurzamer inzetten van voertuigen die bedrijfsafval inzamelen én het reduceren van het aantal vervoersbewegingen. Deze klimaatdeal loopt gelijk op met de klimaatdeal Emissievrije beleving van bouwmaterialen (Klimaatdeal #23). Daarmee is deze klimaatdeal succesvol afgerond in 2021. Verdere initiatieven op gebied van duurzame logistiek krijgen uitwerking via Logistiek 010.	Zie project "emissievrije beleving van bouwmaterialen".	n.v.t.	gereed	De effecten zijn berekend door de DCMR*



What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
Overig	Slimme en schone bouwlogistiek	Het stimuleren en faciliteren van de bouwsector om de bouwlogistiek efficiënter en uitstootvrij te maken, bijvoorbeeld door inzet van bouw hubs, vervoer over water, prefab, ZE-transport etc.	Het stimuleren en faciliteren van de bouwsector om de bouwlogistiek efficiënter en uitstootvrij te maken, bijvoorbeeld door inzet van bouw hubs, vervoer over water, prefab, ZE-transport etc.	n.v.t.	01-01-2030	Impact is < 0,1 kton. Zie rapport DCMR voor details**
DTB	Slimme logistiek stadshubs en vrachtfietsen	Het stimuleren en faciliteren van de logistieke sector om de logistiek efficiënter te maken, bijvoorbeeld door inzet van logistieke stadshubs en vrachtfietsen.	Het stimuleren en faciliteren van de logistieke sector om de logistiek efficiënter te maken, bijvoorbeeld door inzet van logistieke stadshubs en vrachtfietsen.	n.v.t.	01-01-2030	4 kton
Overig	Stappenplan ZES	Dit meerjarige programma is een samenhangend pakket van stimulerende en regulerende maatregelen om tot efficiënte en uitstootvrije stadslogistiek in Rotterdam te komen. Het belangrijkste onderdeel is de invoering van de zero-emissiezone voor bestel- en vrachtauto's vanaf 2025. Uiterlijk in 2030 mogen er helemaal geen zakelijke bestel- en vrachtauto's met brandstofmotor de ZE-zone in.	Dit meerjarige programma is een samenhangend pakket van stimulerende en regulerende maatregelen om tot efficiënte en uitstootvrije stadslogistiek in Rotterdam te komen. Het belangrijkste onderdeel is de invoering van de zero-emissiezone voor bestel- en vrachtauto's vanaf 2025. Uiterlijk in 2030 mogen er helemaal geen zakelijke bestel- en vrachtauto's met brandstofmotor de ZE-zone in.	n.v.t.	01-02-2030	40 kton
Overig	Verduurzaming gemeentelijk wagenpark	Het gemeentelijk wagenpark dient eind 2030 verduurzaamd te zijn. Dit is noodzakelijk voor het klimaat en de luchtkwaliteit en om blijvend de werkzaamheden in de ZE-zone voor Stadslogistiek te kunnen uitvoeren.	Met het verduurzamen van het eigen wagenpark geeft de gemeente Rotterdam het goede voorbeeld en stimuleert ze de markt voor elektrisch rijden. Kennisdeling is hierbij van groot belang. Dit doet de gemeente Rotterdam in regionaal verband, maar ook breder, zodat de gemeente de markt aan kan zetten tot innovaties van de duurzame (werk)voertuigen. De doelstelling is dat het hele gemeentelijke wagenpark in 2030 uitstootvrij is. Lichte bedrijfsvoertuigen (busjes e.d.) zero emissie in 2025, het zware segment (vrachtwagens e.d.) zero emissie in 2030	n.v.t.	31-12-2030	Totale impact bij verduurzaming gemeentelijk wagenpark is 3 kton

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Other mobility

Several pilots were conducted in 2022 to gain experience and stimulate the market for the use of zero emission mobile tools.

In large framework contracts, among other things, firm efforts have been made to work with zero-emission equipment; in addition, a pilot was carried out in which large equipment was tested. It turns out that there is a lot of savings potential here for CO₂ and pollutant emissions. An approach to changing mobile equipment (such as construction equipment) is being drawn up based on the pilots and a study of the possibilities of relief.



Inland navigation plays a major role in hinterland freight transport. Inland shipping consumes less energy per tonne-kilometre than road transport. On the other hand, CO₂ and pollutant emissions from vessels have decreased only slightly in recent years. Road traffic has halved its emissions compared to 2005.

The municipality is working with the Port Authority on an approach to inland waterway cleaning. There are gains to be made there. In late 2023, a first draft of an inland shipping clean-up plan was presented. This plan will be further developed in 2024, which will include emission labels for inland navigation.

Project overview

[Click here for the overview of all projects.](#)

[Project overview](#)

Project overview

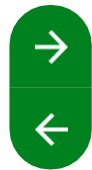
Mobility: Other mobility

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What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Hardt Hyperloop	Het project omvat de ontwikkeling van een Europees Hyperloop Centrum in Rotterdam. Hiervoor zoeken we naar een locatie (in Rotterdam) voor een lange testbaan (3 kilometer), waar op hoge snelheid kan worden getest. Daarnaast omvat het project de ontwikkeling van een experience center waar gewerkt wordt aan standaardisering, customer engagement en verdere ontwikkeling van netwerken. De bijdrage is bestemd voor de planontwikkeling en de doorontwikkeling van de business-case.	In 2022 is Hardt Hyperloop verhuisd naar hun nieuwe kantoor aan de Marconistraat. In november is dit kantoor en daarmee ook het experience center geopend.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*



What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
Overig	Hytrucks		Het creëren van een corridor voor trucks op waterstof tussen Havens van Rotterdam en achterland (Brabant Oost-NL, Duitsland, etc) waarbij we vanuit Rotterdam binnen vijf jaar minimaal 500 trucks op waterstof willen laten rijden en in 2030 zo'n 1000.	n.v.t.	31-12-2030	De toekomstige effecten worden ingeschat door de DCMR**
Overig	Verduurzamen mobiele werktuigen	Verschonen van het bouw materieel zodat niet met vervuilende generatoren gewerkt hoeft te worden.	nog onbekend	n.v.t.	n.v.t.	20 kton

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

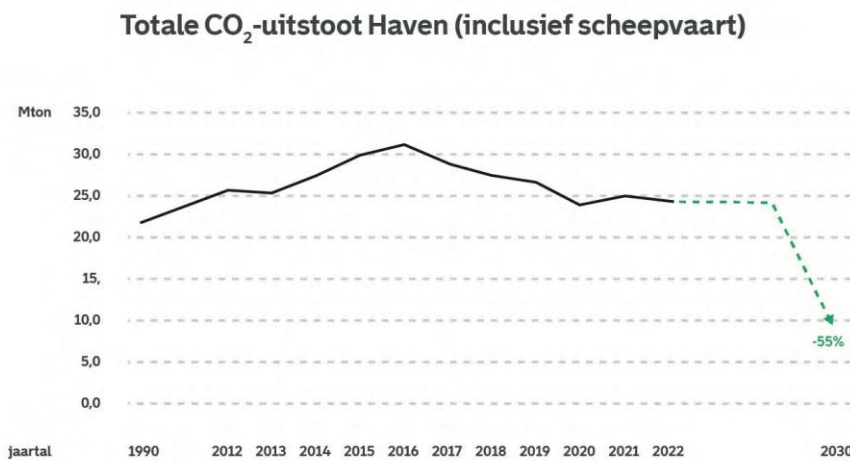
For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Port of the future

Rotterdam's port is one of the world's largest ports and a key driver of the national economy. To maintain its position, it must develop into the sustainable world port of the future. This way, we also retain jobs for Rotterdammers. The port is working towards a 55% CO₂ reduction by 2030 and zero emissions by 2050. By that year, the port industry will also have to be fully circular.

CO₂ in the Port

The port of Rotterdam has grown since 1990 and this is reflected in CO₂ figures. Due to the closure of coal-fired power plants, electrification and energy savings in industry, CO₂ emissions decreased between 2016 and 2020. Since 2020, total emissions have remained about the same. No big decrease is expected for 2023 either. Mainly because coal plants have been allowed to run harder since the international energy crisis.



Achieving all the goals requires major commitment from the major companies in the port, innovations from newcomers, as well as retraining staff and investing in safety. The use of green power and hydrogen is decisive in making the energy system more sustainable. A circular ground and fuel system requires a mix of CO₂, hydrogen, biomass and residual streams.



Investments by companies in the port show that they have confidence in the future. However, accelerating the transition in the port is complex, because in front of the companies and the municipality are many factors over which we have limited control. These include, for instance, nitrogen space, limited space in upstream and downstream areas or the tightness of the labour market.

It is important not to delay decisions on major infrastructure projects, such as the Delta Corridor or the construction of the national hydrogen network. For this, we need the central government and the province. To recruit technical staff, we work together with educational institutions, companies, Deltalinqs and the Port Authority.

The role of the municipality

In the port, the ball is in the court of the big companies and the state. In the port, the central government makes agreements on CO₂ reduction with the big emitters. Together, the State and the municipality are shareholders in the Port Authority. Besides our limited official role, we do our best to bring companies together, promote innovation and improve preconditions, for instance through the Acceleration House.

Making production system more sustainable

Rotterdam port's industrial cluster includes five oil refineries, over 45 chemical companies and five biorefineries. The target for this industry is economy based on green energy, hydrogen and bio-based

Read more

Preserving Energy System

By 2030, the two coal-fired power plants on the Maasvlakte must close. We aim to green power and heat for the port. Energy infrastructure is key to a successful energy transition in the port.

Read more

Making transport system more sustainable

For the port to function, a reliable network of road, rail, waterways and pipelines is crucial. For sustainability, the port is committed to sustainable fuels, electrification, efficiency, and

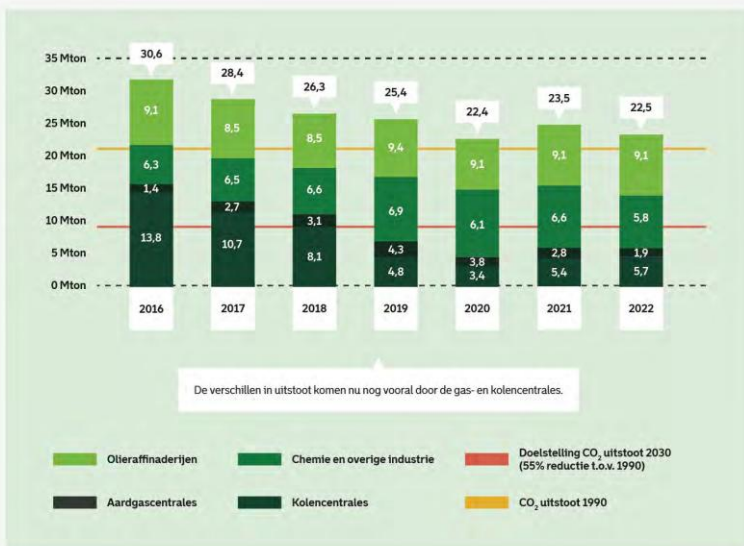
Read more

Making production system more sustainable

Rotterdam port's industrial cluster includes five oil refineries, over 45 chemical companies and five vegetable oil refineries. The target for this industry is a biofuel- and hydrogen-based economy.

55% reduction compared to 1990 means we need to reduce emissions to 9.3 Mton by 2030. From 2025 onwards, we count on the effects of planned and started projects in the port in the field of CO₂ capture and storage and hydrogen. The Port Authority heeh calculated that projects for 13.7 Mton savings have been promised by companies. Many of these projects involve infrastructure. Once the infrastructure is in place, much more reduction is possible. But we are not there yet. In the annual DCMR reckoning, there is a stricter calculation of CO₂ reductions; namely, how much of the potential CO₂ reduction within Rotterdam is assigned "certain", "expected" or "targeted" status. As a result, they arrive at a lower reduction figure of 12.4 Mtonnes.

Haven Industrieel Cluster



Geplande en gestarte projecten	CO ₂ mTon reductie in 2030	Inschatting HBR	Doorrekening DCMR
Energie-efficiëntie		0,5	0,5
CO ₂ opslag (CCS): Porthos		2,5	2,25
CO ₂ opslag (CCS): Aramis		1,7	0
Groene Waterstof: electrolyzers op de Maasvlakte		1,0	0,86
H-Vision: nieuwe blauwe-waterstoffabriek voor verwerking restgassen industrie		1,3	1,76
Elektrificatie Industrie: vermindering gasgebruik door industriële warmtepompen en boilers		1,0	1,0
Uitfaseren Kolen		5,4	6,01
Walstroom		0,3	0
Totaal		13,7	12,4

Veel van de effecten vanwege projectontwikkeling na 2025.

Bron: Havenbedrijf Rotterdam

De projecten in ontwikkeling tellen nu op tot een gecontracteerde CO₂ reductie van 13,7 Mton CO₂ in de Rotterdamse haven (afhankelijk van invulling randvoorwaarden). De potentie bij opschaling is groter, maar nog minder zeker. Waterstofimport kan ook bijdragen aan vergroening van de haven en haar achterland.

De verschillen in uitstoot van de centrales worden vooral beïnvloed door internationale ontwikkelingen (o.a. de oorlog in Oekraïne) en Rijksbeleid. De kolencentrales stoten tot 2024 waarschijnlijk meer uit. Deze uitstoot gaat richting 2030 naar beneden door de opwek van duurzame energie (met name wind op zee).

De industrie verduurzaamt door energiebesparing en elektrificatie van industriële processen. Het behalen van de emissiedoelen voor 2030 valt of staat met het succes van CO₂-opslag en waterstof. Dit zijn projecten met een lange ontwikkeltijd. Daarom worden veel van de emissiereducties pas na 2025 verwacht.

Er zijn verschillende bedreigingen voor de grote projecten. De belangrijkste is de stikstofcrisis, met de huidige Porthos-uitspraak wordt het moeilijker om sleutelprojecten in de energietransitie te ontwikkelen. Verder zijn fysieke ruimte, vergunningenbeleid, ruimte op het elektriciteitsnet en beschikbaarheid van personeel beperkende factoren.



What have we already done?

Reducing CO₂ in large quantities must take place at the big companies and projects. The municipality jumps in when plans and parties need a push in the right direction. Our commitment here focuses on the following roles:

Addressing businesses and helping with bottlenecks

It is the companies in the port that have to make the big difference. From the municipality, we address the companies on their social responsibility and we help the companies with bottlenecks they experience. The emphasis is on the labour market, education, permits and space.

Breaking down barriers with the right parties

The municipality brings together parties around key issues that can remove barriers. Examples: Cluster Table Port & Industry, the Acceleration House, and Permit Pilot and the coalitions around the use of captured CO₂ (CCU) and offshore wind.

Lobbying and international cooperation

To advance greening in the port, we also contribute in lobbying the state and the EU. We do this on specific topics together with other port cities in Europe, such as with Hamburg and Antwerp.

Enabling innovation

The municipality supports and funds innovative projects from the energy and sustainability transition budget and the Rotterdam Energy Transition Fund (ETF-R). This is how we try to accelerate developments around hydrogen, circular raw materials and shore power, for example.

Which projects are still ongoing?

The planned and started projects (the observed CO₂ reductions) add up to 12.4 Mton less CO₂ emissions (excluding maritime shipping), according to DCMR calculations. This does not mean that all projects are guaranteed, certain preconditions will have to be met in order to make the necessary investment decisions. Moreover, there is much more potential to reduce CO₂, but it is also more uncertain. Therefore, we will continue to monitor progress.

What is left for us to do?

Dozens of planned and started projects in the port area add up to the big reduction in CO₂ emissions. But many conditions (money, space, technology) are not yet in place. From the sustainability transition budget, the municipality supports circular projects, hydrogen projects and shore power. However, much more is needed to make it happen. That is why we continue to work to engage companies, help remove barriers, lobby and encourage innovation.

Project overview

Click here for the overview of all projects.

[Project overview](#)

Open review

Project overview

Port: Making production system more sustainable

Reading guide Table:

1. ETB - Energy Transition Budget - this is a fund that finances the acceleration of the energy transition in Rotterdam focused on projects mainly implemented between 2020-2022.
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What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
ETB	Biondoil 1	Verrichten van onderzoek om fossiele grondstoffen te vervangen door gebaseerd op circulaire en hernieuwbare koolstoffen, duurzame gereïterateerde, houtachtige biomassa, diverse biobased chemicaliën en ethanol.	Onderzoek gereed	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Benutten van reststromen, biomassa, CO2 in het Haven en Industrieel Complex (Klimaatdeal #7)	Op termijn zal de industrie in de haven van Rotterdam voor een belangrijk deel zijn gebaseerd op circulaire en hernieuwbare koolstoffen, duurzame biomassa en waterstof. De haven is dan de nationale en internationale hub voor de import, export, distributie en verwerking van reststromen, CO2 en duurzame biomassa. De realisatie van de eerste nieuwe fabrieken en waardecetens, georganiseerd in clusters ter ondersteuning van de grondstoffentransitie, zijn belangrijke bouwstenen op weg naar een circulaire grondstoffen economie. Klimaatdeal loopt door. In het afgelopen jaar is er gezamenlijk ingezet op regionale versnelling van duurzame circulaire projecten middels het zogenaamde HIC-lijst (HIC = Haven Industrieel complex) overleg. De focus ligt op enkele projecten die zich richten op chemische recycling, biograndstoffen en CO2-verwerking	De Zuid-Hollandse biobased propositie is ontwikkeld en kansen voor Biorefining cluster HIC zijn geïdentificeerd. Ook is er een lobby rondom chemische recycling knelpunten ingezet.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Versnellingshuis energietransitie Haven en Industrieel Complex (Klimaatdeal #3)	Het Versnellingshuis ondersteunt bij het vinden van financiering en het wegnemen van barrières in de regelgeving voor het verduurzamen van productieprocessen. Het gaat hier o.a. over waterstof als energiebron, industriële elektrificatie, gebruik van industriële verwarmde en inrichtingen van circulaire processen. Zo zorgen de partners er met elkaar voor dat innovatieve projecten met een investeringsbehoefte van proef naar opschaling worden versneld. In 2022 is het Versnellingshuis intensiever bekend gemaakt bij de bedrijven in het Haven Industrieel complex (HIC). Inmiddels zijn 20 projecten actief geholpen. Het Versnellingshuis blijkt te voorzien in een behoefte en krijgt in de rest van Nederland navolging.	Het versnellingshuis	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Zero Emission Fuels onderzoekstraject	Subsidie aan start up bedrijf ZEF (Zero Emission Fuels BV) voor de financiering van twee studies naar CO2-reductie bij de productie van de brandstof methanol. Traditioneel wordt methanol geproduceerd uit aardgas of synthetisch gas, dat meestal gemaakt wordt door vergassen van steenkool. ZEF wil synthetisch methanol gaan produceren uit atmosferische CO2 en m.b.v. zonnepanelen. Ze werken samen met de TU Delft en TNO aan het productietype maken van het concept.	Project is afgerond. Ontwikkeling van een nieuwe CCS/CCU techniek	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
RKA	Arbeids- en scholingsagenda energietransitie	De Energietransitie is een banenmotor en vraagt om andere vaardigheden, dus aangepaste scholing. Daarnaast zijn vele tienduizenden extra arbeidskrachten nodig om de klimaatdoelen te halen zijn. In deze arbeidsmarktsituatie, waarin nieuwe kansen voor de duurzame economie en werkgelegenheid kan worden verzilverd en een gebrek aan goed geschoold personeel moet worden voorkomen, is dialoog en gezamenlijke inzet van regionale overheid (gemeente en provincie), onderwijs en kennisinstellingen en bedrijfsleven noodzakelijk. De uitvoering hiervan ligt in handen van de organisatie van het Rotterdamse Leerwerkakkoord.	Een actiegerichte 'human capital coalition' met concreet actieprogramma.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Biondoil 2	Biondoil is een privaat initiatief gesteund door partners zoals Shell, Uniper, Fortum, Technip FMC en Chempollis. Het project is erop gericht fossiele grondstoffen te vervangen door biobased chemicaliën. Biondoil produceert op basis van niet-aan-voedsel-gerelateerde, houtachtige biomassa, diverse biobased chemicaliën en ethanol.	Biondoil	n.v.t.	Project is uitgevoerd conform wensen, maar financiële verantwoording heeft wat vertraging opgelopen. Project is in 2023 volledig afgerond.	De effecten zijn berekend door de DCMR*



What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO2 Impact
Overig	CCUS - OCAP project	Levering van reststromen CO2 aan kassen in Westland en de rest van de regio.	Levering van reststromen CO2 aan kassen in Westland en de rest van de regio. 0,5 MT al benut. 0,7 MT is het nog te benutten potentieel	n.v.t.	31-12-2025	De toekomstige effecten worden ingeschat door de DCMR**
Overig	CCUS - Porthos	Ontwikkeling en aanleg van infrastructuur voor transport en opslag van CO2. Belangrijk voor de transitie naar groene waterstof.	Aanleg centrale infrastructuur voor transport en opslag van afgevangen CO2.	n.v.t.	31-12-2025	2.250 kton
ETB & RKA	Fieldlab Industriële Elektrificatie	Het project 'field lab industriële elektrificatie' (FLIE) biedt een proeftuin om kansrijke initiatieven te testen op middelgrote schaal. Zo wordt er ervaring opgedaan en aangetoond dat innovaties ook op (haven)industriële schaal toepasbaar zijn. Het FLIE zal daarnaast vanuit een zogeheten 'competence center', pilootprojecten bij eindgebruikers ondersteunen. De kennis en ervaring die deze pilots opleveren dragen vervolgens weer bij aan implementatie, risicomanagement en passende wet- en regelgeving.	Een fieldlab voor Industriële Elektrificatie	n.v.t.		De toekomstige effecten worden ingeschat door de DCMR**
2. DTB	Waterstofbudget	Opzetten van een breed waterstofcluster in Rotterdam, dat niet alleen bestaat uit grote industriebedrijven maar ook interessant is voor mkb, maakindustrie en startende bedrijven, en aantrekkelijk voor theoretisch en praktisch geschoolde werknemers. Door zelf ook mee te investeren tonen we onze betrokkenheid als gemeente aan, wat andere partijen (zowel privaats als publiek) meer geneigd maakt om mee te investeren.	Bevindt zich in opstartfase. Ondersteuning van 5 tot 10 projecten deze collegeperiode, met een beoogde gemeentelijke bijdrage per project van 150.000 tot 1 miljoen euro.	n.v.t.	31-12-2026	De toekomstige effecten worden ingeschat door de DCMR**

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Making the energy system more sustainable

By 2030, the two coal-fired power plants on the Maasvlakte must close. There are already many wind turbines in the port, and where opportunities arise we would like to see this number grow further. Many power cables from offshore wind farms come ashore in the port.

And this college wants to realise 3.2 km² of solar panels in city and port. We are looking for additional opportunities to generate wind energy in the port area. For the gas power plants, we are investigating whether they can also run on sustainable gases, such as hydrogen.

The amount of renewable energy available in the Netherlands is not enough to meet our own energy needs. Therefore, we will probably also have to import renewable energy, just as we currently do with fossil fuels. Hydrogen, produced using solar and wind energy in other countries, seems to be a promising energy carrier. We hope to welcome the first hydrogen tankers to Rotterdam in 2026. To make all these developments possible, the energy system in the port is undergoing a major overhaul. The use of other energy sources makes other demands on storage and infrastructure. For instance, the electricity grid in Botlek and Europoort has reached its limit. New connections are no longer possible.

Network operators, the state and the province are in charge of solving this problem.

What have we already done?

Energy infrastructure is key to a successful energy transition in the port. Plans for this are laid down in the Cluster Energy Strategy (CES) Rotterdam-Moerdijk. The central government is taking the lead in its realisation through the Multiannual Energy and Climate Investment Programme (MIEK). Of the 14 MIEK projects in the Netherlands, nine are located on Rotterdam territory.

Which projects are still ongoing?

As a municipality, we support the MIEK projects. We also facilitate bringing power cables ashore from offshore wind farms. We also make arrangements to generate solar and wind energy in the port area.

What is left for us to do?

All plans together lead to the desired reduction of CO₂ emissions, but we still need to arrange the optimal framework conditions for their realisation. In particular, nitrogen space, spatial factors and tailor-made subsidies from the state are of great importance.

Project overview

[Click here](#) for the overview of all projects.

Project overview

Port: Preserving Energy System

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What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Waterstof-H-Vision project	Het project H-Vision onderzoekt de haalbaarheid van productie en toepassing van zogeheten blauwe waterstof in het Rotterdamse havengebied. Daarbij gaat het niet alleen om de toepassing van blauwe waterstof in industriële en chemische processen, maar ook om de aanleg van de benodigde waterstofinfrastructuur en de ontwikkeling van de Rotterdamse haven als internationale waterstof-hub voor de productie, invoer en doorvoer van waterstof.	Uitbreiding productiecapaciteit blauwe waterstof t.b.v. elektrificatie industrie	De verdieping en actualisatie van de haalbaarheidsstudie is succesvol afgerond. Betrokken partners hebben het project scherper kunnen afbakenen en een beter inzicht gekregen in mogelijkheden, voorwaarden en dilemma's voor grootschalige productie en toepassing van blauwe waterstof waarmee de industrie in Rotterdam al voor 2030 een substantiële CO ₂ -afname kan bereiken.	2025	2,9 MT als het project gerealiseerd wordt
ETB	Haalbaarheidsstudie stoomintegratie Rotterdam Botlek	Verrichten van een haalbaarheidsonderzoek voor de uitwisseling van stoom.	Onderzoek gereed	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Vervolgonderzoek synthetische brandstoffen	Verrichten van vervolgonderzoek.	Onderzoek gereed	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Asbeter	Project betreft een subsidie aan de onderzoeks- en testfase gericht op de technologische en economische validatie van de verwerking van asbest op industriële schaal. Door deze industriële afvalzuren te hergebruiken ontstaat een proces om asbestcement dakplaten volledig en veilig af te breken. De circulaire invalshoek van Asbeter Acids kan dit op industriële schaal haalbaar en betaalbaar te maken; het circulair hergebruiken van industriële afvalzuren die nu nog worden getoosd.	In 2021 afgerond en vastgesteld.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Phario project	Phario is een initiatief van vijf waterschappen (waaronder Hollandse Delta, hooftkanton: Ridderkerk) en technologieorganisatie Piques. Het heeft als doel om uit biologisch slib van huishoudelijke afvalwaterzuiveringen, afbrekbare bioplastics te produceren. Project betref een subsidie aan het demonstratieproject voor 400-600 kg productie van bioplastics (PHA) uit bioslib, waardoor ander grondstoffengebruik worden vermeden.	De demonstratiefabriek met een capaciteit van 25 kg/dag is op 10 mei 2022 bij HVC te Dordrecht succesvol in bedrijf genomen.	n.v.t.	2022 (dit project is echter een tussenstap in een reeks). De ambitie is om in 2026 een eerste commerciële fabriek te openen op het terrein van een waterschap.	4 kg CO ₂ eq/kg PHA (full-scale: 200.000 t/jr)
ETB	Bleekaarde	Project betreft subsidie voor de bouw van een proef-fabriek voor het hergebruik van 2.000 ton bleekaarde per jaar. Bleekaarde is een speciaal soort koolen (mineraal) waarmee plantaardige oliën worden gezuiverd voordat de oliën verwerkt (geraffineerd) worden.	Proef-fabriek voor het hergebruik van 2.000 ton bleekaarde per jaar. Als de proef succesvol is kan worden opgeschaald naar een fabriek die 20.000 ton kan verwerken (recyclen en/of thermisch verwerken).	Proef-fabriek is uiteindelijk niet gerealiseerd, de business case bleek na initieel onderzoek niet goed genoeg.	gereed	De effecten zijn berekend door de DCMR*

What are we doing?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
Overig	CurRHV (Elektrolyser Vattenfall/Air Liquide)	Elektrolyser: productie van waterstof.	200MW	Nvt - IPCEI status gekregen dus subsidie mogelijk. Dat brengt investeringsbeslissing dichterbij.	31-12-2025	108,6 kton
Overig	Elektrolyser Uniper	Elektrolyser: productie van waterstof.	100MW	Geen IPCEI status gekregen, mogelijke obstakels bij financiering	31-12-2025	54,3 kton
ETB	Energydock	Met dit project dragen we bij aan de realisatie van een docking station op de locatie Waalhaven voor het laden van gecontaineriseerde batterijen voor de binnenvaart.		n.v.t.	01-06-2024	De toekomstige effecten worden ingeschat door de DCMR**
RKA	Grootschalige productie, import en toepassing van waterstof	Het Havenindustrieel complex (HIC) wil de waterstofhub van Europa zijn, waar waterstofimport, -productie en -gebruik op zeer grote, industriële, schaal tot stand komt. Het project H-Vision moet leiden in de productie van blauwe waterstof, uit raffinerijgas en een beetje aardgas. Met grootschalige productie van blauwe waterstof kan de industrie verduurzamen en de waterstofeconomie op gang brengen. Daarnaast zal de productie van groene waterstof worden opgevoerd. Hier zijn meer en grotere electrolyzers voor nodig en een integratie van de aanlanding van elektriciteit van wind op zee. Vanuit het ETB dragen we bij aan H-Vision.	Doorlopend worden zaken opgestart of een stap verder gebracht projecten en infrastructuur. Bedrijven als Air Liquide, Vopak, Shell, BP, ExxonMobil, Gasunie, AirProducts, Eneco, Nouryon/HYCC hebben projecten bekend gemaakt. Ze werken toe naar final investment decisions. Shell is inmiddels gestart met de voorbereidingen voor de bouw (in 2023) van het grootste groene waterstofpark van Europa: Holland Hydrogen op de Maasvlakte.	n.v.t.		De toekomstige effecten worden ingeschat door de DCMR**
Overig	Shell elektrolyser	Elektrolyser: productie van waterstof.	200MW	Investeringsbeslissing is genomen, gaan over tot realisatie		167,6 kton
Overig	stoomuitwisseling stoompijp Botlek	Uitbreiding van het bestaande stoomnetwerk in de Botlek		n.v.t.	31-12-2024	100 kton
Overig	Waterstof: elektrolyser BP/Nouryon	Elektrolyser: productie van waterstof.	Productieopstelling voor groene waterstof van 250 MW	n.v.t.	31-12-2028	135,8 kton
Overig	Elektrolyser Eneco	Elektrolyser: productie van waterstof.	Productieopstelling voor groene waterstof van 800 MW	n.v.t.	31-12-2029	391 kton

What else is in the pipeline?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
DTB	Flex Scans	Op het elektriciteitsnet wordt congestie afgecondigd op het moment dat het net op piekmomenten de maximale belasting bereikt. Buiten deze piekmomenten is vaak nog veel vermogen beschikbaar. Netbeheerders gaan het beschikbare vermogen buiten de pieken ter beschikking stellen, mits bedrijven verzekeren dit vermogen niet tijdens de piekmomenten af te nemen. Bedrijven moeten dus flexibel met hun energievraag omgaan door hun vraag aan te passen aan het lokale aanbod en misschien zelfs energieopslag toe te passen. Flexibel energiegebruik is noodzakelijk, zowel om de energietransitie op gang te houden als om zo efficiënt mogelijk gebruik te maken van het net en congestie te voorkomen of uit te stellen. Dit houdt het tempo in de energietransitie en op deze manier behouden we ruimte op het net voor bijvoorbeeld woningbouw. Daarnaast vraagt dit ook steeds vaker om samenwerking met meerdere bedrijven in een gebied in een zogenaamde Energy Hub. Dit vraagt ook om juridische afspraken en bijbehorende contracten.	Dit project heeft als doel om (groepen van) bedrijven of ondernemersverenigingen middels een subsidie-regeling te ondersteunen om flexibel met de energievraag om te gaan of om een Energy Hub op te zetten. De inzet van de flex scans wordt daarnaast in de uitwerking geïntegreerd in de lopende programma's zoals verduurzamen bedrijventerreinen, de Bedrijventerreinen aanpak voor logistiek laden en Smart Energy Systems. Na afloop van dit project is een significante groep van bedrijven geholpen om het flex potentieel (de mate waarin zij flexibel gebruik kunnen maken van netcapaciteit) van hun bedrijfsvoering in kaart te brengen. Dit advies biedt een concreet handelingsperspectief voor deze bedrijven om flex toe te passen.	n.v.t.	01-01-2025	De toekomstige effecten zijn ingeschat door de DCMR**
Overig	Rotterdamse Energie Databank	Gemeente Rotterdam en Stedin zijn samenwerkingspartners in de energietransitie. Om integraal het energiesysteem te kunnen plannen, moeten we slimmer digitaal samenwerken met één gedeelde waarheid waar we centraal de regie op voeren.	Doel van dit project is om een digitaal samenwerkingsproces op te zetten, met als concrete deliverables (1) datadeels met Stedin op onderwerpen en (2) een viewer: De Rotterdamse Energietransitie Databank (RED). De data onderliggend aan RED kan gebruikt worden voor verschillende gemeentelijke opgaven zoals bijv. onze ruimtelijke opgave om elektriciteitsinfrastructuur in de stad een plek te geven.	n.v.t.	31-07-2024	De toekomstige effecten zijn ingeschat door de DCMR**

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

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Making transport system more sustainable

For the port's competitive position, a reliable network of road, rail, waterways and pipelines is crucial. To make logistics chains more sustainable, the port focuses on sustainable fuels, electrification, efficiency and encouraging the shift to the most efficient forms of transport (modal shih). For shipping, we mainly focus on shore power. Shore power provides docked vessels with electricity, allowing them to turn off their polluting generators. It is currently the best available technology to reduce shipping emissions. It reduces noise, CO₂, nitrogen and particulate emissions. This is important as city and port grow ever closer together.

Ligplaatsen met walstroom

Op te leveren collegeperiode 2022-2026

Doelen uit walstroomstrategie, EU en samenwerking Europese havens: Walstroomvoorzieningen voor cruise in 2024, containerschepen in 2028, ferry's en roll on, roll off in 2030. Gebruik van walstroom >90% voor deze schepen in 2030.

Dit college wil hier een schepje bovenop. En het mede mogelijk maken dat er walstroom is voor containerterminals in 2026 en voor alle schepen in 2030.

Aanleg van walstroom voorzieningen wordt gestimuleerd met subsidies, generatorverboden, wettelijke verplichtingen en nieuwe maatwerksubsidies.

Vanaf 1 januari 2027 wordt een generatorverbod ingesteld voor afmerende cruiseschepen.

Er wordt in internationaal en lokaal verband hard gewerkt aan standaardisatie van de walstroomvoorzieningen aan boord en de stekkers en installaties aan de wal.

Op plekken wordt de aanleg van walstroom bemoeilijkt door onder andere netcongestie, ruimtelijke inpassing maar ook het gebrek aan middelen om de onrendabele top te financieren.

What have we already done?

Shore power for inland vessels is already available throughout Rotterdam. The shore power strategy of the municipality and the Port Authority has triggered the development of shore power for seagoing vessels. With a subsidy from the municipality, shore-based power for Heerema's off-shore vessels has been installed in the Calandkanaal. In 2023, new shore power facilities in Merwe-Vierhavens and in the Waalhaven were commissioned. Besides shore power, projects are also being carried out for alternative fuels and for more efficient transport, for example through automation.

Which projects are still ongoing?

In the Port of Rotterdam, shore power is being realised at Lloydkade, Parkkade and Wilhelminakade (Cruise Terminal). As a municipality, we started a scheme in 2023 in which we finance 80% of a feasibility study. With other ports (Hamburg, Antwerp), we coordinate our actions around shore power so that we strengthen and help each other in this area. Also towards the EU. We also work together with surrounding municipalities.

What is left for us to do?

This college wants to step up its existing ambitions. The municipality is working hard to equip all container terminals with quayside electricity as early as 2026. For container ships, ferries and cruise ships, quayside electricity will be mandatory in Europe from 2030. EU and national subsidies are available for its realisation. We are working together with the Port Authority, the companies and Stedin to also realise shore power for all other ships (including bulk ships and offshore).

Project overview

Click here for the overview of all projects.

[Project overview](#)

Open review

Project overview

Port: Making transport system more sustainable

Reading guide Table:

1. ETB - Energy Transition Budget - this is a fund that finances the acceleration of the energy transition in Rotterdam focused on projects mainly implemented between 2020-2022.
2. DTB - Sustainability Transition Budget - this is a fund that finances the sustainability transition in Rotterdam focused on projects to accelerate the right innovations in the region, support entrepreneurs, and thus promote earning capacity for the city and employment for Rotterdammers between 2023-2026.
3. RKA - Rotterdam Climate Agreement. These are projects that were started under the Rotterdam Climate Agreement and some are continued from the Rotterdam Climate Boosters.
4. SES - Smart Energy Systems - SES is an existing innovation programme aimed at accelerating and facilitating innovations in the energy transition.
5. ETF-R - Energietransitiefonds Rotterdam - this is a fund for sustainable investments that contribute to reducing CO2 emissions, air quality, reducing the use of primary raw materials and strengthening a 'green' economy in Rotterdam.

What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
RKA	Duurzame warmte vanuit de industrie (Klimaatdeal #6)	Een warmtetransportnet in Zuid-Holland moet de basis leggen en onderdeel zijn voor verduurzaming van het energiesysteem, zorgen voor leveringszekerheid en een katalysator vormen voor (lokale) duurzame bronontwikkeling. Partners spannen zich in om belemmeringen weg te nemen in de het tot standkoming van een warmtenet in de provincie Zuid-Holland.	Deze deal is afgerond. Het Warmtebedrijf Rotterdam (WbR) is verkocht aan Vattenfall en voortgang rondom warmtetransport wordt geborgd in het lopende warmtedossier.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
Overige	Hydrocat3	De te realiseren proefinstallatie kan verontreinigde plasticstromen met biomassa omzetten in scheepsbrandstof via hydroprolyse. Dit is een nieuwe technologie.	De labunit voor hydroprolyse en de testen zijn conform plan gerealiseerd.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Walstroombaan Landtong Rozenburg	De zeeschepen van de offshore firma Heerema hebben een vaste ligplaats langs de Landtong in Rozenburg, naast een bestaand windpark van Eneco. Het project omvatte de aanleg van een walstroombaan die de schepen van Heerema voorziet van duurzame elektriciteit geproduceerd door de windmolens. Daarnaast bestaat de mogelijkheid tot de aanleg van een walstroombaan waarmee behalve de schepen van Heerema ook omliggende ligplaatsen over vaste walstroombaan kunnen beschikken.	Realisering walstroombaan.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Walstroombaan Coolhaven en Aelbrechtskade	Walstroombaan voor binnenvaartschepen.	Realisering walstroombaan.	n.v.t.	gereed	De effecten zijn berekend door de DCMR*
ETB	Waterstofsysteem opleidingschip	Subsidie aan het Scheepvaart en Transport College (STC) om haar nieuwe opleidingschip te voorzien van een waterstof brandstofcel om emissieloos te kunnen varen. Voor de binnen- en zeevaart is de toepassing van waterstof één van de belangrijke transitiepaden. Met o.a. dit opleidingschip leidt het STC de komende generaties studenten op voor toekomstig bestendige en duurzame vaartechnieken.	n.v.t.	Subsidie aan het Scheepvaart en Transport College (STC)	Gereed	De effecten zijn berekend door de DCMR*

What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
Overig	Experiënten walstroombaan voor kleine zeeschepen	Het project Walstroombaan voor kleine zeeschepen is een stimuleringsregeling samen met het Havenbedrijf om de ontwikkeling van (mobiele) walstroombaan te stimuleren.	In plaats van op het vaste elektriciteitsnetwerk, experimenteren we met een mobiele unit. Zo kunnen we mogelijk de kosten drukken en walstroombaan versnellen.	n.v.t.	01-01-2024	De toekomstige effecten worden ingeschat door de DCMR**
Overig	Walstroombaan Parkkade Lloydkade	Realiseren van walstroombaan voor kleine zeeschepen bij de Park- en Lloydkade	Havenbedrijf voert uit, gemeente is subsidieverlener.	n.v.t.	31-12-2024	1,3 kton per jaar (maar internationale zeescheepvaart telt niet mee voor de CO ₂ -doelstelling)
Overig	Walstroombaan Wilhelminakade	Walstroombaan installatie bouwen voor Cruiseterminal aan de Wilhelminakade. Geïnitieerd door de gemeenteraad in 2019 en zal worden uitgevoerd door Havenbedrijf. De installatie wordt ingebouwd in monumentaal pand.	Realisering walstroombaan van 10 MW. Er wordt gewerkt aan de omgevingsvergunning, verbouwing van de technische ruimte en plaatsen van de walstroombaan installatie	n.v.t.	31-12-2024	7,3 kton per jaar (maar internationale zeescheepvaart telt niet mee voor de CO ₂ -doelstelling)
Overig	Walstroombaanprogramma	walstroombaanprogramma	Walstroombaan is elektriciteitsvoorziening voor schepen die aangemeerd zijn, zodat ze hun generatoren kunnen uitzetten. Door duurzaam opgewekte elektriciteit te gebruiken in plaats van fossiele scheepsbrandstof vermindert de uitstoot van o.a. CO ₂ , stikstof, fijnstof en geluid. Hier ligt de focus op de walstroombaanprojecten dichtbij bewoond gebied. Dit project is de gemeentelijke inzet voor walstroombaan voor deze collegeperiode	n.v.t.	31-12-2027	internationale zeescheepvaart telt niet mee voor de CO ₂ -doelstelling

* DCMR reports on the CO₂ reduction effect of completed projects in the CO₂ monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO₂ emissions | DCMR](#)

Project overview

Other projects

Reading guide Table:

1. ETB - Energy Transition Budget - this is a fund that finances the acceleration of the energy transition in Rotterdam focused on projects mainly implemented between 2020-2022.
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What have we already done?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Duurzaamheidsloket	Duurzaamheidsloket en actieve informatievoorziening. Dit doel is gerealiseerd met de komst van de website Duurzaam010.nl.	Duurzaamheidsloket	n.v.t.	gereed	De toekomstige effecten worden ingeschat door de DCMR**

What are we working on?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
DTB	Proceskosten DTB	Met het vaststellen van het coalitieakkoord is besloten tot de inrichting van een Duurzaamheids Transitiebudget ter grootte van €100 mln. Om de juiste innovaties in de regio te versnellen, ondernemers te ondersteunen, en zo het verdienvermogen voor de stad en de werkgelegenheid voor Rotterdammers te bevorderen. Het fonds wordt ingezet voor de vergroening van de leefomgeving, duurzame opwek en opslag van zonne- en windenergie, waterstofproductie, de transitie naar een circulaire economie en het reduceren van energieverbruik.	Projecten uit het DTB dienen een bijdrage te leveren aan CO ₂ -reductie nu of in de nabije toekomst inclusief reductie in de CO ₂ -keten.	n.v.t.		De toekomstige effecten worden ingeschat door de DCMR**
Overig	Rotterdams Burgereraad Klimaat	We organiseren een burgereraad over klimaat in Rotterdam omdat: Om de klimaatdoelen van 2030 en 2050 te halen hebben we de wijsheid, kennis en creativiteit van de stad nodig. Met het Rotterdams Burgereraad Klimaat hopen we die te stimuleren en op te halen. De Ommbuizenquête van 2022 laat zien dat 7 op de 10 Rotterdammers zich zorgen maakt over het klimaat. Het klimaat raakt iedereen. Daarom is het belangrijk om Rotterdammers meer te gaan betrekken bij het bedenken en meebeslissen over acties om de klimaatdoelen te gaan halen. Uit het Klimaat Actieplan Rotterdam (KAR) blijkt dat er meer plannen nodig zijn bovenop wat de gemeente nu al doet. De gemeente kan het namelijk niet alleen: er is ook inzet nodig van de bewoners, organisaties en bedrijven in Rotterdam. In het coalitieakkoord 'Een stad' is afgesproken om een burgereraad te organiseren over het thema klimaat.	De doelstelling van het Rotterdams Burgereraad Klimaat is het ophalen van voorstellen die leiden tot het halen van de Rotterdamse klimaatdoelen en ervaring opdoen met een burgereraad. We willen verder bouwen aan de betrokkenheid van de gemeente bij de Rotterdammers en andersom. Het vergroten van het vertrouwen van Rotterdammers in de overheid is niet de doelstelling, maar kan wel bijvangst zijn van het burgereraad.	n.v.t.		De toekomstige effecten worden ingeschat door de DCMR**
DTB	Rotterdamse Klimataanjagers	Met de Aanjagers wordt de doelstelling van het Rotterdams Klimaat Akkoord voortgezet: het verbinden van partners om samen te werken aan de Rotterdamse klimaatdoelstellingen op het gebied van de energie- en grondstoffen transitie. Met het nieuwe programma en aanpak is er een kernachtige structuur opgezet om te versnellen en om concrete projecten mogelijk te maken.	De Rotterdamse Klimataanjagers trekken de stad in om partners en netwerken te activeren en verbinden met de energie- en grondstoffen transitie en zetten concrete projecten neer. Zij consolideren en borgen de netwerken die zijn opgebouwd tijdens het Rotterdams Klimaatakkoord in de periode van 2019-2022. Zodoende pakken de Klimataanjagers door in de netwerken die met het Rotterdams Klimaatakkoord zijn opgebouwd, welke op dit moment betreffen: Zorg, Circulair en Haven & Industrie. Daarnaast vindt een samenwerking plaats door een van de Aanjagers met het Platform Ontwikkeling Rotterdam (POR).	n.v.t.		De toekomstige effecten worden ingeschat door de DCMR**
DTB	Diverse projecten voor het samenvoegen en verduurzamen van woningen: Boergoensehof, Oud-Carnisse fase 1, Jaersveltsstraat e.o. Nachtegaalsstraat e.o.	NPRZ wonen werkt aan gedifferentieerde wijken in Rotterdam zuid. In de projectgebieden is de woningvoorraad ééntonig en minimaal verduurzaamd	Verduurzaamde en samengevoegde woningen die weer worden verkocht. Met de middelen van DTB worden 14 woningen verduurzaamd.	n.v.t.		De toekomstige effecten worden ingeschat door de DCMR**
DTB	DVO Renovatie Putselaan 178	Cultuur&Campus Putselaan is bedoeld als een uniek en vernieuwend instituut in Rotterdam-Zuid, toegankelijk voor studenten, talenten, onderzoekers, culturele makers en de lokale gemeenschap. Het betreft een samenwerkingsverband tussen de gemeente, Hogeschool Rotterdam, Codarts, Willem de Kooning Academie en de Erasmus Universiteit Rotterdam. De verbouwing en verduurzaming van de Putselaan is een belangrijke stap naar het realiseren van de 'grote' Cultuur&Campus: vastgelegd in het coalitieakkoord 2022-2026 – Een Stad.	Renovatie gemeentelijk monument aan de Putselaan 178 met als doel het realiseren van een duurzaam, toegankelijk en veilig gebouw bedoeld voor maatschappelijke doeleinden (ca. 1250 m ² BVO). Daarnaast ambities mbt ecologie/biodiversiteit (tuin) en circulariteit (inbouwpakket).	Co-financiering, NEB-subsidie		De toekomstige effecten worden ingeschat door de DCMR**

What else is in the pipeline?

Soort project/Dekking	Maatregel	Projectomschrijving	Omvang/Resultaat	Randvoorwaarde	Wanneer gereed	CO ₂ Impact
ETB	Energietransitielingen	De gemeente Rotterdam werkt aan de energietransitie om de klimaatdoelen te behalen en tegelijkertijd te bouwen aan een nieuwe duurzame economie. De gemeente heeft in dit kader in 2020 het Rotterdamse Energietransitiefonds (ETF-G) opgericht. In het collegeakkoord 2022-2026 – één Stad- is ook opgenomen dat de gemeente energietransitielingen beschikbaar wil blijven stellen voor Rotterdammers, VvE's, ondernemers, scholen en sportvereniging die hun pand willen verduurzamen	Bijdragen aan het behalen van de lokale klimaatdoelen en stimuleren van de Rotterdamse, duurzame economie.	Om de continuïteit van het fonds te waarborgen is het wenselijk voor een zo lang mogelijke periode financiering te ontvangen voor capaciteit voor uitvoering en beheer.		0,9 kton

* DCMR reports on the CO2 reduction effect of completed projects in the CO2 monitor

** DCMR reports on estimation of future results in report 'Effect Rotterdam Climate Approach'

For the most up-to-date reports, see the DCMR website: [Reducing CO2 emissions | DCMR](#)

Source references

Policy frameworks, policy monitors and laws and regulations

- [Zero emission mobility approach Soil energy](#)
- [plan Centrumgebied Rotterdam Building](#)
- [regulation 2010](#)
- [Covenant ZES - Zero Emission City Logistics Rotterdam Municipal](#)
- [vision sustainable biomass](#)
- Municipal [vision hydrogen port vision](#)
- [High-rise vision 2019](#)
- [Urban Development Framework](#)
- [Guideline on working method for area approaches](#)
- [to natural gas-free Multi-year plan Construction](#)
- [and Housing Supervision 2018-2021 Multi-purpose roof programme](#)
- [New energy for Rotterdam \(Drih report\)](#)
- [Omgevingsvisie](#)
- [Council Agreement Energy Transition](#)
- [Reports - Research010](#)
- [RES 1.0 - Rotterdam-The Hague Regional Energy Strategy Roadmap](#)
- [Next Economy](#)
- [From mess to beautiful, Rotterdam Circular 2019-2023 programme](#)
- [Rotterdam goes green](#)
- [Rotterdam Map of the City - Exploring long-term development opportunities](#)
- [Rotterdam Sustainability Compass](#)
- [Rotterdam Energy System Vision](#)
- [Rotterdam Climate Approach](#)
- [Rotterdam Climate Agreement](#)
- [Rotterdam Heat Transition Vision 1.0 \(2021\)](#)
- [Resilient Rotterdam](#)
- [Rotterdam Adaptation Strategy Clean](#)
- [Energy Strategy](#)
- [State of the city 2020](#)
- [Start plan natural gas-free neighbourhoods](#)
- [Start plan Zero Emission Urban Distribution](#)
- [Start note accelerating wind energy Start](#)
- [note accelerating solar energy Strategy](#)
- [Walstroom Rotterdam Port](#)
- [Trend CO2 emissions & effect Rotterdam climate approach](#)
- [Implementation agenda Biodiversity](#)
- [Energy transition implementation plan](#)
- [2019-2020 Energy transition](#)
- [implementation plan 2020-2022 Story of the city](#)
- [Rotterdam Soil Energy Systems Regulation](#)
- [WANNEER map natural gas-free](#)
- [WAT map natural gas-free \(update June 2021\)](#)



Colophon

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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 goals: That 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 approach. That 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 goals: That 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 approach. That 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 Pilot stimuleren overstap elektrisch koken	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. 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.	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				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 Subsidieregeling duurzaam bouwen	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			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: <ul style="list-style-type: none"> ■ Collaboration with Zero Avia (hydrogen aircraft). ■ RHIA H2 Challenge. ■ Feasibility study hydrogen flying at RTHA. ■ Research into maintenance training for sustainable flying. ■ Tender for self-driving transport 'MARTHA'. ■ Cooperation with SHELL (electric charging). ■ Location determination of SAF pilot plant. ■ Plan exhibition center innovations. ■ 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	<p>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.</p>	<p>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.</p>	<p>The effects have been calculated by the DCMR*</p>
Business	Businesses	Ongoing	MKB Duurzaamheidsvouchers	<p>With this project, we offer SMEs (small and medium-sized enterprises) a helping hand city-wide in making their business premises more sustainable.</p>	<p>Every year, 500 SMEs help make their business more sustainable by means of an energy or roof scan.</p>	<p>2,8 kton**</p>
Business	Businesses	Ongoing	Toekomstbestendig MKB Groeiversnelling	<p>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.</p>	<p>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.</p>	<p>The future effects have been estimated by the DCMR**</p>
Business	Businesses	Ongoing	Kantoorpanden energielabel C	<p>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.</p>	<p>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.</p>	<p>10 kton**</p>
Business	Businesses	Ongoing	Maaskoeling Nieuwe Luxor	<p>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.</p>	<p>Reduction of CO2 emissions of 73 tons per year.</p>	<p>The future effects have been estimated by the DCMR**</p>
Business	Businesses	Ongoing	Toekomstbestendig MKB - Circulair ondernemerschap	<p>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.</p>	<p>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.</p>	<p>Scope 3 effect wordt niet meegenomen in de DCMR berekeningen.</p>
Business	Businesses	Ongoing	Verduurzamen MKB detailhandel en horeca: Energie Klus & Coach aanpak	<p>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.</p>	<p>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.</p>	<p>The future effects have been estimated by the DCMR**</p>

	Ongoing	verduurzamen werklocaties (bedrijventerreinen)	<p>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.</p> <p>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.</p> <p>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.</p>	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	<p>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.</p> <p>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.</p>		The future effects have been estimated by the DCMR**
Circularity	Done	Circular waste valorisation projects	<p>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.</p>	Various feasibility studies have been carried out.	Scope 3 effect is not included in the DCMR calculations.	
Circularity	Done	Selective Plastic Extractie	<p>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.</p>	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)	<p>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.</p>	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, Sportbedrijf 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 km ² of solar will have been realized in parking lots.	Impact is < 0.1 kton. See DCMR report for details**
		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, 0.12km ² 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 km ² / 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 80km ² 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 lokaal elektriciteit	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 CO ₂ emissions and an improvement in air quality and a potential saving of 100 tonnes of CO ₂ 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	Programmatiese aanpak Smart Energy Systems (af ronding 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	Battolyzer Systems is developing the 'Battolyzer', 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, Battolyzer looked at: the required production installations, (cost estimates for) suitable locations and a complete business case. With these results, Battolyzer 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 elektrificeren 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 Ressor 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 vliegwiél	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 Schouwborgplein	The 7SE project aimed to work together on a climate-neutral Schouwborgplein 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***
Mobility	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**

Mobility	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**
Mobility	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**
Mobility	Charging infra	Ongoing	Restroom 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**
Mobility	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**
Mobility	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*
Mobility	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*
Mobility	Freight transport	Done	Emissievrije beleving 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*

Mobility	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.
Mobility	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**
Mobility	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**
Mobility	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**
Mobility	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*
Mobility	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*
Mobility	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*
Mobility	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*

Mobility	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*
Mobility	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*
Mobility	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*
Mobility	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*
Mobility	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*
Mobility	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*
Mobility	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*

					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 effects have been calculated by the DCMR*
Mobility	Passenger transport	Done	Multimodale wijken station hubs (Klimaatdeal #21)		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 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.		The effects have been calculated by the DCMR*
Mobility	Passenger transport	Done	Ondernemerstafel (Klimaatdeal #28)		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 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.		The effects have been calculated by the DCMR*
Mobility	Passenger transport	Done	Stadsbrede deelfiets (Klimaatdeal #33)		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 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.		The effects have been calculated by the DCMR*
Mobility	Passenger transport	Done	Vervoersbank (Klimaatdeal #19)		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 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 effects have been calculated by the DCMR*
Mobility	Passenger transport	Done	Zakelijke deelmobiliteit (Klimaatdeal #29)		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	A hub for business shared mobility	
Mobility	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**
					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**
Mobility	Passenger transport	Initiative	Modal shift naar OV en fiets				

Mobility	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**
Mobility	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.
Mobility	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.
Mobility	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. 9 kton**
Mobility	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%.	1,6 kton**
Mobility	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.	4 kton**
Mobility	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.	3,6 kton**
Mobility	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.	

Mobility	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*
Mobility	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**
Mobility	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**



Impact Climate Action Plan Rotterdam 2024

Assessment of CO2 impact of measures



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Quality test	<i>Initials</i> 	Authorisation	<i>Initials</i> 
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Table of contents

Summary.....	5
1 Introduction.....	7
1.1 Objective	7
1.2 Approach.....	7
1.3 Scopes Greenhouse Gas Protocol	7
1.4 Status of measures	9
1.5 Report format.....	9
2 Total impact of measures	10
2.1 Introduction.....	10
2.2 College target 2025	10
2.3 Target 2030.....	11
3 Impact by sector	14
3.1 Built Environment.....	14
3.2 Mobility	15
3.3 Ports and industry.....	17
3.4 Clean Energy.....	19
3.5 Impact for air.....	20
Annex I. KAR measures by sector	23
I.1 Built environment sector	23
I.2 Sector Mobility	27
I.3 Port & industry sector	29
I.4 Clean energy sector	32

Summary

By implementing the Rotterdam Climate Action Plan (hereafter: KAR), Rotterdam aims to reduce CO₂ emissions in the municipality in such a way that climate goals are achieved. The targets are as follows:

- The college target: in the urban area 25% CO₂ reduction by 2025 compared to 1990.
- The goal for 2030, for the entire municipality a 55% CO₂ reduction compared to 1990.

The KAR consists of measures to achieve these CO₂ targets. They are clustered into four themes: Built Environment, Mobility, Port & Industry and Clean Energy. This report describes 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. Its effect on air quality is also determined.

College 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 ktonnes for the urban area in 2025 compared to current CO₂ emissions (which are 2,816 ktonnes 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 ktonnes. This will meet the college target for 2025 (target value is a maximum of 2,578 ktonnes of CO₂).

Target 2030 city and port

The KAR leads to a reduction in CO₂ emissions by 11,662 ktonnes in 2030 for the total territory of Rotterdam (i.e. incl. port and industry) compared to current emissions (24,905 ktonnes 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 ktonnes). The target value for 2030 is 10,440 ktonnes. The 2030 target is thus not yet achieved with the current KAR package of measures. The residual target for 2030 is 2,803 ktonnes of CO₂. This is less than the 4,449 ktonnes 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 electrolyzers. 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.

Impact for air quality

Implementation of the KAR will reduce NO_x emissions by 2443 tonnes and particulate matter by 75 tonnes. Part of this is due to making Rotterdam's mobility more sustainable: 814 tonnes less NO_x emissions and 43 tonnes less particulate matter emissions. Reductions in road traffic are particularly relevant in the city, as they often take place at a short distance from where people are.

Larger emission reductions at coal-fired power plants and industry have comparatively little effect on urban air quality due to high-altitude dispersion (high chimneys) and distance from the built environment.

1 Introduction

1.1 Objective

CO2 targets Rotterdam

Rotterdam City Council has two targets for CO2:

- The college target for 2025: CO2 reduction in the urban area of at least 25% compared to 1990 emissions.
- By 2030, at least a 55% reduction must be achieved compared to 1990. This concerns Rotterdam's contribution to, and corresponds to, the national target.

Climate Action Plan Rotterdam

The Rotterdam Climate Action Plan (KAR) is a continuation of Rotterdam's earlier climate approach and aims to reduce CO2 emissions in such a way as to achieve both goals. The KAR includes many measures clustered in four themes: Built Environment, Mobility, Port & Industry and Clean Energy.

Purpose report

Rotterdam asked DCMR to assess the measures of the Rotterdam Climate Approach in terms of their CO2 effect. This report therefore aims to provide insight into the effect of implementing the KAR on Rotterdam's CO2 emissions. In addition, it indicates whether the (current) KAR leads to achieving the two CO2 targets mentioned above.

1.2 Approach

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 current situation (2022)¹ and.

Sight years

For determining the impact, the following years are relevant:

- 1990: reference year for CO2 targets
- 2022: current situation
- 2023: Intermediate year/meeting date
- 2024: Intermediate year/meeting date
- 2025: target year for college target
- 2030: target year Rotterdam and the Netherlands

1.3 Scopes Greenhouse Gas Protocol

The Greenhouse Gas Protocol (GHG Protocol) is the international standard for categorising and quantifying greenhouse gas emissions. Different emissions² are distinguished. These are divided into three categories, or scopes:

- Scope 1 concerns 'direct' emissions of CO2. This includes all emissions that occur due to fossil fuel combustion in industry, vehicles or buildings. If this occurs within the municipal boundaries of Rotterdam, the emissions are allocated to Rotterdam. In accordance with the national Climate Agreement, emissions from international shipping and aviation are not included in this calculation. Also the agricultural sector (in Rotterdam this mainly concerns some greenhouse farms in Hoek van Holland) is not included in this report ³.

¹ See CO2 Monitor 2022: <https://www.dcmr.nl/verminderen-co2-uitstoot>

² Only CO2 is considered in this report; the other greenhouse gases (methane, nitrous oxide and fluorinated gases) are not considered.

³ DCMR's CO2 monitor does include emissions from shipping, aviation and agriculture.

- Scope 2 includes the 'indirect' emissions of CO₂ from the use of electricity, steam, heat and cold. The use is then translated into the emissions that were necessary to produce electricity⁴ or heat, for example. Where that production took place is irrelevant.
- Scope 3 emissions are the so-called chain effects. These include all (global) emissions released during production, transport and use of goods in activities by individuals or organisations.

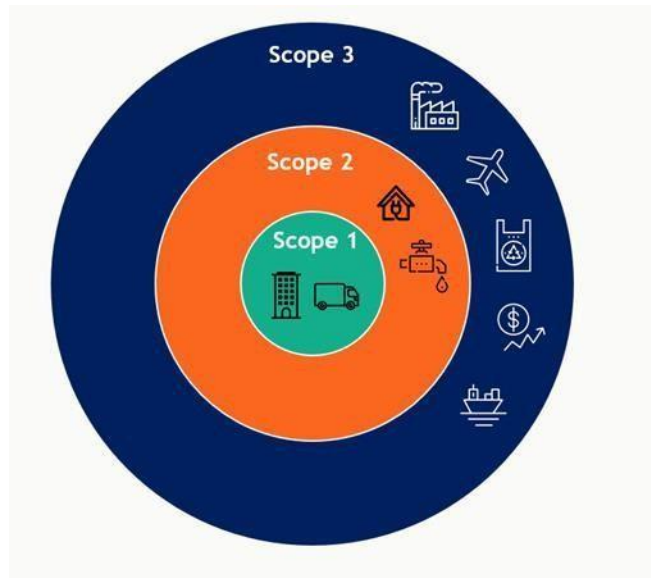


Figure 1. The three scopes of the GHG protocol

Relationship scopes and targets Rotterdam

For the college target (and therefore also for urban emissions in 2023, 2024 and 2025), it is about the sum of scope 1 and scope 2 emissions. This is also known as the user approach. For the 2030 target, only scope 1 emissions are relevant. This is the source approach. It is also used for international calculations. The scope 2 emissions were calculated for 2030 for completeness, but are not relevant for the two climate goals. Scope 3 is not considered further in this report. Incidentally, by far the majority of measures are aimed at reducing scope 1 emissions. If a measure is aimed at a transition to electricity or heat, such as the electrification of vehicles or connecting homes to the heat network, such a measure also has (a negative) effect on scope 2 emissions.

Impact clean energy

For clean energy (wind and solar), there are not so much targets for the CO₂ effects to be achieved as for the total installed capacity. This installed capacity then generates electricity from sun and wind and this translates into avoided CO₂ emissions in scope 1, because less production of 'fossil electricity' was thus required. The installed capacity in Rotterdam contributes to the greening of the national electricity mix.

Electricity and heat emission factors

The emission factor for electricity from the national grid has fallen substantially in recent years and is expected to fall further in the future. It was equal to 0.51 kg CO₂ per

⁴ To determine emissions from electricity use, the national factor of the electricity grid is calculated. This is based on the mix of electricity sources used in a given year or, for future years, on the expected mix of sources. As electricity production becomes more sustainable, this factor is getting smaller.

kWh and decreased to 0.27 kg per kWh by 2022. The Climate and Energy Outlook (KEV) 2022 expects the emission factor to decrease to 0.19 kg per kWh by 2025 and to 0.07 kg per kWh by 2030.

The emission factor for heat is also falling. In 2018, according to Eneco's heat label, 22.3 kg of CO₂ was emitted per GJ delivered, in 2022 it was 17.6 kg per GJ. However, the emission factor for heat is not expected to change much in the future because there are no concrete plans yet among suppliers (some companies in the HIC) to make heat networks more sustainable. Heat from a heat network now provides a CO₂ reduction of almost 70% compared to heat generated with natural gas (central heating boiler).

1.4 Status of measures

DCMR assessed the KAR measures for their impact on CO₂ emissions. These measures were 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 (im)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).

1.5 Report format

This report describes the expected CO₂ effect of all measures. Chapter 2 provides an overall overview of that effect with an assessment against both Rotterdam climate targets. Chapter 3 provides an elaboration per sector, including a description of the sector, the main differences from the previous calculation and the effect of the measures on it. The appendix contains and explains the result of the calculations per theme and per measure.

2 Total impact of measures

2.1 Introduction

This chapter sums up the impact of all measures and tests them against the 2025 and 2030 targets. It also shows the expected emissions for the 'intermediate years' 2023 and 2024. For 2023, this concerns an estimate of the effect of measures that have already been implemented, but for which no figures on that effect are yet available.

2.2 College target 2025

The municipality of Rotterdam has set as a college target a CO₂ reduction in the urban area of at least 25% by 2025 compared to 1990. This is the user approach, which is the sum of scope 1 and scope 2. Scope 1 emissions in the urban environment arise mainly from burning natural gas to heat buildings (residential and non-residential) and fossil fuels (petrol and diesel) from urban traffic. Scope 2 emissions come from district heating for buildings and electricity for buildings, public facilities and urban mobility.

In 1990, emissions were 3,437 ktonnes of CO₂. By 2022 ('current situation')¹ emissions have fallen to 2,816 ktonnes. To meet the college target, emissions in 2025 should be at most (75% of 3,437=) 2,578 ktonnes. That is 240 ktonnes less than current emissions.

Table 1. CO₂ emissions in ktonne and results for the vision years of the college target

CO ₂ emissions [ktonne]	1990	2022	2023	2024	2025	2030
effect built environment scope 1	1.088	763	13	23	35	102
impact built environment scope 2	1.268	914	-1	-2	-5	-20
effect mobility city scope 1	987	1038	127	158	197	419
impact mobility city scope 2	94	101	-11	-12	-15	-16
Total impact KAR city			128	167	213	485
Autonomous reduction due to green gas			2	5	10	92
Autonomous reduction through grid sustainability			85	152	271	677
Remaining emissions City scope 1 + scope 2	3.437	2.816	2.601	2.492	2.323	1.559
college target city 2025 (and -55% in 2030)					2.578	(1.547)

Assessment against college target

The table shows the expected effect of KAR implementation for the 2023, 2024, 2025 and also for 2030 vision years. The autonomous effect of the (national) sustainability of the gas mix and electricity mix adds up. For target year 2025, the calculated effect of the KAR in the urban environment is 213 ktonnes; that of rural developments for gas and electricity together (10+271=) 281 ktonnes. In total, the expected reduction in 2025 is then, after rounding, 493 ktonnes. Current emissions (2,816 ktonnes) will therefore fall to 2,323 ktonnes. This is lower than the college target of 2,578 ktonnes and this therefore seems achievable through implementation of the current KAR package. N.B. By implementing the KAR, scope 1 emissions decrease but there is an increase in scope

2. Such as by connecting homes to the heat grid or switching from fossil to electric vehicles.

For mobility, this concerns only the reductions in the city. The reduction in the port is therefore not considered here. For more details, see 3.2.3.

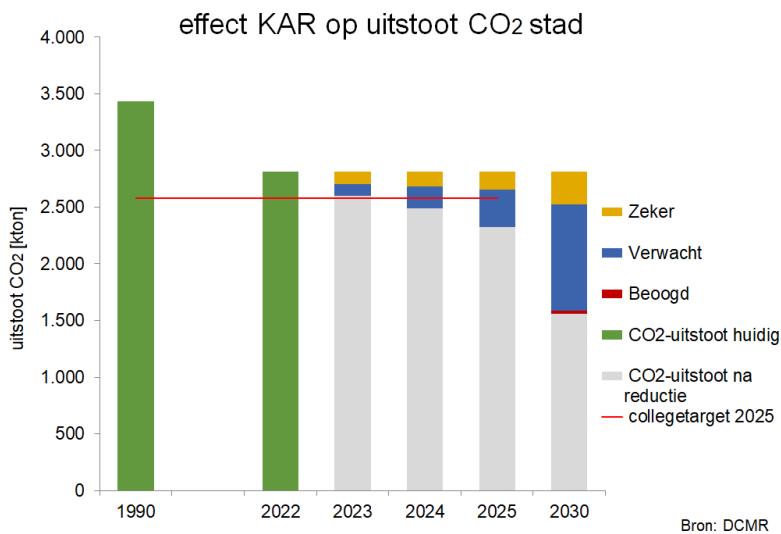


Figure 1. CO2 emissions in kilotonnes by city and results (status of measures) for eight years.

The figure shows the CO2 effect per status of the measures for the intermediate years 2023 and 2024, for target year 2025 and provides a look ahead to 2030. These effects are partly the result of European and national policies, such as the modification of the car fleet based on European standards and the (national) sustainability of the electricity grid. Making the electricity grid more sustainable (status 'expected') will make a major contribution to reducing scope 2 emissions in 2025 and thus to achieving the college target. In 2030, this contribution is further increased. The (nationwide) blending of green gas (also status 'expected') also reduces (scope 1) emissions in 2030. In 2025, this contribution is still limited. The assumption has been that green gas will only be used in the built environment.

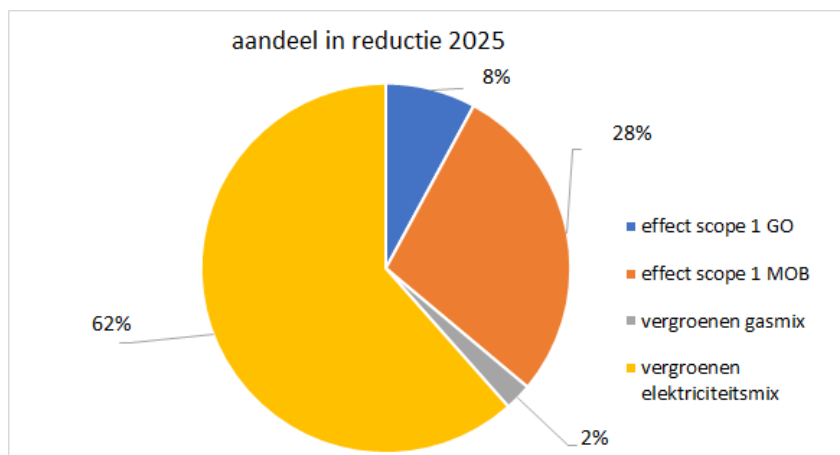


Figure 2. Share by sector of impact for urban emissions in 2025.

All in all, implementation of the KAR ensures a reduction in urban emissions but national policy is important for meeting the college target in 2025.

The figure shows the share of the scope 1 effect of the measures for built environment and mobility for 2025. The (relatively small) negative scope 2 effects have been omitted. For more details, see 3.1.3 and 3.2.3.

2.3 Target 2030

The 2030 target is to achieve at least 55% CO2 reduction compared to 1990. In 1990

emissions were 23,200 ktonnes of CO₂. For scope 1 emissions on Rotterdam territory, this target means maximum emissions of 10,440 ktonnes of CO₂ in 2030.

Current CO₂ emissions refer to the situation in 2022. Because the KAR excludes the international maritime shipping and aviation sectors as well as agriculture, the total figures from the CO₂ monitor¹ have to be corrected for those emissions. Current emissions then become 24,905 ktonnes. As no CO₂ exploration has been carried out for 2030, this is also the emissions assumed for 2030. The reduction task for 2030 is then (24,905 - 10,440 =) 14,465 ktonnes CO₂.

Table 2. CO₂ emissions in ktonne and results for 2025 and target year 2030

Year	1990	2022	Target 2030	Basic path 2030	Up- gift 2030	Impact 2025	Impact 2030	Remaining task 2030
Built environment	1.088	763				35	102	
Green gas						10	92	
Mobility	1.166	1.352				223	489	
Port and industry	13.146	13.214				172	4.971	
Energy sector	7.800	9.577				0	6.008	
Total	23.200	24.905	10.440	24.905	14.465	440	11.662	2.803

With the implementation of the current KAR, supplemented by the greening of the Dutch gas mix, a reduction of 11,662 ktonnes of CO₂ will be achieved in 2030. The (current) target is 14,465 ktonne reduction and so the effect of the current KAR is insufficient to meet the 2030 target. The remaining emissions in 2030 are (24,905 - 11,662 =) 13,243 ktonnes; the remaining target is then 2,803 ktonnes CO₂. The effect of the measures is similar in scope and planning to the effect of the previous calculation, but because current emissions have decreased, the residual task is smaller: last year it was 4,449 ktonnes. The task remains: in order to reach the 2030 target, additional measures are needed or the measures that are now assessed as insufficiently concrete need to be elaborated and implemented. One way to do this is by facilitating and accelerating innovations that can ultimately contribute to meeting the 2030 climate target. The greatest potential is in Port & Industry. See 3.3.3.

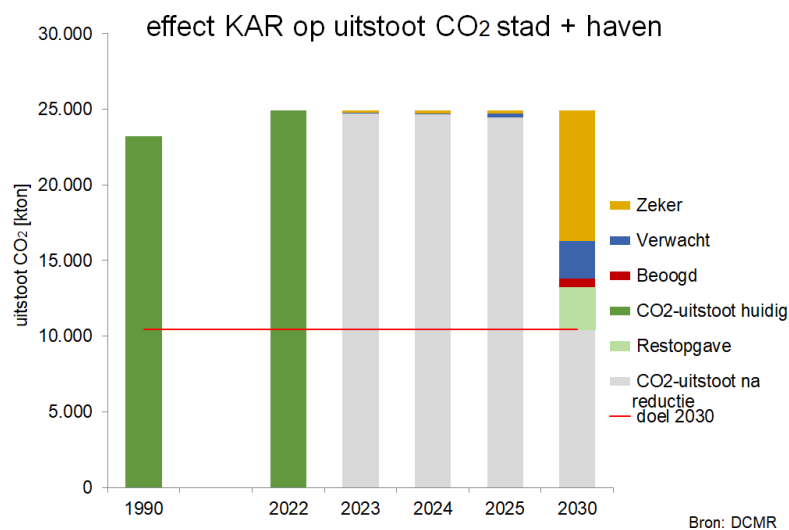


Figure 3. CO₂ emissions in kilotonnes by city and port due to KAR implementation.

Overestimation of impact

The total impact of implementing the current KAR package of measures plus the sustainability

of the national gas mix will result in a reduction of 11,662 ktonnes of CO₂ in 2030. All measures are included, regardless of status (certain, expected or intended). This most likely results in an overestimation of the effect because, especially for intended but also for expected measures, it is not certain whether they will be implemented. For the built environment, measures have a mix of certain, expected or intended status, for mobility and for port & industry it is mostly certain or expected. The energy sector concerns only the closure⁵ of coal-fired power plants (in 2030) and that is a certain measure. Clean energy from wind and sun has no direct effect on scope 1 emissions; it does indirectly, because less fossil electricity generation is needed.

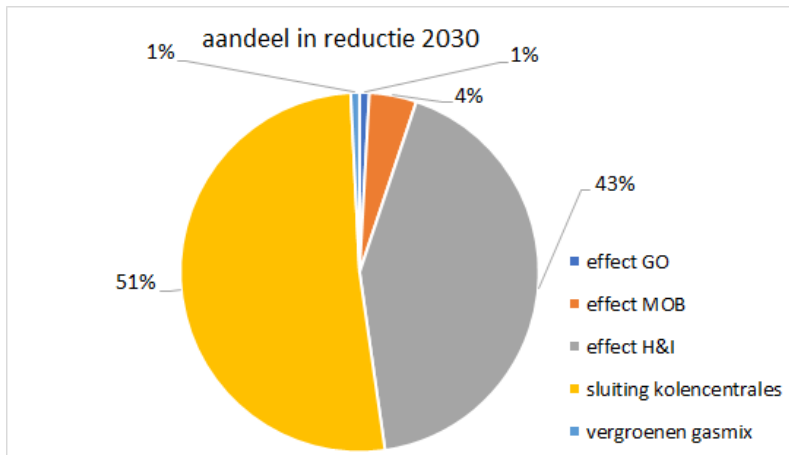


Figure 4. Contribution of sectors to reduction in 2030.

⁵ Strictly speaking, there is no mandatory closure of coal-fired power plants. No more coal may be fired in them in 2030, but they may still be given another function.

3 Impact by sector

3.1 Built Environment

3.1.1 Description sector and measures

The Built Environment sector consists of residential and non-residential construction. Non-residential construction refers to buildings without a residential function, such as hospitals, business premises, offices and schools. Residential buildings are divided into rental and owner-occupied houses. Because we do not consider expected, autonomous developments in the physical living environment⁶ in this report, the new construction task is not included here.

The Built Environment includes measures such as making homes natural gas-free, insulating homes and the renovation of homes by housing associations. Some of these measures are already under implementation. This means that the effects of those measures are already partly 'factored in' to the current figures (up to 2022) that are reported annually in the CO₂ monitor. Because the built environment is part of the urban area and therefore of the college target, the effects for scope 2 have also been determined for all measures.

The following trade-offs and assumptions were used in the calculations:

- Measures related to making buildings natural gas-free require a different form of heating. Heating by district heat has been assumed, unless information has been provided showing another heat source (such as electric heating). For homes, it has been assumed that the induction cooker is used as a substitute technology for gas cooking.
- An improvement of the energy label means in most cases insulation measures and modification of ventilation systems, as these measures have the biggest impact on the label. This predominantly (it could also affect homes with district heating) affects gas consumption and thus scope 1 emissions.
- The installation of solar panels by end users (homes, utilities) ensures that, on balance, less electricity is drawn from the public grid. We calculate for scope 2 reductions with the national electricity mix.
- The measures will be implemented in phases. When calculating the effects in scope 2, the changing electricity mix and heat mix have therefore been taken into account. For the electricity mix in 2025 and 2030, the factors from the 2022 KEV have been retained (no update was given for this in the 2023 KEV); for the heat mix, the data from Eneco's heat label (2022) have been used⁷.
- In the future, the share of fossil sources in the energy mix will decrease. For conservation measures focused on electricity, the CO₂-reducing effect will become smaller in the future.
- The national measure to blend green gas from the KEV⁸ has consequences for the emissions in scope 1 of the Built Environment. Green gas may, arithmetically, be considered emission-free.

3.1.2 Main differences compared to previous calculations

- The reference year (2022, the current situation) has much lower emissions than 2021. In part, this is explained by the climate (in 2022 it was warmer, causing about half of the decrease). Due to the high energy price, many households now set the thermostat lower, which explains the other half. As a result, emissions from homes decreased by 25%. The effect of measures to homes aimed at reducing

⁶ An exception is the number of vehicle kilometres for 2030. This is based on the Rotterdam traffic model to avoid differences with air emissions for the Clean Air Agreement (SLA).

⁷ We calculate scope 2 emissions at 30% compared to natural gas supplied by a central heating boiler. This is already a substantial emission reduction and is expected to remain virtually unchanged towards 2030.

⁸ Green gas blending is discussed in KEV 2021 and the blending obligation in KEV 2022 but has not yet been laid down in legislation. Meanwhile, the increase in green gas appears limited and expectations have been revised downwards

- of gas use is therefore also 25% smaller than in reference year 2021.
- The number of homes going off natural gas is smaller than in the previous calculation. Back then, it concerned 47,000 homes; now there are about 33,000. Some have already been realised, while others will not be (before 2030).
- Another calculation was performed for effects in scope 2. The improvement of the emission factor for national electricity production produces the largest CO₂ effect in scope 2 emissions due to the increase in energy from solar PV and wind.

3.1.3 Impact measures

Table 3. Effect of measures Built environment, CO₂ reduction scope 1 (ktonne)

Status	2023	2024	2025	2030
Sure	11	17	20	30
Expected	2	6	14	39
Intended	0	0	1	33
Total	13	23	35	102

Table 4. Effect of the measures Built environment, CO₂ reduction scope 2 (ktonne)

Status	2023	2024	2025	2030
Sure	-1	-2	-2	-2
Expected	0	-1	-2	-7
Intended	0	0	0	-10
Total	-1	-2	-5	-20

The national measures "greening electricity mix" and "blending green gas" deliver large CO₂ reductions by 2030. These measures fall under the category of expected. The measure "off the gas" provides a CO₂ reduction in scope 1. This is offset by an increase in district heating (scope 2). The share of sustainable heat in district heating may increase over time if the share of residual heat from industry increases and requires less use of fossil fuels. As there are no concrete plans from heat companies to make heat production more sustainable, we assume that the emission factor for heat will remain the same until 2030.

3.2 Mobility

3.2.1 Description of theme and measures

Mobility concerns road traffic (people and freight) but also includes mobile machinery, rail transport and inland waterway transport within the municipal boundaries of Rotterdam. Mobile machinery also covers the part in the port. Sea shipping and aviation are not included².

The following trade-offs and assumptions were used in the calculations:

- The national government has not updated the national emission factors for different types of vehicles and road types since 2018. Updated CO₂ emission factors are expected during 2024. These outdated factors were used to determine the current emissions (2022), which are therefore too high. In the case of measures related to fleet renewal, an estimate has therefore been made of the effect already realised that has not yet 'landed' in the current emissions. This has been added to the expected effect in 2023 and subsequent years. This thus provides an overestimate of the actual effect but, on balance, gives a good indication of the remaining emissions.
- A distinction was made between the impact of mobility measures in the city and in the port area. In the port, it concerns (European and national) measures for heavy road traffic and part of the effect for mobile machinery. This part of the effect of the KAR does not count towards the college target.

- Not only Rotterdam, but also national and European measures affect emissions. This creates double counting. This has been corrected for, although the dividing line is sometimes difficult to determine. A second form of double counting occurs when one measure replaces another: e.g. the effect of blending biofuels decreases with increasing electrification. Likewise, volume measures (e.g. modal shift) take away some of the other effects. These interactions have been estimated, partly based on earlier studies for Rotterdam.
- Measure effects are mostly taken from previous reports, but where relevant they are based on the most recent 2030 prognosis of the traffic model of the Metropoolregio Rotterdam Den Haag (V-MRDH, version 2.10) used by the municipality of Rotterdam. Some measures have been given a higher status. The calculations were carried out for the year 2030 and for the intermediate years. If a phasing was missing, linear interpolation was applied for the period in which the measure is planned.
- The measure effects have only been determined for the Rotterdam area or part of it (such as for the ZE zone). The overall effect will often extend beyond that. For example, traffic wanting to enter the Rotterdam ZE zone for goods traffic will often also drive outside that zone, and the employer approach will not only affect employees living within the municipal boundaries.
- Because part of the mobility is part of the urban area and therefore important for the college target, the effect for scope 2 was also determined for that part of the measures.
- For measures where fossil vehicles are replaced by electric vehicles, the following calculation has been used. For example, for passenger mobility, the average emissions of a petrol car is 0.204 kg CO₂/km, for a comparable electric car on the average power mix 0.069 kg/CO₂/km. So for 2025, about a third ($69/204 = 33.8\%$) of the electrification gain is included as a negative scope 2 effect.
- For some initiatives, only green power is claimed to be used. If a party claims more green power in its calculations, the mix for the other power users will become more unfavourable. On balance, this will therefore not change CO₂ emissions. We therefore use the national mix (emission factor) of the electricity grid for all measures. This factor decreases annually.

3.2.2 Main differences compared to previous calculations

- The package of measures from Mobility is largely the same as last year. However, the status for a number of measures has moved to expected or certain. There are differences at measure level, but the overall effect does not appear to have changed significantly.
- The effect of modal split was redetermined based on updated traffic figures and new insights into the effect on car and public transport use. This effect was derived by determining the difference in travelled kilometres of the scenarios WLO High 2030 and Urban Reference 2030 in Rotterdam in the above-mentioned V-MRDH 2.10 traffic model.
- The impact of electrification of mobile tools has been adjusted based on discussions with experts, including those from the municipality.
- The effect of the ZE zone has been revised downwards following a study carried out in summer 2023 by DCMR in close cooperation with Rotterdam.

3.2.3 Impact measures

Table 5. CO₂ reduction through effect of measures Mobility, scope 1 (ktonne)

Status	2023	2024	2025	2030
Sure	129	150	177	341
Expected	15	29	46	148
Intended	0	0	0	0
Total	144	179	223	489

As mentioned at the beginning of this section, the figures in this table include a

overestimate for the impact of road traffic shifting.

For the college target, only the effects for urban traffic are concerned. The figures in Table 5 and Table 6 also include the CO₂ effects of measures for heavy goods traffic and mobile machinery at the port. Therefore, the figures reported here are not the same as those in Table 1. For 2025, the effect in the port is 26 ktonnes, in 2030 it is 70 ktonnes.

Table 6. CO₂ effect of measures Mobility, CO₂ reduction scope 2 (ktonne)

Status	2023	2024	2025	2030
Sure	-8	-9	-10	-11
Expected	-3	-5	-7	-9
Intended	0	0	0	0
Total	-11	-13	-17	-20

3.3 Ports and industry

3.3.1 Description sector and measures

The Port and Industry sector comprises business activities in the port of Rotterdam. It includes chemicals, waste processing and refineries, among others. Shore power facilities for marine shipping are also classified under this sector. Transport in the port is classified under the Mobility sector. Sea shipping is outside the scope of the KAR. The energy sector falls under the Clean Energy sector.

The Ports and Industry sector has measures in the following categories, among others:

- Electrolysers at various industrial companies;
- CO₂ capture and storage (CCS) - Porthos;
- Hydrogen plants with CO₂ capture - H-Vision;
- Steam exchange - steam pipe Botlek;
- Electrification industry - electrode boilers and heat pumps instead of natural gas;
- Shore power facilities

3.3.2 Main differences from previous calculations

The main changes from the previous calculations are that a number of projects are closer to realisation and more information about the measures is available:

- The number of electrolyzers and installed capacity has increased: about 1,500 MW of capacity is now planned compared to about 600 MW in the earlier calculations;
- Porthos may be realised and given all the steps now taken towards implementation, the status can go to certain;
- There is more information on project Aramis. The EIA report shows that CO₂ can be supplied by ships from outside Rotterdam as well as by land pipeline from Porthos. A storage terminal will be built to temporarily store CO₂ brought in by ship. Porthos' land pipeline still has sufficient spare capacity to transport CO₂ from companies in and around Rotterdam. New compressors and a new sea pipeline and storage reservoirs under the seabed from Shell and TotalEnergies will be used to dispose of the supplied CO₂. From the terminal, CO₂ can also be transported by sea vessels to locations in or outside the Netherlands. One of the suppliers to Aramis is H-Vision.
- H-Vision is now a concrete project planned at BP. Due to the submission of a permit application and other steps towards realisation such as more clarity on Aramis and availability of storage capacity, the status has been changed to expected;
- A grant has been provided by both South Holland and Rotterdam for the expansion of the Botlek steam pipe. This brings the project much closer to realisation and the status goes to expected;
- Electrification through electrode boilers and heat pumps. The permit applications

in industry in Rotterdam mainly concern small initiatives (boilers up to 20 MW). This is also evident from SDE++ subsidy applications. Substantial upscaling towards 2030 is needed to achieve a CO2 effect of 1,000 kt expected by HbR. This also depends on the availability of renewable energy and sufficient electricity grid capacity. DCMR does see concrete plans to improve that capacity but it is unclear whether this will lead to reductions before 2030. It is therefore seen as potential for now.

- Shore power facilities have been or are being realised. Only shore-based power for inland navigation counts for CO2 reduction. Shore power for marine shipping (including cruise ships and container ships) counts as international shipping and therefore does not count. However, the electricity use (scope 2) due to the use of shore power for cruise ships does count towards the emissions from the built environment.
- Rotterdam sees a potential for energy saving by industry of 500 ktonne CO2 reduction in 2030. The introduction of the energy research obligation in 2023, which required large energy users (including ETS companies) to submit an energy-saving plan by 1 December 2023, among other things, provides more insight into this potential. The first studies have now been assessed. However, it is currently not clear which measures will be taken in the coming years and therefore a good estimate of the CO2 reduction to be realised is not possible.
- From the Cluster Energy Strategy⁹, we see import and application of hydrogen as (one of) the main opportunities to reduce CO2 emissions. If 10 to 20 per cent of the imported hydrogen could be used in Rotterdam, the potential is potentially 0.5 to 2 Mton. Due to major uncertainties about what exactly the plans entail and where the hydrogen will be deployed (mainly outside Rotterdam?), we cannot yet attribute CO2 reductions to this.

3.3.3 Impact measures

For Port and Industry, with the exception of shore power, only scope 1 impacts have been determined. However, there are also impacts on scope 2 emissions in the port. In particular, electrolysers and electrification of industrial projects increase electricity consumption and have an impact on infrastructure (electricity grids). If there is not a sufficient supply of offshore wind, these projects will lead to an increase in scope 2 emissions. The calculation of scope 1 effects assumes that the number of full-load hours of electrolysers will be aligned with the supply of wind energy.

Table 7. Effect of measures Port and industry, CO2 reduction Scope 1 (ktonne)

Status	2023	2024	2025	2030
Sure	0	4	4	2.254
Expected	0	0	168	2.191
Intended	0	0	0	527
Total	0	4	172	4.971

A limited number of projects will be realised before 2025. The first large electrolysers will be realised in 2025 and 2026, and CO2 capture and storage projects will lead to CO2 reductions from 2026 onwards. The total CO2 impact for 2030 is almost 5 Mtonnes.

Potential additional measures

In the Port and Industry sector, the best opportunities exist to meet the remaining 2030 challenge. The potential of additional measures - by the port authority, industry and government together - seems to be large, according to various publications of the HbR¹⁰. Not all measures named by the port authority in the process affect Rotterdam's CO2 emissions. For instance, like Porthos, the Aramis project provides for the storage of CO2 in reservoirs under the North Sea. However, most of the CO2 is brought in by (sea) ships from outside the port and therefore does not cause

⁹ [Cluster Energy Strategy Rotterdam-Moerdijk.pdf \(portofrotterdam.com\)](https://www.portofrotterdam.com/nl/haven-van-de-toekomst/energietransitie)

¹⁰ <https://www.portofrotterdam.com/nl/haven-van-de-toekomst/energietransitie>

for a CO₂ reduction within Rotterdam (or the port). The import and application of hydrogen has many potentials but it is not yet sufficiently clear what the plans are for this and so a potential estimate is not possible now. The possibilities of electrification are limited by grid capacity but when more is known about the mitigating measures, this could impact on the CO₂ reduction potential. There is also much to be gained with energy conservation¹¹.

3.4 Clean Energy

3.4.1 Description of theme and measures

Clean energy includes deployment of renewable energy from wind and solar. For wind, it concerns projects that are already in procedure or expected to be implemented in the coming years. Large-scale projects in Rotterdam contribute to the greening of the national energy mix by reducing the need to use fossil sources to produce electricity.

Since that relationship is not direct (where that production, and therefore CO₂ emissions, decrease is unclear), it talks about 'avoided CO₂ emissions'.

The fossil energy sector also falls under this theme. The energy sector includes coal-fired and gas-fired power plants (including combined heat and power plants, CHPs) that supply electricity to the national grid. Emissions in the energy sector fall under scope 1.

The following starting points and assumptions were used:

- The premise is still that production by wind and solar will replace deployment at gas-fired power plants.
- In determining avoided emissions, the emission factor of a gas-fired power plant was used, 369 g/kWhe.
- There may be a slight overestimate of the calculated avoided emissions due to the fact that not all sustainably generated energy can be utilised due to grid congestion.
- To determine production by wind, SDE++2023¹² was used for categorisation. Rotterdam largely falls into cat. 4; that means 7 m/s. For Maasvlakte 2, cat. 2 applies; that is 8 m/s.
- For solar, production is based on 950 full-load hours for standard PV panels, 808 hours (15% less) for facade systems and 1045 hours for solar-following systems.

3.4.2 Main differences from previous calculations

There are no major differences for wind compared to the previous calculation. Realised projects are no longer included in the calculation (expected avoided emissions). For some projects, the installed capacity has been adjusted.

For solar, there are a number of new or modified projects. Solar on company roofs has increased substantially and has potential (not yet sufficiently concrete) for further growth. There are also plans for solar PV along national roads (Opwek Energie op Rijksvastgoed, OER), partly on Rotterdam territory. A start has also been made on solar PV on facades.

3.4.3 Impact measures Energy

from renewable sources

¹¹ Rotterdam estimates that electrification and energy conservation together have a reduction potential of 1,500 ktonnes.

¹² <https://www.rvo.nl/sites/default/files/2023-07/BrochureSDE2023.pdf>

Table 8. Impact of measures Clean energy, avoided CO₂ emissions (ktonne)

Status	2023	2024	2025	2030
Sure	94	136	136	136
Expected	0	11	42	131
Intended	0	0	0	29
Total	94	147	179	297

According to the calculations, avoided CO₂ emissions from fossil sources will total 297 kt in 2030. The calculations assume that clean energy replaces a gas-fired power plant.

For the Clean Energy sector, targets are not expressed in terms of CO₂ effect but in km² (solar) or installed capacity (wind). The goal is to achieve within municipal boundaries:

- to have 350 MW of installed capacity of wind turbines by 2025, and
- to have an area of 3.2 km² of solar PV by 2026.

Of the wind projects, the wind farm on Maasvlakte 2 ('Hard and soft seawall') is by far the biggest contributor to the target. For solar, there are a few projects that contribute substantially to the target: solar on company roofs, solar on infrastructure OER and solar park Slufter.

As there are no targets for CO₂ reduction, these cannot be assessed within the framework of this calculation either. Testing realised installed capacity against ambitions for 2025 or 2030 is not within the scope of this calculation.

Coal plant closure

It concerns the ban on coal-firing at the two Maasvlakte coal-fired power plants. In the previous calculation, a different base year was used and therefore the effect had a different magnitude.

Table 9. Effect of the measure Closure of coal-fired power plants, CO₂ reduction Scope 1 (ktonne)

Status	2023	2025	2030
Sure	0	0	6.008
Total	0	0	6.008

Closing the coal-fired power plants in 2030 means that the current emissions from the plants will disappear in that year. In this calculation, 2022 is taken as the current situation. These are net emissions, i.e. after deducting emissions from biomass combustion. According to international calculation rules, this is considered zero emissions. Because the ban on coal combustion is laid down in the Law banning coal in electricity production, it is a certain measure. It is not likely that the power plants will be converted to use another type of fuel and therefore the measure is referred to as coal plant closure.

Given the influence of external circumstances on the production of coal-fired power plants, there is uncertainty about their CO₂ emissions in the coming years. We therefore calculate (as for the other themes) with a scenario where emissions in 2030 remain the same as in the base year.

3.5 Impact for air

3.5.1 Introduction

This section describes the effects of KAR implementation on emissions of the air pollutants nitrogen oxides (NO_x) and particulate matter (PM₁₀). Two general assumptions that apply here are:

- For CO₂, it does not matter where the reduction takes place whereas for air quality it is about

exposure of people and therefore to the distance from the location where emissions are emitted. Sources such as inner-city traffic are then more important than industry even though reduced emissions are smaller.

- Electrification of traffic reduces CO₂ and combustion emissions. However, this is less relevant for particulate matter emissions because the wear and tear of road surfaces and vehicles (tyres, brake discs) and the swirling up of road dust now leads to more particulate matter than combustion. Volume policy and modal shift are then more important measures.

In this report, we report only reduced tonnes of emissions and not estimated or calculated air quality effects.

3.5.2 Built Environment

The measures relate to avoided gas use for home heating and cooking. The kilotons of CO₂ are therefore related to the average CO₂/NO_x emissions of consumers. This follows from figures from the national Emissions Registration. The CO₂/NO_x ratio is 0.27 g/kg and is assumed constant until 2030. It is also assumed that all gains are caused by less gas consumption (and thus not by less biomass or wood burning). The effect on particulate matter is therefore zero.

Table 10. Effect of measures Built environment on particulate matter and NO_x in tonnes

	Reference emissions dwellings		Reduction through measures built environment				
	NO _x (tonnes)	PM10 (tonnes)	CO ₂ (ktonne)	NO _x (tonnes)	%	PM10 (tonnes)	%
2022	127	2					
2030			102	28	22	0	0

3.5.3 Mobility

The average ratio of CO₂ to air pollutants (source: Emissions Registration), was used for an overall estimate of the air effect. Those ratios are 0.14 and 2.17 g/kg respectively for particulate matter and NO_x. This year, mobile tools are included in the reference emissions. Different emission ratios apply to mobile tools, namely 0.24 and 6.68 g/kg respectively for particulate matter and NO_x.

Table 11. Effect of Mobility measures on particulate matter and NO_x in tonnes

	Reference emissions road traffic + mobile machinery		Reduction through mobility measures				
	NO _x (tonnes)	PM10 (tonne)	CO ₂ (ktonne)	NO _x (tonnes)	%	PM10 (tonne)	%
2022	3013	159					
2030			271*	814	28	44	27

* Note: concerns only CO₂ reduction due to avoided fuel (which therefore also leads to NO_x and PM10 effects).

3.5.4 Ports and industry

A few peculiarities for air quality come into play at Port and Industry. Capturing CO₂ costs energy and thus fuel. This leads to additional air pollution: with a positive CO₂ effect, there is a negative air effect. More or less the reverse is true for shore-based power: in this report, maritime shipping is not included in the CO₂ calculations, but the use of shore-based power does reduce air pollutant emissions. On balance, a small increase in NO_x emissions remains because CO₂ capture plays a major role in this category.

As emission ratios, the gas-fired CHPs were used 0.29 g NO_x/kg CO₂ on the one hand, and for electrolyzers, the emissions of a hydrogen plant were used as a benchmark (0.42 g NO_x/kg CO₂). A separate calculation was made for shore power. The particulate matter effect is entirely to the credit of writing from shore power.

Table 12. Effect of measures Port and industry on particulate matter and NO_x in tonnes

	Reference emissions industry		Reduction through port and industry measures				
	NO _x (tonnes)	PM10 (tonnes)	CO ₂ (ktonne)	NO _x (tonnes)	%	PM10 (tonnes)	%
2022	5.228	335					
2030			4.971	-104*	-2	3	1

*) a negative number means increase in emissions

3.5.5 Clean Energy

In Clean Energy, it is assumed that additional production by solar PV or wind turbines means that less production is needed at gas-fired power plants. Gas-fired plants have hardly any particulate emissions so the effect mainly occurs for NO_x. Which plants run harder or less hard at any given time is unknown so it is not certain whether there will be any effect in Rotterdam. The calculation assumes that this reduction does take place in the HIC; the calculated effect is therefore indicative. Average NO_x emissions in 2022 per unit CO₂ were 0.29 g/kg and are assumed constant until 2030. In addition, coal-fired power plants will be closed by 2030. With the closure of coal-fired power plants, all particulate emissions from the power sector disappear. NO_x emissions also drop substantially.

Table 13. Effect of Clean Energy measures on particulate matter and NO_x in tonnes

	Reference emissions energy sector		Reduction by KAR				
	NO _x (tonnes)	PM10 (tonnes)	CO ₂ (ktonne)	NO _x (tonnes)	%	PM10 (tonnes)	%
2022	2.979	31					
2030 clean energy			297	86	3	0	0
2030 coal-fired power stations			6.008	1.617	54	29	94

3.5.6 Total

Total air pollution emissions fall by 2443 tonnes of NO_x and 75 tonnes of particulate matter. Mobility accounts for 814 tonnes of the NO_x reduction and 43 of that for particulate matter. This is a significant reduction because a good part of it takes place a short distance from where people are located.

The larger reductions at the coal-fired power plants (and industry) have relatively little effect on the exposure of people in the Rijnmond area due to the dispersion of emissions at higher altitude (chimneys) and due to the distance to the built environment.

The reduction slightly lowers exposure to NO₂; incidentally, this does so across the country (and beyond). This is also a small improvement for the blanket of nitrogen deposition over the country, but again for a very large area.

	Table/theme: GO	realisation year	status measure	scope 1 emissions reduction [ktonne CO2]				scope 2 emissions reduction [ktonne CO2]			
	Measure / project			2023	2024	2025	2030	2023	2024	2025	2030
GO 1.24	Preserving VVE energy savings	2024 and beyond	expected	0,00	0,14	0,28	0,83				
GO 1.28	Replacement Municipal property	2020/2030	expected	1,30	2,60	3,90	10,40				
GO 1.34	Energy Transition Loans	2024-2030	expected	0,30	0,40	0,50	0,90				
GO 1.35	Area-based approach to owner-occupied housing	2024-2030	expected	0,00	0,26	0,56	0,56				
GO 1.37	Office buildings label C	2023	definitely	10,00	10,00	10,00	10,00				
GO 1.44	Save the Homes	2024 and 2025	intended	0,00	0,01	0,01	0,01				
GO 1.46	Future-proof SME sustainability voucher	2024/2026	expected	0,00	0,94	1,87	2,81				

Table/theme: GO		realisation year	status measure	scope 1 emissions reduction [ktonne CO2]				scope 2 emissions reduction [ktonne CO2]			
Measure / project				2023	2024	2025	2030	2023	2024	2025	2030
GO 1.51	Water-side balancing	2024/2025	expected	0	0	0	0				
GO 1.53	Performance agreements housing associations 2024-2025	2024/2030	definitely	0,00	2,61	5,22	15,65				
	effect scope 2 district heat							0,00	-0,60	-1,20	-3,59
	effect scope 2 induction cooking							0,00	-0,08	-0,15	-0,45
	effect scope 2 solar PV							0,00	0,63	1,26	3,77
GO 1.53	Performance agreements housing associations 2024-2025	2024/2030	expected	0,00	1,31	2,61	7,84				
	effect scope 2 district heat							0,00	-0,32	-0,63	-1,89
	effect scope 2 induction cooking							0,00	-0,04	-0,08	-0,24
GO 1.54	Insulation subsidy for small VVEs	2025	definitely	0,00	0,00	0,04	0,04				
total of measures built environment				effect of measures scope 1 ktonnes				effect of measures scope 2 ktonnes			
				2023	2024	2025	2030	2023	2024	2025	2030
				ktonne	ktonne	ktonne	ktonne	ktonne	ktonne	ktonne	ktonne
all measures reduction scope 1 sure				11,28	16,51	19,78	30,22				
all measures scope 2 district heating sure								-0,37	-1,39	-2,16	-4,56
all measures scope 2 electricity sure								0,00	0,26	0,18	-0,12
solar PV on homes for sure								0,00	0,63	1,26	3,8
all measures reduction scope 1 expected				1,60	6,34	13,52	39,46				
all measures scope 2 district heating expected								0,00	-0,51	-1,72	-6,50
all measures scope 2 electricity expected								0,00	-0,06	-0,22	-0,82
all measures reduction scope 1 targeted				0,00	0,04	1,49	32,50				
all measures scope 2 district heating envisaged								0,00	-0,01	-0,42	-9,30
all measures scope 2 electricity targeted								0,00	0,00	-0,05	-1,17

Explanation and background calculations Built environment
GO 1.01 to GO 1.18; GO 1.36; GO 1.38 Explanation This concerns all measures natural gas-free for the various districts and corporations. Rotterdam has supplied as information the expected numbers of homes, the phasing per year and the status of the measure. A CO2 effect has not been supplied in all cases. We have calculated the measure on the basis of the natural gas consumption of an average Rotterdam dwelling with 2022 as base year, which makes the effect different from previous calculations. See also the box below
GO 1.19 explanation expected effect Rotterdam: There were 1195 participants in an energy coaching meeting in 2023. $1195 * 200 \text{ kg} = 239 \text{ tonnes}$ savings. Judgement DCMR: The measure leads to CO2 reduction in 2024. Part of the effect 20% is in scope 2 (40 kg) and because of the reference year 2022 we have to count with a 25% lower reduction in scope 1 (120 kg) .
GO 1.20 explanation Municipal subsidy from SPUK for making woco's more sustainable. Only solar PV has been implemented effect is already in GO 1.53 Judgement DCMR: is already in measure GO 1.53 so no additional effect for this measure.
GO 1.21 explanation expected effect Rotterdam: In 2023, 7078 home visits were made by the energy handymen. $7078 * 200 \text{ kg} = 1415.6 \text{ tonnes}$ CO2 Judgement DCMR: because of the reference year 2022, we calculate with 40 kg reduction in scope 2 and 120 kg reduction in scope 1
GO 1.22 explanation Expected effect Rotterdam: 338 tonnes. Substantiation - until the end of 2025 for VVEs with a maximum allowance of max 2000 Euro for max 2 measures. Verdict DCMR: This (930 kg/app) is probably an overestimate. This may persuade owners to take measures but 20% per dwelling seems maximum feasible. 50% of 1250 homes (budget 2.5 million) yields 232 kg per home is 145 tonnes
GO 1.23 explanation Info Rotterdam: A subsidy was provided by 1 large VVE with 36 flats and 12 business premises, with which 992 m2 of roof insulation was installed. Verdict DCMR: That amounts to about 28m2 per flat so stacked construction(?) . We calculate per flat with the effect of a single measure 20% reduction from 2024 and that may be an overestimate.
GO 1.24 explanation Expected effect Rotterdam: 1000 flats of 50 large and small VVEs participate in an advice and support programme each year and it is expected that 30% will take multiple insulation measures each year, which means 300 homes x 642 kg = 193 tonnes per year. Verdict DCMR: The saving depends on the measures taken but a saving between 30 and 50% should be possible, which means an improvement to label A or B. We calculate with the average of 40% saving on 650 m3 and that results in 462 kg per flat compared to 2022.
GO 1.25 and GO 1.40 explanation Insufficient information has been provided - not possible to estimate impact
GO 1.26 explanation Insufficient information has been provided - not possible to estimate impact
GO 1.27 explanation Energy potential scans have been carried out to identify savings potential. CO2 emissions have been studied and the aim is to reduce them by 49% by implementing measures. This does not concern the implementation of the measures themselves and therefore it is not possible to attribute an effect to this.
GO 1.28 note Regular replacement task of municipal property. Budget for replacement task according to current laws and regulations with a small sustainable plus. It concerns 250 buildings. A CO2 reduction of 1,300 tonnes per year (delivered) from 2023 is plausible so in 2030 10.4 ktonnes
GO 1.29 explanation It has been indicated by Rotterdam that no CO2 reduction is expected and that there is a long development time of projects in the spatial domain. Because of this and because we have no further information on the measure, we cannot estimate a CO2 effect.
GO 1.30 explanation Eventually no further info was provided and Rotterdam requested not to pass the measure
GO 1.31 explanation Collection of proposals leading to the achievement of Rotterdam's climate goals. The initiative does not directly lead to a CO2 reduction or energy saving
GO 1.32 explanation No information has been provided. Rotterdam has requested not to calculate the effect because, according to Rotterdam, the effect equals zero
GO 1.33 explanation No information has been provided. Rotterdam has requested not to calculate the impact
GO 1.34 explanation Expected effect Rotterdam: A CO2 reduction has been determined based on measures implemented in the period 2021-2023. This concerns 217 measures. Proposal is to use 310 kg CO2 reduction per single measure which yields 67 tonnes to date. For the coming years, the estimate is 100 tonnes per year. Verdict DCMR: The 310 kg CO2 savings are based on reference year 2021. If we calculate relative to 2022, we come out 25% lower at 231 kg. The basis for the estimate of 100 tonnes has not been substantiated.
GO 1.35 explanation Expected effect Rotterdam: in 2024 a total of 1100 houses insulated and in 2025 another 1300 and in 2030 a total of 4000. Calculate 310 kg per dwelling. DCMR's opinion: in itself a 20% reduction in natural gas consumption is a reasonable assumption, but for reference year 2022 this will be 25% less
GO 1.37 explanation Judgement DCMR: Implementation of law. Office buildings must have at least energy label C. An earlier calculation determined that a reduction of 10,000 tonnes is possible in scope 1 at 3.3 million m2 of offices to label C
GO 1.39 explanation No information has been provided. Was realised in 2022, proposal to remove from list
GO 1.44 explanation Expected impact Rotterdam: Over a 2-year period, 16 private homes will be made natural gas-free. The assumption is that this will yield 5 tonnes per year. Verdict DCMR: If this is about natural gas-free in combination with insulation, this seems a conservative estimate. In the absence of details on the measure, we adopt this figure (provisionally).
GO 1.46 explanation Expected impact Rotterdam: 400 entrepreneurs apply for the voucher in 2024 and 2025. Total 1200 vouchers. Klimaatroute has determined iov DCMR (?) that the vouchers produce an average of 2.34 tonnes of CO2 per year. DCMR's opinion: We can adopt this effect if it is substantiated.
GO 1.51 explanation Expected effect Rotterdam: in 5% of the homes where energy tinkers come, the installation can be regulated with a total of 850 homes x 200 kg per home. Verdict DCMR: This would mean double-counting because the adjustment is already included in the total effect of the energy loops. Moreover, the effect of water-side adjustment is limited. No CO2 reduction is attributed to this measure.

I.2 Sector Mobility

Table/theme: GO		realisation		scope 1 emissions reduction [ktonne CO2]				scope 2 emissions reduction [ktonne CO2]			
	measure	when	status	2023 scope 1	2024 scope 1	2025 scope 1	2030 scope 1	2023 scope 2	2024 scope 2	2025 scope 2	2030 scope 2
1.01a	passenger cars (EU source policy) 2030	2030	Sure	46	54	62	100				
1.01b	bestelwagens (EU source policy) 2030	2030	Sure	7	8	10	16				
1.02	trucks (EU source policy) 2030	2030	Sure	21	24	28	45				
1.03	biofuel blending all vehicles	2030	Sure	24	28	32	52				
2.03	Fuel-efficient tyres + excise duty increase (NL-ambition) *	2030	definitely	5	6	7	11				
2.04	Commitment to a move to completely clean driving:	2030	Sure	10	12	14	22	-3,0	-3,2	-3,1	-1,9
2.11	cargo agenda charge, generic windfall KEV in particular	2026	definitely	0	0	0	15				
2.99	persons	2030	weight	2	5	7	18	-1	-1	-2	-2
total EU + national				115	136	158	278	-4	-4	-5	-3
3.01	charging infrastructure public poles	2030	definitely	10,2	11,8	13,5	22,0	-3,0	-3,2	-3,1	-1,9
3.02	Modal shift to public transport and cycling (SVPR and RMA including parking policy)	now until 2030	weight	4	8	13	34	0,0	0,0	0,0	0,0
3.03	Mobility management (ITS, MaaS, semi-autonomous)			0	0	0	0	0,0	0,0	0,0	0,0
3.04	Smart logistics (bundling via hubs, routing)	now until 2030	weight	0,5	1,0	1,6	4,1				
3.05a	ZE buses	2030	definitely	3,9	4,1	4,5	9,0	-1,6	-1,6	-1,4	-1,1
3.05b	ZE taxis	2028	weight	1,5	3,0	4,5	9,0	-0,4	-0,8	-1,0	-0,8
3.05c	ZE target group transport	2030	definitely	1,3	0,0	0,0	4,0	-0,6	0,0	0,0	-0,5
3.05d	ZE municipal wagen park persons + order + cargo	2025	Sure	0,5	1,0	1,5	3,0	-0,1	-0,3	-0,3	-0,3
3.05e	Multimodal construction hub (ZE via wagen/water)	2030	weight	0	0	0	1				
3.12	Encouraging partial concepts	2021 - 2030	Sure	0	0	1	2	-0,1	-0,1	-0,1	-0,1
3.12_extra	existing sub-concept	2030	Sure	0,2	0,4	0,6	1,6	-0,1	-0,1	-0,1	-0,1
3.17 & 3.18	Transport over water (taxis and buses)	2030	weight	0,4	0,7	1,1	4				
3.20	Employer approach to sustainable mobility	2030	weight	3	6	10	29	0	-1	-1	-1
3.25	Zero Emission Urban Logistics		definitely	0	0	5	40	0,0	0,0	-1,6	-4,7
3.29a	Making mobile within the city more sustainable	now until 2030	weight	1	2	4	20	-0,4	-0,8	-1,3	-2,4
3.29b	mobile with others elsewhere (port)	now until 2030	weight	2	3	6	30	-1	-1	-2	-4
3.30	Making inland navigation more sustainable			0	0	0	0	0,0	0,0	0,0	0,0
3.32	Making training ship STC more sustainable	0	intended	0	0	0	0	0,0	0,0	0,0	0,0
total local				29	43	66	211	-7	-9	-12	-16
total impact mobility				144	179	223	489	-11	-13	-17	-20

For explanation, see next page

	toelichting maatregel
1.01 t/m 1.03	Berekening op basis eerdere berekeningen KAR/RKA, maar met de nieuwe 2030 cijfers. NB. In feite is deel verschoning t/m 2022 al gerealiseerd, maar de emissiefactoren voor het wegverkeer zijn verouderd dus toch volle effect aangehouden.
2.03	Berekening op basis eerdere berekeningen KAR
2.04	Berekening op basis eerdere berekeningen KAR; voor de helft toegekend aan landelijk beleid, voor andere helft aan lokaal beleid (plaatsen laadpalen, 3.01).
2.11	Berekening op basis eerdere berekeningen KAR
2.99	0,6 Mton generieke extra verschoning (zie KEV 2022, pag 173) met name bij wegverkeer. Rdamse aandeel in wegverkeer is 3% dus 18 kton reductie.
3.01	Zie 2.04
3.02	Het effect van modal split is begin 2024 opnieuw bepaald op basis van de geactualiseerde verkeercijfers en nieuwe inzichten in het effect op auto- en OV-gebruik.
3.03	Niet meer relevant; beleid is stopgezet.
3.04	Berekening op basis eerdere berekeningen KAR/RKA, maar met de nieuwe 2030 cijfers.
3.05a	Cijfers en aannames ongewijzigd. Effect voor scope 2 gebruikt cf rekenregels (dan niet relevant dat dat RET groene stroom gebruikt). CO2 emissiefactoren gebruikt voor touringcars.
3.05b	ingroei 2023/2025 van Rotterdam overgenomen; ook scope 2 effect bepaald met zelfde factor als personenauto.
3.05c	Aanname dat alle kilometers binnen Rotterdam gereden worden. Helft van elektrificatie is al gezien als onderdeel van huidige situatie met restant in 2023. Andere
3.05d	Planning voor 2023-2025 in overleg met Rotterdam iets bijgesteld. Ook scope 2 effect bepaald.
3.05e	oude uitgangspunten gehandhaafd
3.12	Tot nu beperkte resultaat. Toekomstig effect lijkt niet heel groot en is in overleg met Rotterdam bepaald.
3.12 extra	
3.14	
3.17 & 3.18	Omvat zowel de watertaxi als de waterbus. Effect, deels buiten Rotterdam, is som van beide afzonderlijke maatregelen. Effect voor scope 2 onduidelijk.
3.20	De aanpak is zeker, de potentie is groot maar het resultaat is nog onduidelijk: in hoeverre zullen bedrijven hun werknemers zover krijgen dat ze hun vervoer duurzaam aan gaan passen?
3.21	
3.22	
3.23	
3.25	Effect gebaseerd op berekening DCMR (in opdracht van en in samenwerking met Rotterdam) voor ZE zone, zomer 2023. Scope 2 effect bepaald.
3.29a	Geschat iom Eelco den Boer, projectleider Rotterdam en Paul van de Lande, adviseur mobiele werktuigen
3.29b	Idem.
3.30	geen input ontvangen
3.32	Idem.

I.3 Sector Port & industry

PORT AND INDUSTRY							
Measure / project	year	status measure	expected effect 2023[kton]	expected effect 2024[kton]	expected effect 2025[kton]	expected effect 2030[kton]	
HI 2.01	Shore power Lloydkade / Parkkade	2024	expected	0	0	0	0
HI 2.02	Shore power Wilhelminakade	2024	definitely	0	0	0	0
HI 2.03	CCUS OCAP	expired					
HI 2.04	Porthos - capture installations at Porthos' customers	2026	definitely	0	0	0	2.250,0
HI-2.04a	Porthos infrastructure and storage	2026	definitely	0	0	0	0
HI 2.05	Elektrolyser AVR Tronox	expired					
HI 2.06	Biondoil	expired					
HI 2.07	Bleaching earth	expired					
HI 2.08	Electrolyser Vattenfall Air Liquide CurtHyl 200 MW	2028	expected	0	0	0	108,6
HI 2.09	Electrolyser Uniper 100 MW	2026	expected	0	0	0	54,3
HI 2.10	Electrolyser MultiPLHY Neste 2.6 MW	2024	certain / realised	0,0	4,0	4,0	4,0
HI 2.11	Import and application of hydrogen	2030 and beyond	insufficiently concrete	0	0	0	0
HI 2.12	Electrolyser Shell 200 MW	2025	expected	0	0	167,6	167,6
HI 2.13	Electrolyser BP/Nouryon 250 project name H2-Fifty	2026	intended	0	0	0	135,8
HI 2.14	Enecolyzer 800 MW	2029	intended	0	0	0	391,0
HI 2.15	H-Vision	2028	expected	0	0	0	1.760,0

PORT AND INDUSTRY							
Measure / project	year	status measure	expected effect 2023[kton]	expected effect 2024[kton]	expected effect 2025[kton]	expected effect 2030[kton]	
HI 2.16	Energy saving industry	2030	insufficiently concrete - can be seen as potential	0	0	0	0,0
HI 2.17	Electrification industry	2030	insufficiently concrete - can be seen as potential	0	0	0	0,0
HI 2.18	Aramis infrastructure and storage	2028	intended	0	0	0	0
HI 2.19	Steam exchange Steam pipe Botlek	2025 (Q4)	expected	0	0	0	100,0

Total overview of measures Port & Industry	Impact 2023 - ktonne	Impact 2024 - ktonne	Impact 2025 - ktonne	Impact 2030 - ktonne
Measures certain	0,0	4,0	4,0	2.254,0
Measures expected	0,0	0,0	167,6	2.190,5
Measures envisaged	0,0	0,0	0,0	526,8
Total	0,0	4,0	171,6	4.971,3

Explanatory measures
HI 2.01 Shore power Lloydkade / Parkkade Note: The emission reduction is 300 tonnes CO2 per year for Lloydkade and 1,000 tonnes CO2 per year for Parkkade based on Darel reports from 2021 and 2022 respectively. Emissions from marine shipping and hence reductions are not counted for the climate agreement. The emission reduction seems to be a conservative estimate given the size of the shore power installation.
HI 2.02 Shore power Wilhelminakade Note: The emission reduction is 7.3 ktonnes CO2 per year in 2030 and 5.0 in 2025 in scope 1 based on rounded 2399 hours of laytime with 90% shore power in 2030 and 2200 hours with 65% shore power in 2025. Emissions from marine vessels (including cruise ships) are not counted for the RKA. Status changed to certain
HI 2.03 CCUS OCAP Explanation: Project too uncertain and therefore not included in calculation
HI 2.04 Porthos - capture facilities at Porthos customers Explanation: Several mer trajectories and permit applications have now been received from Porthos customers. The applications show that the total capacity of Porthos is being utilised. The permit of the storage reservoirs shows that injection is not expected before Q2 2026 and thus we expect full impact in 2027 and partly in 2026
HI-2.04a Porthos infrastructure and storage Note: This refers to Porthos infrastructure. As such, it does not provide any reduction. We know that the reservoirs store up to 2,500 kilotonnes per year by the targeted customers and are fully utilised. The land pipeline has a larger capacity and if the storage reservoirs are expanded, it can also be utilised. This is happening in the Aramis project
HI 2.05 Electrolyser AVR Tronox Note: Project remained at concept study and therefore not included in calculation
HI 2.06 Biondoil Clarification: The study has been completed and project is no longer included in the calculations any further
HI 2.07 Bleekaarde Clarification: The study has been completed and project is no longer included in the calculations
HI 2.08 Electrolyser Vattenfall Air Liquide CurtHyl 200 MW Explanation: We are using PBL figures for determination of hydrogen production as in previous calculations. An FID has been taken and thus the status can go to expected. In the years before 2030, there is not yet sufficient supply of wind - the 3,500 full-load hours we are calculating will only be feasible in 2030, and thus also the 108.6 ktonne reduction.
HI 2.09 Electrolyser Uniper 100 MW Note: Again, we are using PBL figures as in previous run-throughs. An FID has been taken and so the status can go to expected. In the years before 2030, there is not yet sufficient supply of wind - the 3500 full-load hours we are counting on are only feasible in 2030.
HI 2.10 Electrolyser MultiPLHY Neste 2.6 MW Note: Completion and testing Q1 2023 and in operation by the end of 2024. We calculate with the same reduction as last year
HI 2.11 Import and application of hydrogen Clarification: Import and application of green hydrogen is mentioned by the HBR as having great potential to reduce CO2. There are still many uncertainties and these are also mentioned by Rotterdam; how much hydrogen of the 4 Mton will actually be realised, where will the hydrogen be used, what is the origin and emission intensity. These are valid questions and there is a significant chance that it will be import and transit and that this will result in a limited reduction for Rotterdam. Rotterdam estimates that at 10 to 20% utilisation of green hydrogen in Rotterdam, a CO2 saving of 0.5 to 2 Mton is possible but there is currently insufficient information to calculate this and include a potential estimate in the table.
HI 2.12 Electrolyser Shell 200 MW Explanation: Shell intends to align the production of the electrolyser with the production of its "own" wind farm Hollandse Kust Noord. This will make more full-load hours available for production - similar to a direct line. Shell states that 1100 GWh is taken from the wind farm every year, which could produce 19 ktonnes of hydrogen. If we use the PBL calculation, we arrive at a similar number of 18.7 ktonnes and a reduction of 167.6 ktonnes of CO2. This is an adjustment from the previous effect of 200 ktonnes.
HI 2.13 Electrolyser BP/Nouryon 250 project name H2-Fifty Note: The emission reduction of this project has been adjusted by the promoters. Instead of 45 kilotonnes of hydrogen, an amount between 20 and 30 kilotonnes is now quoted. According to the PBL SDE++ 2022 recommendation, 3500 full-load hours are available in 2030. This provides 15 kilotonnes of hydrogen annually and thus avoided emissions of 135.8 ktonnes per year. There are no (or hardly any) scope 2 emissions of electricity during these hours
HI 2.14 Enecolyzer 800 MW Explanation: According to Eneco's website, it is an 800 MW electrolyser but that includes auxiliary power. The permit application shows that the electrolyser is 720 MW and that the capacity is 98.9 tonnes of hydrogen and production will be between 50 and 85 ktonnes per year, depending on the wind supply. For now, we calculate using PBL methodology and arrive at 43 ktonnes of hydrogen per year and 391 ktonnes of CO2 reduction
HI 2.15 H-Vision Clarification: BP Europort has now prepared an EIA report and submitted a permit application for a capture plant linked to a new hydrogen plant. Amount of CO2 capture is 2200 kilotonnes. Porthos' land pipeline and Aramis' sea pipeline will be used, making H-Vision's planning dependent on those projects. Intended start in 2028. With a 20% penalty, the maximum CO2 reduction is 1760 kilotonnes.
HI 2.16 Energy saving in industry Clarification: Qualified by Rotterdam as not an effect but an important autonomous development. Proposal is to include an effect of 500 ktonnes for 2030. Rotterdam bases this on the port authority's list of measures, the figures in the KEV 2022 (national) and project 6-25 (study). The KEV does mention the overlap with ETS system and previous covenants that companies participated in. Judgement is that 500 ktonnes for 2030 is not unrealistic but at this point should be seen more as an estimate of the potential. It is not clear which companies are taking which measures.
HI 2.17 Electrification industry Note: Rotterdam proposes to include an effect for 2030 of 1,000 ktonnes. This corresponds to the HBR's statement and we already saw this effect in previous calculations. Our earlier calculations take into account limitations of the electricity grid but also the availability of sufficient sustainable electricity. We do see improvement through projects such as the Simonshaven distribution station but that project is ready in 2029 will not have an immediate impact on customers (an application for a connection has a lead time). We only see the number of full-load hours of renewable electricity increasing substantially after 2030 due to offshore wind, so we see this as potential for the period (immediately) from 2030 but no reduction in 2030 yet

I.4 Clean energy sector

Table/theme: Clean energy		avoided emissions [ktonne CO2]					
	Measure / project	realisation in [year]	status measure DCMR	effect 2023	effect 2024	impact 2025	expected effect 2030 DCMR
	wind						
4	Expansion Landtongue Rozenburg	2026	expected	0	0	0	7
5	Beneluxplein	2029	expected	0	0	0	10
6	Charloisse Gate	2027	intended	0	0	0	5
7	Innocent	early 2025	expected	0	0	9	9
8	Sif-2	mid-2025	expected	0	0	5	10
9	Hard and soft seawalls	May 2023	definitely	100	150	150	150
10	Corner court	2026	expected	0	0	0	13
11	Hartel-3	mid-2025	expected	0	0	7	14
12	Dintel (to be removed in 2023)	mid-2023	definitely	-8	-16	-16	-16
	total wind			92	134	155	203
	sun						
1	Innovation solar on facades	2023	definitely	0,01	0,01	0,01	0,01
2	Solar on company roofs	2027	expected	0	10	20	20
3	Solar on cooperative roofs	2024	intended	0	0	0	0
4	Solar on roofs schools	2026	expected	0	1	1	1
5	Sun on roofs VVE WoCo private individuals		insufficient concrete				
6	Sun on infra OER	2026	intended	0	0	0	23
7	Sun on infra Solar Carports		insufficient concrete				
8	Solar farm Hoek van Holland	2026	expected	0	0	0	8
9	Solar park Sluffer	2026	expected	0	0	0	39
10	Solar park Schiebroek	2025	definitely	0	0	1	1
11	Company roof Matrans	2023	definitely	2	2	2	2
	total sun			2	13	24	94
	Total			94	147	179	297

For explanation, see next page.

	explanation
wind 4	Formerly Landtongue Rozenburg-East
5	Beneluxplein is one of the VRM sites in the city-region covenant. A plan EIA will be carried out in 2023. Result: 9.6 MW
6	proved due to a combination of (mostly technical and incorporation) risks versus commercial feasibility. The study phase shows that there is no profitable business case for a regular turbine.
7	Concerns two 4.2 MW wind turbines on the premises of juice manufacturer Innocent at the port. A irrevocable environmental permit. A Wnb (Nature Conservation Act) permit is still awaited.
8	Study phase completed with applications for planning permission June '23. Not yet granted. Concerns a 2nd offshore test turbine on site
9	The wind turbines became operational in 2023.
10	Formerly Extension New Waterway. An environmental permit has been applied for two wind turbines. Eneco/FMT. This is based on a comprehensive participation plan.
11	Study phase completed with applications for planning permission December '23. Not yet granted. 3 turbines, potential total 13 MW.
12	
Sun 1	In 2023, 2 facades were realised on 2 sports halls. In total: 2x18 panels x 400 Wp
2	Concerns SDE applications and mainly company roofs (barring exceptions) with a total of 83 MW. In practice, around 30% drop out,
3	
4	From school roof revolution, the first solar PV roofs will be realised. This will involve 24 rooftops in 2024 for sure, and probably 4-6 more. A total of at least 4057 panels
5	
6	0.3km ² / 67MW will be realised along highways. planned in 2026. Letter of intent signed by RWS, municipality Rotterdam and the BAR municipalities. The square kilometres listed here refer only to those on Rotterdam territory.
7	
8	realisation will take place in 2026, tender will be issued this year, zoning plan amended
9	Rotterdam is the competent authority to grant the environmental permit, but Rijkswaterstaat and the Port of Rotterdam Authority are rotating
10	Permit already issued. Valuation is currently taking place for land exploitation; financing is/seems not 100% certain yet.
11	