

CLIMATE CITY CONTRACT CITY OF ROTTERDAM



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Preamble

1. Introduction & background to climate neutrality challenges for Rotterdam City

Rotterdam, the second-largest city in the Netherlands with a population of 619,000, is one of the most urbanized areas in the country, with 40% of its surface area covered by the sea.

After suffering heavy damage during World War II, the city has since gone through a process of reconstruction and expansion. In the last ten years, the city has welcomed 55,000 new citizens. By 2035, the city is expected to grow by another 55,000 people.

Key to the economy and identity of the city is the Port of Rotterdam, which extends over 40 km² and is Europe's largest port. It is an enormous supplier of jobs and contributes 6.2% of the national GDP.

Moreover, this machine emits 14 million metric tons of CO₂ per year, ranking as the fifth largest polluter in Europe. Thus, to become climate neutral, Rotterdam heavily depends on its port. Making this transition while maintaining the jobs and income stream for the city will therefore pose a substantial challenge.

2. Evidence and data on most pressing local needs connected to the climate neutrality goals

Looking at climate predictions, the risk of warmer, drier summers may result in pressures on electricity, agriculture, and drinking water supplies. Such drought may also increase flood risk; many areas of Rotterdam are built on peat, increasing subsidence and destabilizing dikes. Also, the city has a lower GDP per capita and a lower economic growth and employment rate than the national average, and it is more economically dependent on its port than most comparable cities.¹

In a recent evaluation report of the European Commission, Rotterdam is one of the worst scoring urban areas on air quality in Europe (Redactie AD, 2017).²

¹ The predicted sea-level rise of 1 to 2 meters by 2100 is likely to have a significant impact on the city, despite the cutting-edge strategies employed in Rotterdam. This is due to the fact that significant parts of its economic infrastructure, including power stations, railways, and water purification plants are located outside the protective dikes. Also, a big issue has to do with the fact that 40,000 people live outside the flood defense system.

² Travel demand management strategies provide multiple policy options that can be used to tackle congestion and pollution. In order to reduce pollution, the municipality of Rotterdam implemented a low emission zone. Starting the first of January 2016, old polluting cars were no longer allowed into the Rotterdam city center. From the first of May onwards, unwanted cars were fined with a 90 euro penalty.

Indoor air pollution in Rotterdam is as dangerous as outdoor pollution, because the air pollutants come inside the houses or buildings through doors, windows and ventilation.³

In addition to that, there is a housing shortage in Rotterdam due to a combination of registration regulations (it is really difficult to obtain building permits because it is fundamental to protect nature reserves) and population growth due to both many immigrations and births in the city.⁴

3. State of the art analysis

Rotterdam is developing a network of environmentally friendly, self-reliant economies and communities called the "Next Economy." This project basically focuses on community-driven projects and citizen cooperatives aimed at transforming the city into a zero-carbon bioport.⁵

Regarding the port, the municipality, other governmental organizations, companies, and utility owners are developing an adaptation strategy to cope with the vulnerable functions in the port. The aim is to map out the risks and consequences of flooding in order to select appropriate measures tailored to the specific characteristics of the areas.

4. Rotterdam's specific needs

Rotterdam, because of its geographical characteristics, is likely to be deeply affected by the impacts of climate change, such as heat stress, increased rainfall, and rising sea levels. This, combined with flood risk, can cause even greater direct damage to facilities and indirect economic losses with a significant impact on society as a whole.

Another key issue is port traffic. Just to mention, the number of containers transported peaked at **8.9 million** in 2021 (*Statista*). An additional alarming fact is the accumulation of empty containers in the port, which causes a buildup of waste at sea.

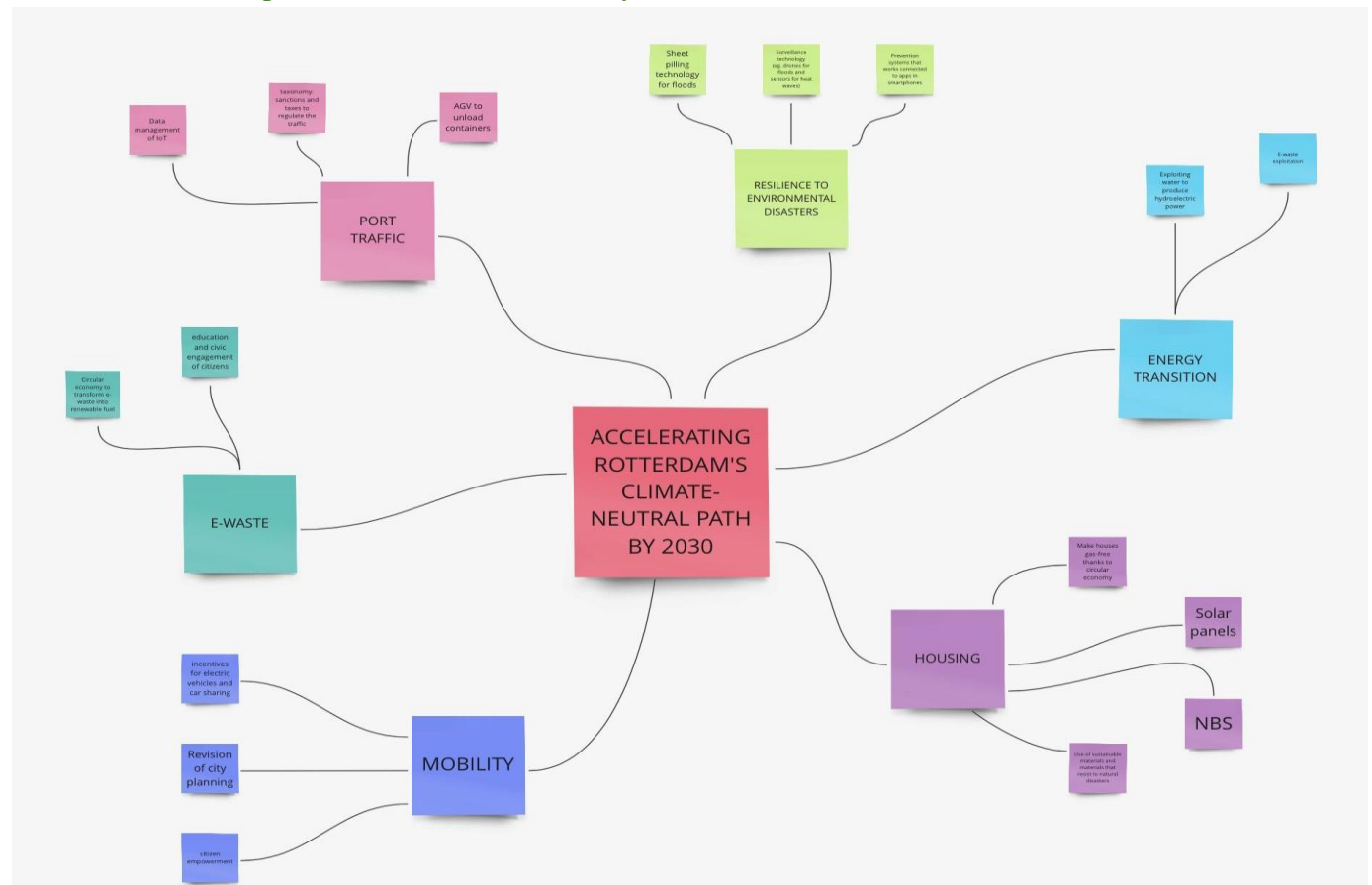
Rotterdam is already quite advanced in the transition to climate neutrality compared to other cities in the Netherlands, but although digitization is having positive effects, at the same time there are negative consequences that the Contract intends to overcome by making the systems already in place more efficient. Mainly, there has been an increase in the amount of e-waste (e.g. excessive use of lithium batteries) that is among the most harmful to human and environmental health.

³ Main causes of indoor air pollution are harmful gases from cooking fuels, damp, mould smoke, chemicals from cleaning materials, etc.

⁴ One of the most serious impacts of this problem is the rising house pricing: homelessness is on the rise and students particularly struggle to find affordable housing.

⁵ Rotterdam's climate roundtables have produced 49 climate agreements targeted to cut CO2 emissions in half over the next ten years.

5. Core principles for a Smart and Climate Neutral “City of Rotterdam”. This contract sets out how Rotterdam plans to be climate neutral by 2030.



Section I. Planning

1. Governance structure and the network of actors

Existing projects in Rotterdam are based on horizontal subsidiarity, which entrusts initiatives to take care of collective needs directly to resident citizens. But, in order to streamline the objectives, the government - whose function has been reduced to mere control—should play an active role. In particular, a *quintuple-helix stakeholder model* should be implemented, with the following actors involved in the five helices of the project:

| |
|---|
| National Government |
| Province |
| Citizens |
| Municipality |
| Other Dutch cities with which to establish partnerships |
| NGO |
| Water utilities |
| Waste disposal companies |
| Data science, machine learning and AI developer experts |
| TNO, universities and research institutes |
| Start-ups, banks, EU structural funds and PPPs |
| Civil and environmental engineers |

2. The key sectors addressed in the CCC, the areas of greenhouse gas emissions to be improved, and the smart technologies and strategies to be adopted.

Key sectors tackled by the contract are transportation, housing, energy sources, and the improvement of flood mitigation and urban resilience. Over 85% of the CO₂ exhaust in the Rotterdam area originates from port. The industry in the port of Rotterdam will be based on circular and renewable carbon, sustainable biomass, and hydrogen.⁶ Creating a network or networks to share waste streams of energy and/or commodities represents a good way to promote energy efficiency in an industrial zone or network, while also relying on an effective data center to exploit the usage of data and improve coordination among the different actors. Moreover, the implementation of nature-based solutions will help communities become more resilient to the effects of climate change, including flooding.

Innovative strategies:

- All suitable roofs in business and industrial areas will be equipped with solar panels and if possible, with an application of wind energy.
- In time, the industry in the port of Rotterdam will be based on circular and renewable carbon, sustainable biomass and hydrogen. The aim is to transform the port into an (inter)national hub for import, export, distribution and valorisation of residual flows, CO₂ and sustainable biomass.
- Natural Based Solutions: The drainage and storage capacity of the urban water system has to be adapted to deal with extreme rainfall. The ‘sponge function’ of the city will be

⁶ The focus is thus to stimulate the implementation of new, cleaner, and more efficient process technologies.

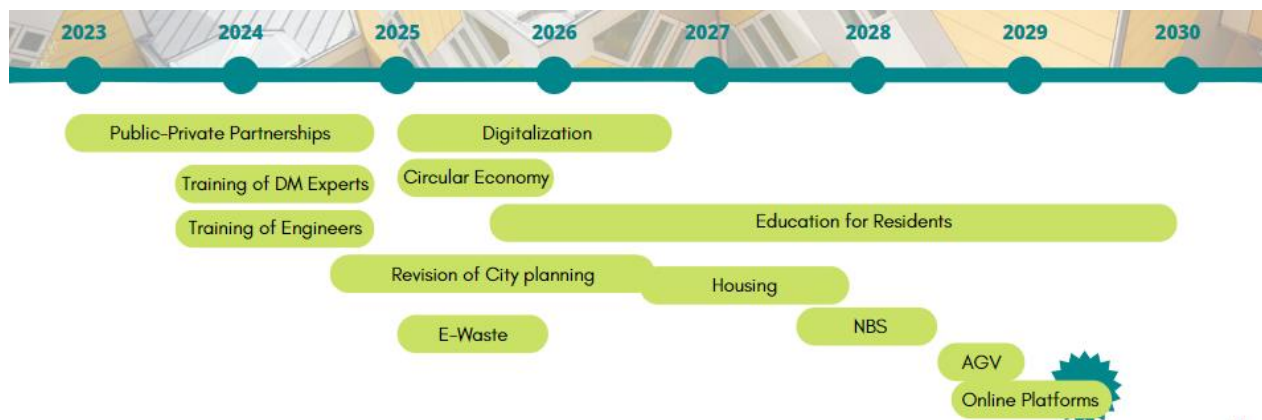
restored by taking measures to capture and store rainwater where it falls and to delay drainage.⁷

- Both dedicated bus lanes and bus priority represent good examples of travel demand management strategies as they are both low-cost and aim to optimize the utilization of the available capacity.⁸ In addition, car and bike sharing will be intensified.
- Individuals can commit to very low temperature buildings, get used to sustainable individual transport and rely on heat pumps for heating.

3. Climate neutrality preparedness assessment tool

Among the many measures already in place, first of all, the *Rotterdam Climate Initiative* (RCI) was launched in 2006 with the goal of reducing CO2 emissions by 50% while promoting the economy in the region. Rotterdam is one of the leading cities in *Horizon2020's European RUGGEDISED* project, which tests smart solutions in energy, transport and digital technologies. Then with *Rotterdam's RoofScape* program, software has been developed that codes rooftops throughout the city, providing information on how they can be used for rooftop greenery, water harvesting and energy production.

4. Duration of the contract and milestones in the timeframe: through process technologies towards climate neutrality by 2030.



⁷ These measures include green roofs and façades, less paving and more vegetation in public streets and neighborhoods, water squares and infiltration zones as infrastructure. These measures will be especially effective in highly populated, built-up areas with little open space.

⁸ In terms of congestion reduction, both measures are only viable for buses and tackle only a small part of the congestion problem experienced in most cities.

Section II. Key Sectors and Strategies: Technological and Digital Solutions

1. From the demand side, the sectors employed in the contract

The sectors used in the contract are as follows: mobility, housing, industry, waste management, energy sources and circular economy. Port traffic is to be scaled back. The goal is to establish a threshold limit for empty containers and implement the use of Automated Guided Vehicles (AGV) to unload containers quickly, through proper data management and the use of IoT.

Second, a circular economy model needs to be developed to turn waste into renewable fuel to power, for example, homes and buildings. As for the energy transition, excess water should be harnessed to produce hydropower.

2. On the supply side, development of the city's infrastructure to use and produce renewable resources

There are two likely future scenarios regarding CO2 emissions:

- A market-oriented path that focuses on all-electric solutions. Rotterdam will construct 73,000 new buildings and renovate 213,000 homes over the next 30 years with low-temperature, renewable fuel-based heat pumps for heating. These new homes are to be built with materials resistant to climate disasters.
- A collective pathway which assumes that in the next 30 years 243,000 homes will be renovated, 15,000 will be demolished, and another 43,000 will be built from scratch. In terms of mobility, individual car use would be drastically reduced, with the majority of the city's residents commuting by walking, bicycling, electric vehicles, and other forms of micro-mobility; in addition, the use of public transportation would increase.

3. Strategies for integrating supply and demand

The transition to a sustainable port and industrial complex will be successful if government, industry, and science can work together across the maritime cluster, bringing in the expertise of new entrants to help companies accelerate the transition to sustainable operations.⁹

The energy transition strategy to a circular and zero-carbon economy is based on four main pillars:

- a. Increasing the efficiency of existing industry and building (additional) infrastructure for heat, CO2, electricity and hydrogen.

⁹ The decarbonization of the Port of Rotterdam can be an enabler for future hydrogen markets by creating enough renewable energy for hydrogen production.

- b. Renew the energy system by switching from fossil fuels to green electricity and hydrogen.
- c. Move to a new materials and fuels system.
- d. Make transportation more sustainable.

Also the development of “Green Infrastructures”, such as planting trees and hedges to increase water absorption, catch rainfall and slow down surface water run-off.¹⁰

4. Technology and digital solutions in support of plan implementation

Maximizing energy and heat production by industry is one of the main challenges. Industry uses a lot of energy and releases a lot of heat. Sometimes production stalls, and sometimes it is supplied to the grid. Artificial intelligence solutions can help in this regard.

Floods could be curbed through mapping using smartphone-based applications. Surveillance technology could flood mapping through the use of drones.

Smart technology is also useful for industry to monitor energy consumption in real time and use this information to optimize production processes.

In addition, information on citizens' needs and behaviors could be collected in order to promote citizen involvement in a bottom-up approach by developing a platform open to all residents.

5. The digitization process supports a just and democratic transition

Digitalization brings more equity to this transition. The main reason this process will be fair and democratic is the transparency of any movement or transaction, which is essential in an always-connected world. Any online platform must keep its stakeholders informed of any changes, increasing honesty and authenticity to build trust in the services it offers. Adding value to the tools already in place will be "sustainable digital solutions," which not only provide digital services but also overcome the negative impacts of digitization (e.g., increase in e-waste).

Section III. Investment Plan

The CCC will include an investment plan to scale up and deploy innovative solutions for delivering on the commitments. Two things need to be done at the same time: in the short term, energy infrastructure needs to be adapted and implemented (such as strengthening the power grid,

¹⁰ These measures include green roofs and façades, less paving and more vegetation in public streets and neighborhoods, water squares, and infiltration zones as infrastructure. As a bonus, these features can also make cities cooler in the summer and increase access to nature for city dwellers.

hydrogen and CO2 transport and storage), while at the same time sufficient scale projects need to be accelerated. This stimulates business investment, which needs certainty about conditions.

The types of financing for cities to achieve climate neutrality must be based on different financial sources (international, European and domestic). Most of the investment to achieve climate neutrality will have to come from citizens (e.g., taxes), property owners, businesses and other stakeholders. In fact, *Material Economics* estimates that only 17% of investments will come directly from cities. Creativity and collaboration with diverse partners are critical to ensure that projects are feasible and sustainable, so it is important to consider a mixed and shared financial perspective to fund the project.

Several projects are already implemented to reach the goal of a climate-neutral transition for the city¹¹. Specifically, the CCC considers:

- Deltafund¹²
- EU funding¹³
- Havenbedrijf¹⁴
- Rotterdam Port Fund (RPF)¹⁵

¹¹1) European Green Deal to reach climate neutrality by 2050; 2) Delta Programme; 3) RCI; 4) Rotterdam joined the RUGGEDISED project to accelerate the path towards a sustainable future. National research programme *Knowledge for Climate* (Knowledge for Climate, 2014); 5) Governmental subsidy projects for green mobility and housing solutions

¹² The investments of the aforementioned Delta Fund are entirely part of the government budget and are thus solely government investments. This means a significant part of the funding for this contract will be government-funded.

¹³ The EU also supports Rotterdam in getting more green. Therefore, the EC helps invest in projects as part of this contract, largely on a grant basis. In 2021, the port will receive an investment of \$25 million as a grant to reduce emissions. The city received an investment of \$7 million for circular chemical substances. So, EU funding can be a useful tool in achieving the goals of this contract.

¹⁴ This is the private entity of the harbor. This harbor company exploits, manages, and develops the entire Rotterdam harbor area. Even though this organization is private, its shares are owned by the municipality of Rotterdam (70%) and the Dutch State (30%). The company is currently involved in two large investments. This governance ownership The graphic shows the types of investments that the company enters into, with at least one governing body usually involved. First of all, a partnership with private companies ExxonMobil and Shell to capture CO2 and store it in empty gas fields in the North Sea. This investment totals 500 million euros. Secondly, in cooperation with the municipality of Rotterdam, an investment of 125 million euros is made. This investment aims to create infrastructure that provides ships in the harbor with green power from the land instead of polluting diesel generators.

¹⁵ In this fund, the port tries to combine public and private partners to create an investment fund. Partners such as NIBC are involved in investments to make the port more sustainable. Furthermore, the fund aims to support companies with investments to help achieve this goal.

- Neste¹⁶
- EU's 2021–2027 long-term budget, together with the NextGenerationEU recovery instrument¹⁷

Table 15: Budgetten Deltafonds in 2019 en in totaal op basis van de Ontwerpbegroting 2020 (in miljoenen €)

| | | 2020 | totaal (2020-2033) |
|---|---|----------------|--------------------|
| Art. 1 | Flood risk management investments | 462.4 | 6,568.5 |
| Art. 2 | Freshwater supply investments | 27.5 | 78.0 |
| Art. 3 | Management, maintenance, and replacement | 133.3 | 2,733.3 |
| Art. 4 | Experiments | 13.0 | 902.4 |
| Art. 5 | Network-related expenses and other expenditure of which Investment scope | 328.8 17.5 | 5,685.1 1,174.6 |
| Art. 6 | Contribution from other national budgets | - | - |
| Art. 7 | Water quality investments | 127.5 | 770.1 |
| Total expenditure under Delta Fund | | 1,105.0 | 17,911.9 |

In regards to the funding of the energy transition for housing, there are a wide range of government subsidies available. Citizens can and must apply for those themselves. There are national subsidies for isolation materials, solar panels, and non-gas heating.¹⁸ Additionally, Dutch cities and provinces also have their own available municipal funds to provide their inhabitants with subsidies.¹⁹

Concerning mobility, the financing is twofold. First of all, there is another subsidy structure provided by the Dutch government for people who drive electric or hybrid cars.²⁰ Next to this is

However, the size of this fund is quite low, as even the largest investments do not exceed 10 million euros.

¹⁶ Neste announced that they have chosen Rotterdam as the intended location for a €1.5 billion investment to expand their sustainable fuels production capacity (renewable diesel and jet fuel) and raw materials for the chemicals industry.

¹⁷To help achieve its climate goals, the EU has decided to mainstream, or integrate, climate action across the entire EU budget. The EU's 2021–2027 long-term budget, together with the NextGenerationEU recovery instrument, amounts to €2.018 trillion at current prices (€1.8 trillion at 2018 prices).

¹⁸ The percentage that citizens can get reimbursed varies from 21 to 30 percent.

¹⁹ In Rotterdam, there is a subsidy for making houses more green, thus collecting rainwater.

²⁰ People who buy electric or hybrid cars will receive a flat subsidy of 2950 euros for a new car and 2000 euros for a used one. Furthermore, people who drive these vehicles get tax advantages.

government funding for innovation. This year, the National Growth Fund has set aside 4,55 billion euros for pharmaceutical research and mobility innovation.²¹

The costs of the proposed measures in this contract are divided between several categories:

| | |
|--|---------------|
| Installations to contain flooding (such as physical barriers) | € 50.000.000 |
| Development of technologies to monitor flooding (such as drones) | € 40.000.000 |
| Construction of safe and gas-free houses | € 200.000.000 |
| NBS implementation | € 30.500.000 |
| Training of Engineers | € 20.000.000 |
| Training of Data Manager | € 20.000.000 |
| Port of Rotterdam climate transition | € 150.000.000 |

It is estimated that the total costs of the measures listed above will reach EUR 600.000.000.

The financial structure should be placed on the short to medium term in order to achieve climate neutrality goals in the period between 2023 and 2030.

²¹ Until 2026, this fund contains 20 billion euros in total for these purposes.

The investments will prioritize making the Port of Rotterdam climate neutral.²² Investments have climate neutrality of the Port of Rotterdam as a priority. This is followed by investments in housing and mobility, which are equally important.

Since the corporatization of Dutch ports, public-private partnerships (PPPs) have become the means to manage port operations more effectively²³. Since municipalities are the major shareholders in most Dutch ports, port authorities that engage with private companies do so through PPP transactions.

The partnership may be solely financial (donations and sponsorship), or may involve a more concrete collaboration²⁴. Whereas the state-owned parties are responsible for the project and the investment in the infrastructure, private companies invest in capture and pay for storage. The ‘landlord port model’ is the dominant model in Dutch ports. However, the legal title to the land in ports still rests with the municipal government, and the port authorities have leased this land in perpetuity. Third parties – individuals companies – looking to establish their business within a port must therefore approach the relevant port authority to conclude a lease agreement for the granting of access to a plot of land or certain facilities within the port area.

Section IV. Implementation

1. Multilevel governance

In Rotterdam, the projects follow horizontal subsidiarity, and we believe that the contract will be more powerful if it implements the quintuple-helix stakeholder model, creating more cohesion between all the actors involved.

In such a labor market, in which new opportunities for the economy and employment are to be exploited and a lack of well-trained personnel is to be avoided, dialogue and joint efforts by regional governments (municipality and province), educational and knowledge institutions and the business community are essential.

²² The port, as mentioned before, is by far the biggest polluter in the city. Investing in making the port sustainable will be most effective in achieving the goals. Furthermore, ensuring a sustainable future for this harbor will require great strides to guarantee the economic future of the city.

²³ PPPs are based on the following principles: (i) both parties invest in the project in a financial sense (e.g. materials budget) and in an expertise-related sense (e.g. knowledge); and (ii) both parties contribute to a societal and often commercial purpose.

²⁴ The Dutch legislature has not enacted specific PPP law in the Netherlands. However, development of port areas may be subject to EU procurement rules.

The government should play a more active role than just controlling; it is responsible for the planning of public projects.

Collaboration between the public and private sectors is a key to the success of the contract, according to the interests of the smart city. Also crucial is the role of nonprofit organizations and all local associations that can provide concrete support for citizen awareness and empowerment.

The climate city contract is in line with the policies and programs already in force in Rotterdam: the 2006 National Spatial Strategy, the 2007 Programme on Climate Adaptation and Spatial Planning, and the 2007 Rotterdam Climate Initiative (RCI).

2. Multi-stakeholders

These government policies are crucial to helping the transition to climate neutrality, and they use financial incentives for companies that invest in smart cities to further attract external investments.

In the future, companies will have to meet sustainability commitments, and Rotterdam has the public infrastructure to succeed in this transition. We believe that the city will attract investments also because of the great civil contribution that the residents make to reaching these goals.

Sustainable cities bring benefits to residents, adding to their *investment potential*.

The public's participation creates a wealth of data for the city. This data could be an incentive for private investors to create projects that benefit the citizens, but while the companies are rewarded for this, it must be sure that the privacy and security of the users are respected and the contract terms are clear.

3. Community empowerment

To work all together more efficiently, the creation of an effective *data center* is needed to improve coordination and cohesion among the different actors involved.

In an ideal solution, all necessary data would be available in a compatible format. In this situation, challenges need to be addressed in data collection, transmission, integration, visualization, and management.

This is why the collaboration between the public and private sectors is fundamental : it will have *positive effects* on the community. Companies must work with governments and invest in reliable networks, cybersecurity, and backup systems.

The residents will benefit from the realization of smart cities because the city and its services will be more transparent and fair. Users will always be connected to the services, and they will always be informed about every movement or transaction.

That's why the most important benefits that smart cities will bring to the community are safer management of data and a data center that will always operate in the community's interest.

Section IV.2 Work Packages

In order to achieve the final goal of this contract, namely the acceleration of Rotterdam's climate-neutral pathway by 2030, sub-goals were identified that are achievable through the following work packages:

| Work Package No | Work Package Title | Short description | Participants | Start | Finish |
|-----------------|-----------------------------|--|--|----------|----------|
| 1 | Public-Private Partnerships | Fundamental basis, provided through quintuple helix collaboration, for fixing resources and funding | Government agency, private sector company | Jan 2023 | Dec 2024 |
| 2 | Training of DM Experts | Implement data sharing technologies to analyze ships entering and leaving the port in order to make port traffic management more efficient | Technology consulting companies research institutes and universities | Sep 2023 | Dec 2024 |
| 3 | Training of Engineers | Training for city planning and project for converting excess water (caused by floods) into hydropower | R&D, universities, specific companies | Sep 2023 | Dec 2024 |
| 4 | Digitalization | Development of advanced technologies with lower environmental impact, including those for flood management (e.g. drones and physical technological barriers) | Investment institutions, technology service providers (civil and IT engineers) | Jan 2025 | Oct 2026 |
| 5 | Revision of City planning | Implement adequate infrastructure for electric car sharing, such as an equitable distribution of charging stations in the territory, which should also be available in the private parking lots of homes. This | Municipality, Automotive Groups and Civil Engineers | Sep 2024 | Sep 2026 |

| Work Package No | Work Package Title | Short description | Participants | Start | Finish |
|-----------------|--------------------------------------|---|---|----------|----------|
| | | package also includes: bike sharing and ride sharing. | | | |
| 6 | Partnerships Circular Economy | Partnerships between waste disposal companies and companies that produce products and services to intensify waste recycling processes | Recycling, disposal, product and service companies, industries with facilities, municipalities | Jan 2025 | Jun 2026 |
| 7 | Housing | Constructing safe buildings using sustainable materials and fueling them with renewable gas (e.g., biogas, biomethane, or green hydrogen), applying anaerobic digestion to transform organic waste with the circular economy. In addition, roofs should be prepared for the application of solar panels | Municipality, Civil engineers, architects, plant technicians, solar panel companies, circular economy companies, and waste disposal companies | Sep 2026 | Dec 2027 |
| 8 | E-Waste | Rotterdam is a highly digitized city, but the huge use of electric transport and advanced technologies, and thus large batteries, also leads to a large production of e-waste, which is among the most hazardous to health and the most difficult to dispose of | Electronics companies, citizens, municipalities, industries with installations and circular economy participants | Jun 2025 | Dec 2025 |
| 9 | Nature Based Solutions | Design green areas on buildings, shared gardens, vegetable gardens, oases and urban orchards to improve the quality of the atmosphere, with indirect effects on health and | Municipality, architects, environmental engineers | Sep 2027 | Apr 2028 |

| Work Package No | Work Package Title | Short description | Participants | Start | Finish |
|-----------------|----------------------------------|--|---|----------|----------|
| | | psychological welfare | | | |
| 10 | Automatic Guided Vehicles | Design AGV to unload containers faster and more efficiently, so as to reduce the problem of too long dwell time and thus the accumulation of containers (even empty ones) | Computer scientists and developers, port authority | May 2028 | Dec 2028 |
| 11 | Education for Residents | Education of residents, both at school and work, for proper waste management and use of available infrastructure and technology | University, R&D, state/municipality | Sep 2025 | Dec 2030 |
| 12 | Online Platforms | The final output is the development of a platform open to all residents, businesses, and institutions to share their ideas, experiences, and to increase the sense of ownership of this large project for the city, using a crowdsourcing approach | Consulting companies, software companies, citizens, municipality, data management | Oct 2028 | Apr 2029 |

Section V. Monitoring & Assessment Framework

The goal and changes must be aimed at achieving a more sustainable and efficient city. Changes we are expected to see:

- More citizen involvement and empowerment
- Better utilization of technology and skilled people to upgrade each sector
- Regenerating the port, making it not only a source of income but also a mean to research and development
- Exploit environmental disasters and not be afraid of them. Use floods to crew energy and fight heat waves with natural solutions
- Change citizens' behavior for the way they move around, and improve service efficiency through digitisation
- Make the city greener and more vibrant, so as to invite new investors.
- Cleaner means of transport, thus making the city more liveable and healthier

1. The expected wider economic and societal impacts

The focus of this project is more than just the reduction of emissions. Making a city sustainable and innovative means creating synergies between all the different actors at all levels to improve this ecosystem. With our initiatives, Rotterdam will achieve its goal of climate neutrality, but not only that: by improving as a city, it will attract entrepreneurs, and they will establish new businesses. More communication and collaboration between the various governments will result in fairer and more accurate policies. Thanks to the exploitation of renewable energy, Rotterdam will gain much more independence in the field; citizens will be more active, informed, and aware. New institutions will be attracted to the new Rotterdam, establishing their bases for future research, experimentation, and innovation.

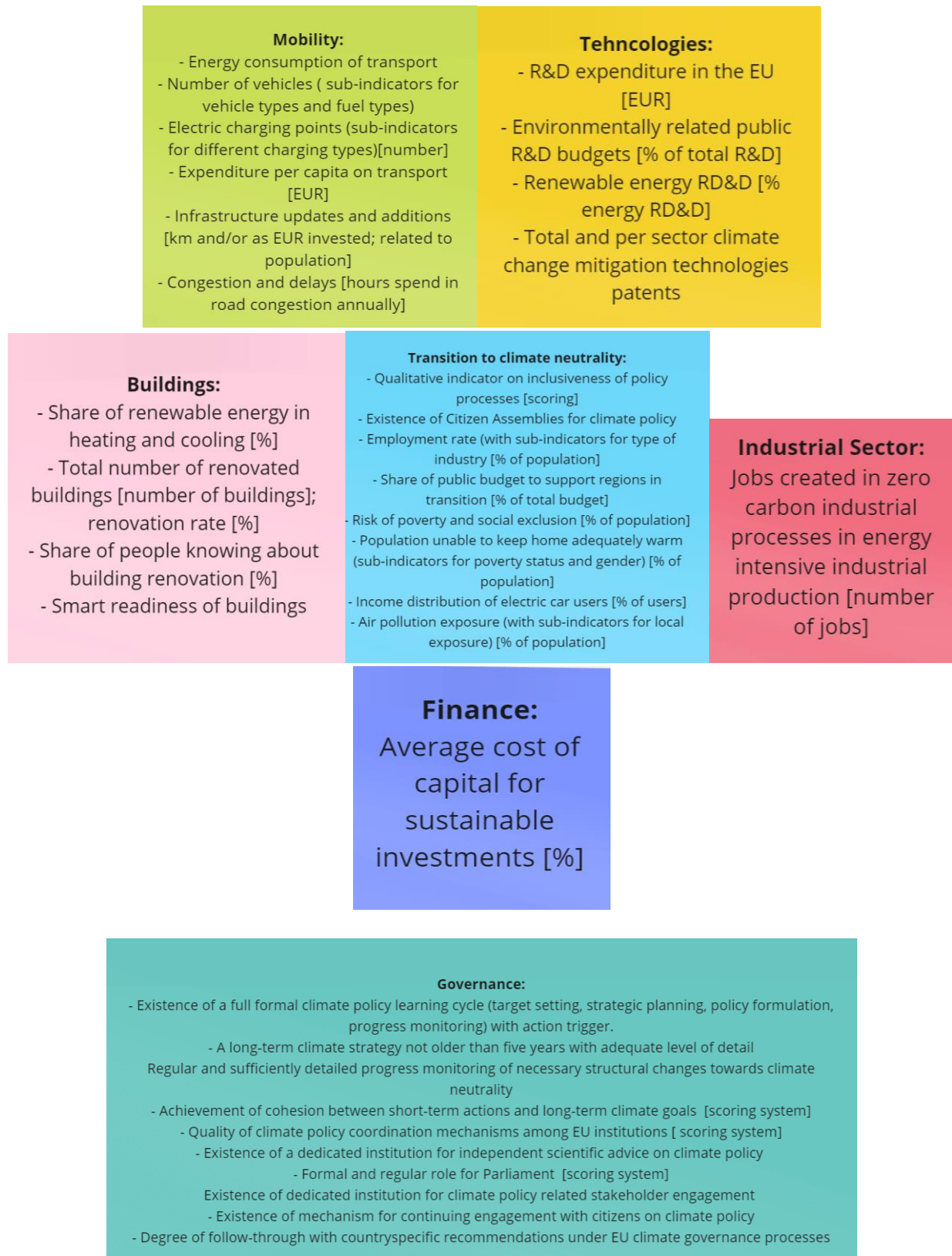
2. The expected co-benefits of the project

Rotterdam, thanks to this project, is the protagonist of an ecosystem. A system based on sharing, in which each actor contributes to the better functioning of the whole and reaps benefits. First and foremost, the citizens will see a city that meets their needs developing around them, and through their behavior, they will be able to contribute to its improvement. The state will receive support from the other actors and guarantee equality and accessibility to all, respecting fundamental principles. The city's greener life will lead stakeholders to invest in its assets, increasing the prospects for profit. Thanks to the implementation of technologies, it will be possible to make the city a hub for research and development, benefiting the institutions and the citizens. Having overcome its obstacles, the port will enable the city to become a center of world trade.

3. The solutions and policy transfer capacity provided by the project

The basis for achieving Rotterdam's climate neutrality was already reasonable before implementing this project. To implement the latter in more cities, these would need to be equipped with a strong base of technological installations and investments in the critical sectors. In order to make the contract applicable not only at the level of one city but at a regional or national level, collaboration between cities and higher institutions will be even more necessary. More importantly, there would need to be a desire from all participants—municipalities, institutions, and citizens—to reach the purposes and work together for a more sustainable future.

Key Performance Indicators (KPIs)



Key Impact Pathways (KIPs)

| Towards Ecological/Climate impact | Short -term | Medium-term | Long-term |
|--|--|--|--|
| Readiness of buildings | All new buildings are gas-free ready | Old buildings are gas-free ready | More than 85% of buildings are gas-free |
| Installation of solar panels | Solar panel installed at district level | Solar panel installed at city level | Solar panel installed an national level |
| Water Storage | Protect and restore 30% of water | Protect and restore 40% of water | Protect and restore 50% of water |
| Nature Based Solutions | NBS are implemented at the district level, where there are most critical situations | NBS are implemented at the city level | NBS are implemented at national level |
| Towards Scientific impact | | | |
| Water Management | Build and upgrade a database of resilient water management case studies. | Scholarships for initiatives to water management | Institutions based on developing water management technologies |
| Measurement of results | Storing and cleaning data | Implementation of the predictions made about data | Verification and measurement of actual results and predictions |
| Towards Societal impact | | | |
| Citizen empowerment | Citizens are helping others make right choices in their energy management, production, consumption | Citizen participation has increased as prosumers and drivers | Civil society continues to actively contribute to the shaping of policies and strategies |
| Cycling monitoring | 30% of people own a bike instead of a car | 40% of people own a bike instead of a car | 60% of people own a bike instead of a car |
| Towards Economic impact | | | |
| Leveraging | Co-investments | Co-investments | EU investments |

| | | | |
|--|--|---|---|
| investments in infrastructure | between districts and Municipality | between cities at national level | |
| Transition to electric vehicles | 30% electric cars | 50% electric cars and trucks | 80% electric cars and trucks |
| Fundings for water management | Crowdsourcing for water management fundings | Financial institutions revise protocols and incentives to create an enabling environment for innovative green / nature - based solutions. | Investors are setting science - based targets for water and climate across their portfolios |
| Creation of jobs | Support new employment | Sustain the employment | Increase number of direct and indirect jobs created |
| Towards Urban Governance impact | | | |
| Implementation of policies | Policies for structural change and transition | Policies directly supporting renewable energy deployment | Policies to ensure continuous monitoring |
| Traffic Management | Parking, pricing regulations and vehicle access regulation in the city | Ensure institutional structures and processes support integrated planning and promote sustainable urban transport | Keep promoting incentives for public transportations |

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