

Rotterdam ROCKS!

Sustainability factsheet

At its core, Rotterdam ROCKS! is conceived as a new form of symbiosis between the man-made city and nature: a place where plants, animals, and people come together. The design explores how a large-scale cultural building can become part of a wider ecological system while addressing the environmental challenges inherent to new construction.

As part of the design's own sustainability ambitions, the construction of the Shift Embassy will become a form of public experiment, an open documentation of which low-carbon construction strategies succeed and which do not, and which approaches succeed in minimising the ecological impact of construction. The project development will serve as a scale-up lab to test and showcase the latest innovations in low-carbon construction, helping to advance sustainable building practices across the industry.

Dutch factsheet below.

1. Project facts

Metric	Value / status
Project name	Rotterdam ROCKS! / SHIFT Landmark
Location	Waterkant, Rotterdam, along the Maas
Building height	~ 60 m
Gross Floor Area	~ 20.000 m2
Façade area	~ 12.100 m2
Roof area	~ 4.200 m2
Vegetated roof area	~ 2.000 m2
PV area	~ 2.500 m2
PV peak capacity	480 kWp
Main functions	Exhibition space, hotel, event space, offices, food court, restaurant, observation deck, gift shop, public route
Expected visitors	~ 700.000 visitors per year (350.000 for Elysium experience and 350.000 for observation deck)

2. Embodied carbon and material strategy

For new buildings, material-related CO₂ emissions are one of the most significant contributors to environmental impact. Rotterdam ROCKS! therefore places embodied carbon reduction at the centre of the design process, using carbon calculations to guide decisions around structure, materials, and construction methods. Given the challenging ground conditions along the Maas and the resulting foundation requirements, the project focuses on reducing impact where possible, including an ambition to incorporate up to 70% reused steel in the primary structure.

Carbon KPI	Value / target / method
Business-as-usual embodied carbon	GWP _a 596 kg CO ₂ -eq per m ² BVO
Minimum reduction scenario	GWP _a 379 kg CO ₂ -eq per m ² BVO
Maximum reduction scenario	GWP _a 225 kg CO ₂ -eq per m ² BVO
Targeted reduction versus BAU	30-50%
Main carbon hotspots	Substructure, superstructure, skin/façade, services
Primary reduction levers	Focus on the heavy hitters; low-carbon concrete, reclaimed steel, biobased and circular non-loadbearing elements, light-weight strategy
Procurement approach	Early engagement with leading manufacturers and suppliers of low-carbon cement/concrete and reclaimed steel systems and pathways
Design principle	Concrete and steel where necessary; circular and biobased materials where possible

3. Material and circularity checklist

Reducing embodied carbon requires more than selecting individual low-impact materials; it also requires reconsidering how buildings are constructed, assembled, and adapted over time. Rotterdam ROCKS! explores circular principles through material selection, reuse strategies, reversible connections, and collaboration with suppliers to investigate how material value can be retained throughout future lifecycles.

Element	Strategy
Substructure	Lightweight strategies to minimise foundations; investigation into the reuse of steel tubes as foundation piles; transparently account for foundation impact.
Primary structure	Hybrid structural system; optimise the use of reclaimed and light-weight elements
Steel	Reclaimed structural elements through early procurement; re-use of steel profiles in main load-bearing frame (columns and beams) through inventory-based design with partner Vic Obdam; investigation of other low-carbon steel sources.
Concrete	Low-carbon concrete innovation roadmap, including CCS / SCM options through early procurement; investigation into low-carbon hollow core floor slabs.
Non-loadbearing elements	Biobased materials such as timber frame, CLT, hempcrete, and rammed earth where suitable
Façade/skin	Modular/prefabricated light-weight elements with integrated ecological pockets
Circularity targets	Innovation roadmap to implement and scale circular and biobased design innovations and measure impact, reversible connections, material passport coverage and prefabrication share to be tracked in later design stages

4. Operational energy and comfort

The energy strategy combines passive design principles, thermal zoning, efficient heating and cooling systems, renewable energy generation, and potential connections to local energy networks. The approach aims to reduce energy demand while maintaining comfort across the building's different functions.

Energy KPI	Bbl reference	Rotterdam ROCKS!
Energy demand	92.6	53.4
Primary energy consumption	77.3	31.5
Renewable energy generation	32.6	61.8
PV area	-	2.500 m ²
PV capacity	-	Approx. 480 kWp

System/principle	Approach
Thermal zoning	High-comfort zones for hotel, restaurant and offices; more adaptive climate zones for Elysium, entrance and food hall
Heating and cooling	Water-based floor systems with groundwater-coupled heat pump / WKO (balanced using Maas water), with conditioned air for high-comfort zones
District integration	Potential for a locally connected WKO grid and a local low-voltage network
Envelope insulation	Rc-values: floors 3.7 m ² K/W; walls 4.7 m ² K/W; ceilings/roof 6.3 m ² K/W
Glazing	HR++ double-glazed window openings concentrated where needed
Thermal mass/inertia	Use exposed mineral surfaces and thermal mass to stabilise comfort; quantify through exposed thermal mass ratio and heat capacity per conditioned area

5. Water and climate adaptation

As a building located along the Maas river, Rotterdam ROCKS! is designed in relation to changing climatic conditions, including increasing rainfall and urban heat. The water and climate strategy focuses on rainwater buffering, reuse, and improving the building’s resilience to changing weather conditions. Vegetation, shading, and landscape strategies contribute to reducing heat stress and improving the local microclimate.

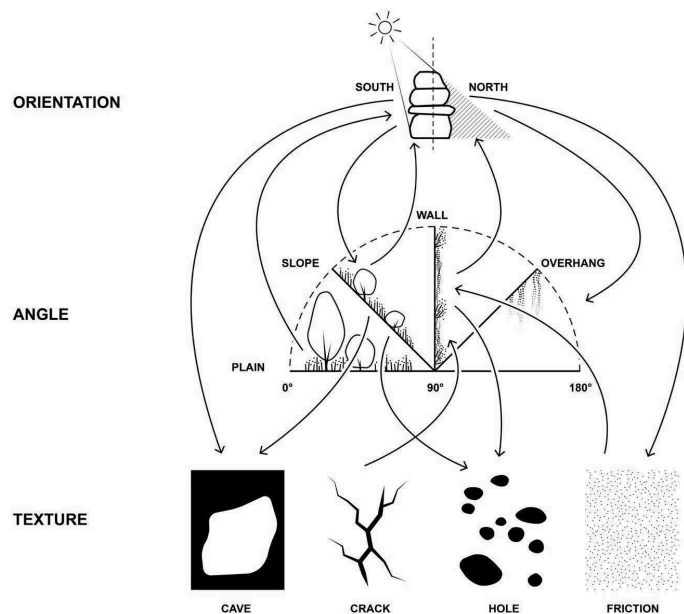
Water / climate KPI	Value / strategy
Rainwater buffering	70 mm target/capacity to be confirmed
Roof-equivalent storage	Approx. 420 m³ based on 6,000 m² roof × 70 mm
Water strategy	Greywater collection, rainwater buffering and storage, and irrigation reuse
Cooling strategy	Vegetation for shade, evapotranspiration, microclimate and reduced surface temperatures
Verification	Monitor and post-occupancy measurements for water use, irrigation demand, comfort and surface temperatures

6. Ecology, biodiversity and landscape

The ecological strategy integrates vegetation and habitat creation into the building design, connecting the project to the wider landscape of the Maas, Tidal Park, and surrounding urban areas. Different planting conditions and micro-habitats across the roof, terraces, and façade are designed to support biodiversity and attract a variety of species.

Ecology KPI	Value/method
Ecological position	Micro-habitats around and on the building, connecting the Tidal Park, Maas, De Esch and urban fabric
Data-driven inputs	Sun, light, wind, runoff, concavity, inclination and height inform façade/landscape patterns
Vegetated roof area	2,500 m ²
Total vegetated area	Roof + terraces + façade pockets; final value TBD
Micro-biome types	6 micro-biomes: coastal grassland plateau, sun-exposed roof meadow, dune edge, wet terrace meadow, woodland edge, shaded moss ecotone
Vegetation types	Mosses and lichen, flowers, ferns and grasses, creepers, shrubs, trees
Habitat functions	Pollinator corridor, water retention, bird support, moisture regulation, decomposition layer
Species monitoring	Baseline survey, Year 1 / Year 3 / Year 5 species richness and habitat occupancy checks in collaboration with a local ecologist

Surface materials, patterns, and planting conditions respond to the local conditions of the building envelope, creating a range of micro-habitats for different species. The combination of mosses, lichens, flowers, ferns, grasses, creepers, shrubs, and trees is designed to support biodiversity and attract indicator species such as common swifts, black redstarts, and house sparrows.



7. Mobility, accessibility and public route

The mobility strategy focuses on connecting Rotterdam ROCKS! to the wider Waterkant district through public routes, landscape connections, cycling infrastructure, and inclusive access. The building’s exterior route creates a publicly accessible connection between the tidal park and the observation deck.

Mobility / access KPI	Strategy / value
Public route	Exterior route connects Tidal Park to the observation deck through viewing platforms and vegetation
Urban connectivity	Links Waterkant, new bridge/mobility hub, public realm and river experience
Bicycle parking	Ambition to integrate into the adjacent mobility hub
Car parking	Integrated with mobility hub/district strategy; minimise impact on public space
Service logistics	Separated from public flows where needed; combined where operationally efficient
Accessibility	Elevators and the inclusive route strategy to be confirmed in the later design stage

8. Social impact and behavioural change

The Shift Embassy combines artistic exhibitions, public spaces, and interactive experiences that inspire and enable sustainable action. Through the Shift landmark, the Elysium experience, and the app, visitors move from awareness to engagement, creating lasting behaviour change that will have a very large positive impact.

Social KPI	Value/method
Annual visitors	Up to 700.000 visitors per year at opening (350.000 for the Elysium experience and 350.000 for the observation deck, growing to 500.000 on average for the Elysium experience in the long term)
Exhibition space	Immersive journey through planetary impact, choices and action
Monitor	Interactive space showing real-time data on energy consumption, water use, air quality and biomes
Behavioural KPIs	Monitor engagement, pledges, app interaction, CO2 reduction, action sign-ups, repeat visitors
Public accessibility	Free public route and public-facing program to be coordinated with ticketed areas
Community value	Learning, new jobs, work, education, culture, hospitality and public landscape integrated across the day and evening; an economical boost for the new district, strengthening Rotterdam's tidal park strategy

Projected 50-year impact

Comparing the landmark's footprint with the impact created through visitor behavioural change

335,000,000 tonnes

Of CO₂ reduction through visitor behavioural change

15,000 tonnes

from construction and operational energy

99,998%

Of the combined impact

0,002%

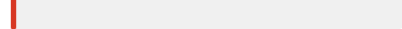
Of the combined impact

Visitor behavioural impact



99,998%

Landmark footprint



0,002%



Key assumptions: 500,000 visitors annually; 25 million visitors over 50 years; 20% take action; average annual CO₂ reduction decreases from 10 to 8 tonnes.



This projection is approximately seven times more conservative than the results observed during Shift's pilots, where participants reduced their CO₂ impact by an average of 30%.

Shift Landmark impact 50 years



99,998%

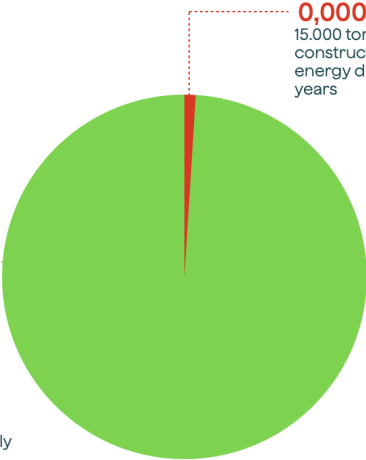
335.000.000 ton reduction in CO2 by
behaviour change visitors

Key assumptions

- 500.000 visitors a year on average
- in total 25 million
- 20% of visitors takes action
- They reduce CO2 from 10 ton to 8 ton annually

*This is 7x less than outcomes of pilots Shift ran,
where 100% of participants reduced on average
30% CO2.*

*CO2 from travel by visitors has already been
deducted (+/- 35 million)*



0,0002%
15.000 ton
construction and
energy during 50
years



9. Certification and governance

The project sustainability strategy is supported by certification frameworks, carbon tracking, material passports, and post-occupancy monitoring. These tools are used to track performance, verify outcomes, and support transparent reporting throughout the project lifecycle.

Framework / tool	Status
BREEAM-NL	Excellent achievable in quickscan; Outstanding potential depending on Waterkant development
BENG	Modelled energy performance
LCA / carbon dashboard	Embodied carbon scenarios tracked from competition design stages throughout the process
EU Taxonomy / CRREM	Alignment to be explored and documented
Material passports	Target scope TBD; recommended KPI: coverage by mass or cost
Monitor / POE	Post-occupancy verification of energy, water, air quality, comfort, biodiversity and behaviour KPIs