

ROTTERDAM – A RESILIENT CITY

Neetu Gode

Resilience has been most frequently defined as positive adaptation despite adversity. Over the past 40 years, resilience research has gone through several stages. Resilience is defined as the ability of a system and its components to anticipate, absorb, accommodate and recover from the effects of a hazardous event in a timely and efficient manner by ensuring the preservation, restoration, or improvement of its essential basic structures and functions (Global Framework: The international disaster for Strategy reduction).

A Resilient City is one that has developed capacities to help absorb future shocks and stresses to its social, economic, and environmental systems so as to still be able to maintain essentially the same functions, structures, and identity (Resiliencecity.org). Moreover, resilience in the urban context is the capability of the city to manage the changes and anticipate risk factors. There are multiple approaches to achieve city resilience. Some of them are Promoting Awareness, Infrastructure projects, Energy Cooperation strategies and working on Nature-based solutions. Many cities such as Rotterdam, Rochester, Surat, Miami, Semarang and many other cities around the world have adopted the Resilient City Approach.

Rotterdam is the second-largest city of the Netherlands and one of the major cities in North-Western Europe. It is situated at the Rhine-Meuse Delta. The city is extensively prone to rise river, sea and groundwater levels leading to a constant threat for the city. Increased precipitation and major heat stresses in and around the city have led to major issues. Rotterdam Climate Change Initiative (RCI) aims to realize a 50% reduction of CO2 emissions by 2025 and to make the city 100% climate-proof in the same year. The Climate Change Initiative aims to develop Rotterdam into an attractive, clean, accessible and safe port city.

The Rotterdam Climate (RCI) Initiative is a partnership between the City of Rotterdam, the Port agencies of Rotterdam, DCMR Environmental Protection Agency Rijnmond and Deltalinqs (representation of the corporate sector in Rotterdam), all government departments

of Rotterdam City and Rotterdam Castleton Commodities International (CCI). The Initiative also participates in the C40 Climate Leadership Group, a worldwide alliance of large cities all over the world collaborating on the Issues of climate change. The RCI closely cooperates with the Clinton Climate Initiative and also with cities such as New York, Shanghai, Singapore, Jakarta, Hong Kong, London and New Orleans. A strong network on a local, regional, national and international level is in place to ensure that good plans are actually carried out. The major strategies are given in the sectors of Water, Land use, Public Health and Energy.

The Climate Initiative aims towards a 50% reduction of CO₂ emissions and 100% climate-proof. The key objectives of RCI are concentrated in two programmes. The major focus is a 50% reduction of CO₂ emissions by targeting the following areas:

- **Sustainable City:** The emission of CO₂ of all homes and buildings in the city should be reduced by at least 50%, and this is to be achieved by saving energy and applying sustainable energy
- **Energy Port:** Aims towards an energy-efficient port. Rotterdam should become the energy port for low- CO₂ energy sources and products
- **Sustainable Traffic and Transport:** Promote sustainable transport by road as well as by water. Cleaner fuels and alternative vehicles should be adopted for cleaner air
- **Energizing City:** A clean and sustainable city of Rotterdam can only be achieved with the participation and cooperation of citizens, companies and organizations Environmental education programmes in schools, an energy conservation programme for companies, and publicity campaigns to persuade citizens to adopt new ways of responding to the climate change issue are measures taken towards this goal
- **Innovation Lab:** Rotterdam welcomes innovative initiatives and supports their implementation to take up a leading position in energy knowledge and developments

Another focus is 100% climate-proof city; by means of the climate adaptation programme ‘Rotterdam Climate Proof’, the Rotterdam Climate Initiative targets to make the city climate-proof through the following key aims:

- **Flood safety:** Ensure all water defences will be sufficiently strong by 2025
- **Accessibility:** A climate change resilient transport infrastructure for both the city and the port

- **Adaptive Building:** By 2025, the existing areas outside the levees (including the waterfront and port area) will be flood-proof, and new construction will be restricted to adaptive building
- **Urban Water System:** To avoid situations where the capacity of the surface drainage water system doesn't suffice for the surface runoff, the excess rainwater needs to be retained in reservoirs. Also, in times of drought, freshwater supply needs to be safeguarded
- **City Climate:** Aim is to improve the living environment in the city by means of shaded and cool public areas and climate-proof parks and green spaces such as green roofs

A few Short, Mid and Long Term initiatives are taken up in the city under various sectors.

1. Water Sector

Short Term - Flood-proof dike on a port under which Safe terps are planned, Tidal Parks which help in the production of Better water quality, Blue & Green framework for which Water Squares are planned

Mid Term - Flood-proof dike on port wherein Wet proof and elevated infrastructure planning is done near the port, Water Storage or smart reuse is done through Water collection & recycling

Long Term - Local reduction of heat stress for which Ecological structures are planned for local cooling, Bioswales are constructed for Natural infiltration & water collection

2. Land-use & Planning Sector

Short Term - Provision of Waterbodies is made to create a good microclimate and increase livability. Provision of Flood Wall and adjacent green area is made to plan for an attractive local environment

Mid Term - Adaptive developments are done to create a good microclimate, Tidal Parks are planned to increase the recreational facilities, Water butts and green courtyards are constructed for local rainwater collection and contributing to a Green Environment

Long Term - Adaptive Developments such as Floating developments, increased property values, linking of - dikes and real estate are planned. Wet surroundings are planned for which water-related industries & regional production are stimulated

3. Public Health Sector

Short Term - Climate Dike are constructed for Extra infiltration potential, Green-Blue ribbon contribute to Healthy ecological network

Mid Term - Provision of Flood Wall is made to Link neighbourhood with vegetation in waterfront and more Green, and more biodiversity, Water robust street or facade gardens are planned for Green and healthy streets

Long Term - Climate Dike are planned as wave barriers and also as public space; collective gardens are designed to contribute to Community building and Drainage collection

4. Energy Sector

Short Term - Green Roofs are designed for increased insulation and cooling

Mid Term - Green Facade and Blue Roofs are designed to Increased Cooling

Long Term - Green Facade and Blue Roofs are planned to reduce energy consumption

The Rotterdam Climate Initiative creates a movement in which government, organizations, companies, knowledge institutes, and citizens collaborate to achieve a 50 per cent reduction of CO2 emissions, adapt to climate change, and promote the economy in the Rotterdam region. In the area of adaptation, the Rotterdam Climate Proof programme participates in the Rotterdam Climate Initiative, collaborating with knowledge institutes and companies from the water management sector and the water boards in the Rotterdam region. Finally, it is evident that Rotterdam has successfully made efforts upon becoming a climate-proof city that will be safe and attractive to inhabitants, visitors and businesses in the future.