Partners in Progress 2024

Amsterdam

- DURATION

  Completed

- POPULATION 2024

  Amsterdam: 1,189,000 (Growth rate 0.59%)

- URA SCOPE

  STRATEGY. Shared Vision
  ECOLOGY: Green Urbanism

- TOPICS

  URBAN RESILIENCE, WATER MANAGEMENT BIODIVERSITY, BLUE-GREEN ROOFS, GREYWATER REUSE, PUBLIC-PRIVATE PARTNERSHIP

- MAIN ACTORS

  City of Amsterdam

TheBay Urban Visioning Awards

Project Urban PhotoSynthesis. Water-conscious and nature-inclusive energy from Amsterdam

Amsterdam is transforming. The weather is evolving—summers are becoming hotter, dry spells are extending, and when it rains, it pours. While we are committed to combating climate change, we are already witnessing its effects.

This calls for immediate adaptation to ensure that our streets, homes, parks, and canals remain safe and enjoyable.

Cities everywhere are rising to similar challenges: housing shortages, pressures on green spaces, the quest for cleaner energy, and the vital preservation of biodiversity. Amsterdam is among them.

The challenge lies in finding unified solutions to these pressing issues. One inspiring solution can be found on rooftops.

Though flat roofs are often designated for solar panels, there is so much more potential.

The Urban PhotoSynthesis project at the Mannoury building showcases the power of combining solar panels with green roofs that effectively manage rainwater—these dynamic blue-green roofs represent a bright future.

The system collects rainwater and utilizes cleaned shower water to irrigate the plants. In return, the plants cool the solar panels through evaporation, which enhances their electricity production.

The shade provided by the panels creates a mix of light and shadow that supports the growth of various plants.

This setup achieves multiple benefits simultaneously: it cools the city, insulates the building, captures rainwater, recycles water, promotes wildlife, and increases energy output.

The Mannoury complex, consisting of two towers and an underground parking garage, is abundant in greenery—from rooftops and balconies to a lush garden above the garage.

All the green spaces are interconnected, allowing water to flow quietly from the top roofs through the building, nourishing the plants throughout the year. This system reduces strain on the sewage system and fosters healthy, thriving greenery, contributing to a cooler and more liveable city.

Challenge

Like many cities around the world, Amsterdam is increasingly affected by the impacts of climate change. Summers are becoming hotter and longer, with more frequent and intense heatwaves. At the same time, heavy rainfall events are growing more common, often overwhelming drainage systems and causing local flooding. Periods of drought are also increasing, putting pressure on water availability for both people and urban nature.

These climate-related pressures are compounded by the steady loss of biodiversity in the city. As urban areas grow denser and green spaces are reduced or fragmented, habitats for birds, insects, and other wildlife disappear. The shrinking presence of nature affects not only ecosystems, but also the well-being of residents and the overall quality of the urban environment.

Amsterdam also faces the challenge of managing limited space while addressing housing shortages, the energy transition, and ageing infrastructure. All of this takes place in a context where global environmental issues—such as rising temperatures, shifting rainfall patterns, and ecosystem degradation—are becoming more severe.

These interlinked challenges require cities like Amsterdam to rethink how urban areas are planned, built, and maintained in a changing climate, where uncertainty and disruption are becoming the new normal.

Solution Proposed

The Urban PhotoSynthesis project was developed in response to the urgent and shared global challenges. Recognising that traditional thinking cannot solve today's problems, the project adopted a new, experimental and integrated approach. It created a collaborative space for partners to engage in open dialogue, learn from each other, and test innovative solutions in practice.

The core idea behind the project was to demonstrate that solar energy production and blue-green roof systems can enhance each other when integrated thoughtfully. By combining solar panels with water-retaining, biodiverse green roofs, the system not only generates more electricity—4.4% more annually compared to conventional installations—but also reduces heat stress, supports biodiversity, and manages rainwater effectively. Filtered greywater from showers is reused to irrigate rooftop and balcony gardens during dry periods, reducing the building's water footprint while keeping vegetation healthy and functional year-round.

The Mannoury Building complex is now a working example of climate-adaptive design where natural systems, people, and technology are integrated at all levels. The project was made possible through a public-private partnership involving housing association Aedes, the City of Amsterdam, engineering consultants SDR and Techniplan, innovative companies Permavoid and ECOFYT, and the scientific expertise of KWR.

Impact

Urban PhotoSynthesis was launched to quantify how biodiversity-rich blue-green roofs and photovoltaic modules reinforce one another while shrinking a building's water footprint.

Twelve months of monitoring show that panels mounted above a water-retaining vegetated roof generated 4.4 percent more electricity than identical units on a black bituminous roof. Shower wastewater treated in an on-site horizontal-flow wetland supplied safe irrigation water that sustained roof- and balcony plantings through drought, preserving cooling capacity and habitat value without drawing on the mains.

Key enabling conditions were identified. A quad-helix partnership—industry, local government, academia and the building owner—combined technical innovation with independent verification, ensuring that outcomes can inform future regulations. Nature-inclusive, water-smart and energy-efficient strategies were embedded from the first design sketch, avoiding costly retrofits. Acceptance of the uncertainties inherent in a living laboratory fostered rapid on-site problem-solving when construction challenges arose, converting risk into shared learning.

The integrated system delivered several measurable impacts.

Vegetated substrates moderated roof temperatures, improving insulation and easing the urban heat-island effect. Captured rainfall reduced storm-water discharge, relieving pressure on sewers, while gravity-fed distribution and natural overflows demonstrated that complex water management can remain mechanically simple. Recycled greywater satisfied irrigation needs year-round, further lowering the building's water demand.

Habitat diversity on roofs and balconies created space for pollinators and other fauna, strengthening urban biodiversity.

Collectively, these results provide a transferable model for climate-resilient housing that simultaneously advances renewable-energy output, water conservation and ecological restoration.

Its evidence base now supports replication in new developments and retrofits across temperate cities worldwide.