

ROTTERDAM CLIMATE INITIATIVE (RCI)	
Overview / summary of the initiative	
	Title: Rotterdam Climate Initiative (RCI)
	Country: The Netherlands
	Thematic area: Climate change, low carbon transition // Circular economy and re-industrialisation
	Objective(s): i) reduce CO2 emissions by 50 per cent by 2025 (as compared to 1990) (climate change mitigation), ii) climate-proof and adapt the city to the consequences of climate change (climate change adaptation), and iii) strengthen the Rotterdam economy.
	Timeline: 2007-2025
	Scale of the initiative (resource/budget indication): To reduce CO2 emissions, three main instruments are foreseen: increasing energy efficiency in industry, using more renewable energy and Carbon Capture and Storage (CCS). The RCI also includes a climate change adaptation plan (RCP – Rotterdam Climate Proof) that foresees in a broad mixture of actions and measures, ranging from floating buildings, dedicated water storage areas to climate-proof buildings. The CO2 reduction aim entails a 34 Mton reduction, bringing emission levels back to 12 Mton by 2025. Initial budget allocation: 50mio EUR over the period 2007-2011 by the municipality of Rotterdam, of which 7 mio EUR spent on organizing and speeding up of the CCS cluster approach. Anticipated investment in CCS when mature, as one of the main pillars of RCI: 330 m EUR public investment (150 m EUR by the national government and 180 m EUR by the EC) and 100 m EUR private investment (from energy companies).
	Scope of the initiative <ul style="list-style-type: none"> • Focused on new knowledge creation (basic research, TRLs 1-4): CCS; climate adaptation (e.g. floating buildings) • Focused on knowledge application (applied research, TRLs 5-9): CCS; 100% climate proof city; climate adaptation • RCI is a programme with various measures and actions directed at its four main themes: energy efficiency improvements, sustainable/renewable energy, Carbon Capture and Sequestration (CCS) and climate change adaptation. Especially CCS, but also cleaner transport and logistics, climate proof buildings, warmth-steam exchange, and climate change adaptation have a considerable R&D&I component
	Source of funding (public/private/public-private): Public (City, national government and – anticipated - EU) and private
	Granularity of the initiative (initiative, policy approach): Policy approach
	Source (webpage): http://www.rotterdamclimateinitiative.nl/ (various publications and overview of measures and actions, including city government plans, mid-term reviews, communications)
	Brief description The Rotterdam Climate Initiative is a public-private partnership, agreed between the City of Rotterdam, the Port of Rotterdam, DCMR Environmental Protection Agency Rijnmond, and Deltalinqs (umbrella organization representing logistics and industry), with the objective of reducing CO2 emissions by 50 per cent by 2025, climate proofing the city and strengthening the Rotterdam economy. The RCI Action Programme has five pillars: Sustainable City, Energy Port, Sustainable Mobility, Energizing City and InnovatieLab. After a starting-up phase focused on CO2 reduction (2006-2007), the climate change adaptation part was added in 2008, with a broad package of measures agreed and gradually implemented by 2008-2009. By 2011 the RCI became a dedicated national Green Deal (see I e below). However, as from 2014, after substantive political change following local elections and the start of a new city council, the CO2 objective was downgraded and the RCI's aim was refocused on "green growth, innovation, energy efficiency and cleaner sources of energy, aimed at reducing pollution for the city (cleaner air), improving the competitive position and attracting new clean technology companies." A substantial reduction in CO2 emissions was no longer the primary and unifying goal of the RCI. CCS had made little progress in the meantime, due to funding problems but also because of technological challenges. The CCS ambitions were to be taken up by the joint venture ROAD, led by two energy-producing companies Uniper and Engie (owners of two new coal-fired plants in the Rotterdam region that came into operation in 2014 and 2016 respectively). Although the majority of funding needs had been secured (mostly public), a financial gap remained with private partners appearing lukewarm to take on the challenge of scaling up the demonstration phase. By September 2017 ROAD was dismantled. A new consortium led by the Port of Rotterdam announced revised plans by November 2017, reacting to plans of the newly formed national government as from October 2017 to take up CCS as one of the main ways to reduce CO2 emissions in the following decade. The coal-based energy production in the region (a decision taken at national level in 2008 and that also entailed the closure of older plants in other parts of the Netherlands), the fact that CCS and the recent commissioning of Maasvlakte 2 (newly made land at the Rotterdam sea shore for industry and harbor purposes) are main reasons why CO2 emissions in the Rotterdam region substantially increased rather than decreased during recent years. Although CO2 reductions are still possible and in sight in later years, it was political forces that changed the RCI content and ambitions since 2014. The

Climate change adaptation plan – Rotterdam Climate Proof (RCP) – has been forging ahead. The RCP has focused on a five themes: flood management, accessibility, adaptive building, the urban water system, and the urban climate.
I: Background, origin, mission and ambition
<p>Ia: Origin The origin of the Rotterdam Climate Initiative can be traced back to 2006 when two energy companies announce plans to build new coal-fired power plants in the Rotterdam region. These plans spark a debate on the need / necessity of new generation capacity in the Netherlands and its environmental consequences. The Rotterdam Environmental Protection Agency DCMR develops an assessment framework for the new power plants, including demands for capture readiness. Early 2006, the Dutch secretary for the environment visits Rotterdam and discusses the environmental consequences of the new plants. DCMR suggests the possibility of Carbon Capture and Sequestration (CCS). DCMR starts a cost/benefit and opportunity survey study for CCS activities in the Rotterdam. End 2006 the conference “New Energy for Rotterdam” initiates an advice by the International Advisory Board (IAB) of Rotterdam holding that Rotterdam should be the “world capital of CO-free energy” in 2025, aiming for a CO2 emission reduction of 50% by 2025 and with CCS mentioned as an important opportunity for Rotterdam. In December 2006 the Mayor of Rotterdam meets Bill Clinton during his visit to the Netherlands who invites Rotterdam to the Clinton Climate Conference in May 2007 in New York. The Municipality together with DCMR, Deltalinqs and the Port Authority, develops a plan to realise the IAB advice. This plan is completed in May 2007 and forms the basis for the RCI, with ambitious <u>climate change mitigation</u> goals for city, port and industry based on energy efficiency improvements, increased use of renewable energy and CCS. The plan is the basis for the Rotterdam Climate Initiative, which also includes <u>climate change adaptation</u> as its 4th main theme. RCI starts as from May 2007 and is celebrated at the Clinton Climate Conference where Rotterdam is hailed as one of the three CCS-capitals of the world. The RCI starts half a year before the European Commission’s Climate Action package (January 2008) with CCS being an important part and enabling financial support.</p>
<p>Ib: Initiator City of Rotterdam, together with the Port of Rotterdam, DCMR Environmental Protection Agency Rijnmond, and Deltalinqs, based on an advice by the IAB of Rotterdam (see Ia).</p>
<p>Ic: Mission and ambition The RCI’s original overall mission initially was to reduce CO2 emissions in the greater Rotterdam area by 50 per cent by 2025 (as compared to 1990) and to make the Rotterdam region a 100% climate proof (‘Rotterdam Climate Proof’ (RCP)). By 201</p>
<p>Id: Decision making process</p>
<p>Ie: Linkage to other governance levels Linked to the national goal of 16% CO2 reduction by 2025. Linked also to the EU climate change goals, including the RCI ambition to develop CCS beyond the pilot and demonstration phase. RCI comprises the local (city) and regional (wider Rotterdam area), with financial support of the national government and the EU. The Dutch Ministry of Environment and the Rotterdam Climate Initiative (RCI) sign a cooperation agreement (Memorandum of Understanding, July 2007), with the aim of accelerating the realisation of large-scale CCS in the port of Rotterdam. In 2010 the RCI and the national government agree on a <u>Green Deal</u> with the aim to get rid of any barriers and obstacles that hinder realisation of the RCI, with a concrete number of actions (7) and associated KPIs. The Green Deal starts in 2011 and ends by 2015.</p>
<p>If: Geographical scope Regional</p>
<p>Ig: Time span 2007-2025</p>
II: Formation
<p>Iia: Driving forces Most active actors at the very outset appear to be the International Advisory Board (IAB) and DCMR. The lead in the process was firmly taken over by the city of Rotterdam by 2007. The Rotterdam Climate Initiative is a public-private partnership, agreed between the City of Rotterdam, the Port of Rotterdam, DCMR Environmental Protection Agency Rijnmond, and Deltalinqs. Other driving forces have been the national government (2011 Green Deal) and the EU climate package (2008).</p>
<p>Iib: Approach Partnership approach, top-down. Determined at regional level</p>
<p>Iic: Citizen involvement No direct citizen involvement</p>
III: Technical and political feasibility
<p>IIia: Technical feasibility assessment CCS technical feasibility was part of an initial assessment by DCMR (see Ia), followed by a feasibility study on distribution, handling and storage by Gasunie and VOPAK, and the establishment of a pilot and demonstration CCS project (ROAD: Rotterdam Capture and Storage Demonstration project), led by two energy companies and supported by the Port of Rotterdam (for CO2 transport) and Oranje-Nassau Energie (for CO2 injection and storage). By September</p>

<p>2017 the latter joint venture was dismantled. Other parts of the RCI were assessed in terms of economic feasibility and CBA by BCG (RCI) and Ecorys (RCP).</p>
<p>IIIb: Ex ante technical and risk assessment Risk assessment: see IIIA. A cost-benefit analysis was made of the Climate adaptation plan (RCP) by consultancy Ecorys. The Boston Consulting Group (BCG) investigated the ex ante economic impact of the RCI. CATO and the Global CCS Institute together with TNO investigated the CCS needs and risks. A CCS safety study was done by DNV.</p>
<p>IIIc: Success factors Close cooperation at city/regional level in a public-private partnerships and a coordinated effort by the City and a concerted lobbying and communication effort at national, European (EC climate package) and international level (Clinton Climate initiative). Whereas the themes sustainable city, sustainable mobility and renewable energy were taken up in several projects, increasing energy efficiency in industry and CCS appeared more difficult to implement. CCS demonstration efforts ended in September 2017 when the CCS joint venture ROAD ceased to exist. CCS is a highly experimental and unproven technology. Leading private actors in the ROAD joint venture stepped out because “they could no longer justify further investment in the project”. The structurally low CO₂-price over the last years created a financial mismatch due to which the final investment decision was postponed several times. For the change in RCI CO₂ ambitions itself, however, a political change in the composition of the city government was responsible. The newly elected city council abandoned the original CO₂. The RCI was redefined.</p>
<p>IIId: Incentives RCI as a public-private partnership was able to set in motion the initiative and to create sufficient ‘ownership’ for the project. Technological and financing challenges sector part formed a barrier for the swift take-up of the CCS part of the RCI programme. External factors (two new coal-fired plants, the start of Maasvlakte 2, a strong recovery of the economy and - hence – of economic activity in the region led to a strong increase in CO₂ emissions. A political change in local government led to a revision of one of the major RCI aims – the RCI had not been made ‘politically-proof’ in the longer term. The fact that individual companies did not take part in the RCI meant that in terms of institutional set-up and structure the parties that were expected to deliver most in terms of energy reduction and CCS did not take part automatically.</p>
<p>IIIe: Political and societal assessment The mid-term review by 2010 indicated that the RCI was well on track. By 2014 political developments in the city region led to a different priority setting for the RCI. One of the main external criticisms of the programme is that citizens have been left out and that the initial programme had too much a top-down character.</p>
<p>IIIf: Interim political and societal assessment See IIIe. Renewed assessment and different political preferences of a differently composed government led to different policy choices, while RCI as a brand and initiative itself remained intact.</p>
<p>IIIg: Financial risk assessment Even though a CBA, an ex ante impact assessment and a CCS needs and technological risks assessment has been made, an overall integral financial risk assessment could not be found. The 2010 interim review does not contain a risk assessment either. The overall evidence base built up since 2007, however, is substantial and easily accessible. Still it is difficult to get a clear picture what has actually been spent since 2007 on the RCI programme.</p>
<p>IV: Governance: organisation, management and coordination</p>
<p>IVa: Governance The initiative has been set up by the City of Rotterdam in close collaboration with the three earliermentioned partners. For particular parts of the programme, specific entities have been established such as the ROAD joint venture for the CCS demonstration project. This also holds for other parts of the programme, e.g. the warmth-steam exchange (‘Stoempijpproject’)</p>
<p>IVb: Progress monitoring The overall initiative is monitored by RCI, with a baseline (“zero”) measurement, a mid-term review (2010) and annual reporting. This was done on a regular basis during the period 2007-2010. During the next city council period, new tools were introduced, such as the annual Rotterdam Sustainability Monitor, to be abandoned again by 2014. Progress monitoring is not as structural and informative as it could have been. It appears very difficult to obtain precise economic and financial data (e.g. actual expenditures on RCI by category, private investment, etc).</p>
<p>IVc: Public-private involvement Public-private partnership with the city of Rotterdam as the leading partner.</p>
<p>IVd: Communication and dissemination Various reports, easily accessible via the website. Strong involvement of the city council and the mayor at international and European meetings/for a, etc.</p>
<p>V: Resources and budget needs/availability</p>
<p>Va: Scale The original anticipated budget allocation by the City of Rotterdam for RCI during the period 2007-2011 was 50 million EUR. The RCI programme entails various measures and actions. An up-to-date comprehensive overview of actual budget expenditure has not been found. The budget needs for CCS (ROAD demonstration phase) were 430 million EUR (started but not realised). The demonstration CCS phase was scheduled to be reached by 2016 with over 1 Mton CO₂ captured and stored annually.</p>

<p>Vb: Funding sources Public: city of Rotterdam, Port of Rotterdam, national government, EC (intended), Global CCS Institute Private: energy companies, Deltainqs</p>
<p>Vc: Allocation of the budget 2007-2011: city of Rotterdam: 50 m EUR allocated. In the period 2014 By end 2011: 7 m EUR public money on CCS (“seed money”) and an estimated 70 m EUR private funding. Reserved funding (majority not spent): 330 m EUR public and 100 m EUR private funding.</p>
<p>VI: Policy mix and integral (‘holistic’) use to deploy mission-oriented R&I-initiatives</p>
<p>Via: Policy mix A distinction can be made between the policy mix for climate change mitigation, i.e. CO2 emission reduction measures, and climate change adaptation measures. For mitigation three measures have been deployed: energy efficiency improvements (various actions), renewable energy use (esp biobased but also wind) and CCS (demonstration phase so far). For adaptation various measures have been deployed including water retention areas, floating buildings, climate-proofing of existing buildings (adapted rooftops, energy performance contracts).</p>
<p>Vib: Engagement of citizens No direct engagement of citizens, other than through communications to the public and actions directed at the public. But no policy formulation with the public. The first CCS storage location foreseen, Barendrecht, has been strongly opposed by local residents and has been opposed by Barendrecht politicians. Barendrecht is a municipality close to Rotterdam city, and part of the wider Rotterdam region, but not Rotterdam city.</p>
<p>VII: Embeddedness of and connectivity with related initiatives (regional, national, supranational, global)</p>
<p>VIIa: Relationships/links/synergies to similar initiatives elsewhere In 2011 a national Green Deal was struck (agreement between RCI and the national government). CCS aims have met financial support from the national government and the EC. Rotterdam Climate Proof has been a part of the RCI. Rotterdam took part in the Clinton Climate Initiative. Rotterdam initiated the global knowledge network Connecting Delta Cities. Leadership role climate adaptation in the C40 Climate Leadership Group in which cities worldwide team up against climate change (closely related to the Clinton Climate Initiative).</p>
<p>VIIb: Links to UN Sustainable Development Goals The initiative is linked to UN SDGs 13 (climate action), 11 (sustainable cities and communities), 7 (affordable and clean energy), 9 (industry, innovation and infrastructure) and 17 (partnerships for the goals).</p>
<p>VIII: SWOT analysis</p>
<p>VIIIa: Strengths Strong and convincing start, strong communication and independent advice/studies, and a shared public-private initiative representing an important part of the stakeholder community. Strong linkages and ties with the outside world (international, European, national). Frontrunner in terms of CCS aspirations. Serious efforts in measuring outputs and impact, certainly during the first period (2007-2011). Various independent studies on feasibility, ex ante economic impact, risk.</p>
<p>VIIIb: Weaknesses Political commitment for the first term (2007-2010), followed by a second term (2010-2014) but not a third (2014-2018) which by then led to a serious reorientation and dismantling of the original RCI CO2 aim. Changing political agendas over time have proven a key threat to the initiative. Another weakness is the absence of direct involvement of citizens and individual companies. Especially the latter made the RCI a non-binding contract for private stakeholders. Regarding CCS specifically: the institutional structure of the ROAD joint venture was such that private companies were leading. CCS investment decisions were postponed several times and eventually abandoned. The decision to allow two new coal-fired plants in the Rotterdam region was taken at national level and could not be influenced by the region.</p>
<p>VIIIc: Opportunities Rotterdam was one of the first EU bigger cities to establish a climate change agenda combined with a sustainability agenda and was teaming up internationally. Exchange of practices and experiences in C40 context and to other governance levels (national, European) offered clear learning opportunities for other cities and governments. The ambition to establish a European CCS demonstration plant further added to the importance of the Rotterdam climate initiative.</p>
<p>VIIIId: Threats In recent years the CO2 price at EU level decreased to such low levels that private investments in CCS became unattractive financially. This was not foreseen at the start of the RCI. A second threat was the stance of the national government that after 2010 did not make a firm step to fully embrace CCS as an important option to combat CO2 emissions. The opposition in the 2008-2009 period against CCS – both of public opinion and of local politics in the town of Barendrecht, one of the foreseen storage locations – delayed the process and most likely also affected the stance of the national government.</p>
<p>VIIIe: Lessons learned The RCI has been able to mobilise at lot of attention to climate change problems and possible solutions at local and regional level in international, European and national policy arenas. The mission itself has changed since 2014 due to</p>

political change – a new city government abandoned one of the main aims of the RCI (CO₂ emission reduction of 50% by 2025). The mission aim appeared vulnerable not only politically, but also economically. The resurrection of the Rotterdam economy after the financial and economic crisis led to a boom in economic activity and as a result also CO₂ emission. CCS itself, on which the RCI betted most in terms of CO₂ reduction (through storage) appeared difficult technologically and financially. The latter was related to both policy and market development (CO₂ pricing). Nationally funds had been freed to support CCS. However, CCS stayed a regional initiative and was not fully embraced at the national level. Only with the new government Rutte-III (October 2017) CCS came back on the national agenda, after ROAD had been stopped (September 2017).

References

Various newspaper articles, in Dutch (Financieel Dagblad, Trouw, NRC); City of Rotterdam (2010) Programme on Sustainability and Climate Change 2010 - 2014 ('Investing in sustainable growth'); City of Rotterdam (2015) Making sustainability a way of life for Rotterdam. Rotterdam Programme on Sustainability and Climate Change 2015-2018

<http://www.rotterdamclimateinitiative.nl/> (various publications and overview of measures and actions, including city government plans, mid-term reviews, communications)