

# LIFE @Urban Roofs Rotterdam



LIFE @URBAN ROOFS  
ROTTERDAM

LIFE ReNatural NZEB Final Event  
Cáceres, España



Gemeente  
Rotterdam

# Rotterdam, the Netherlands



# History



# Urban Challenges

Housing



Greening



Adaptation



Cohesion



Mitigation



# Roofs provide space



# Rooftop functions



**Green roofs** provide space for nature.



**Blue roofs** retain rain water.



**Yellow roofs** produce renewable energy.



**Red roofs** offer social functions.



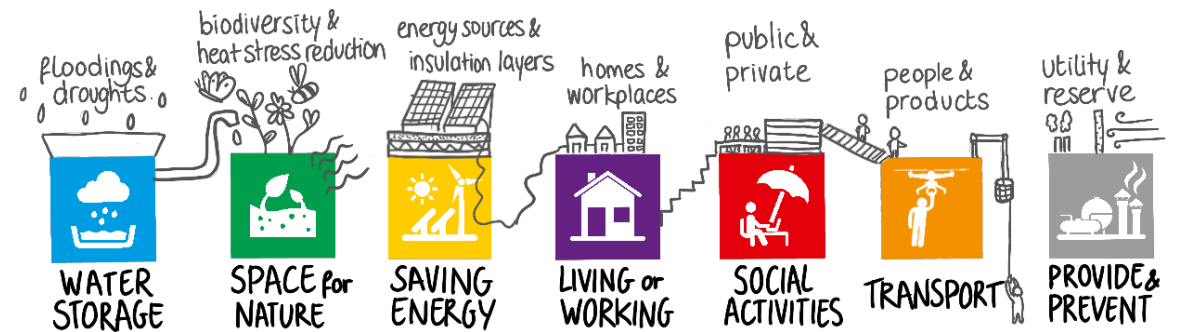
**Orange roofs** are used for mobility.



**Purple roofs** are used for densification.



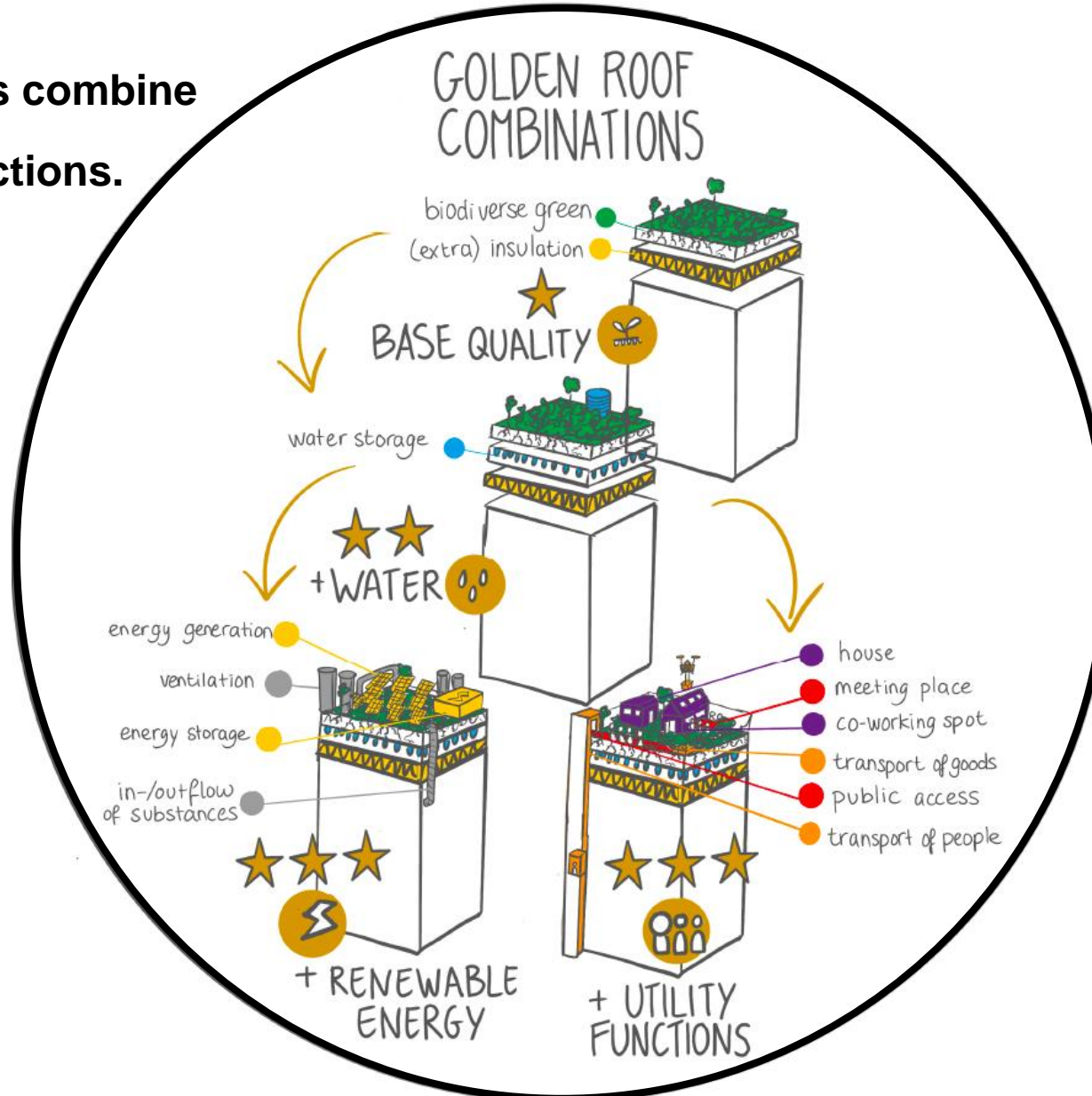
**Grey roofs** offer utilities en reserve capacity.



# Golden combinations

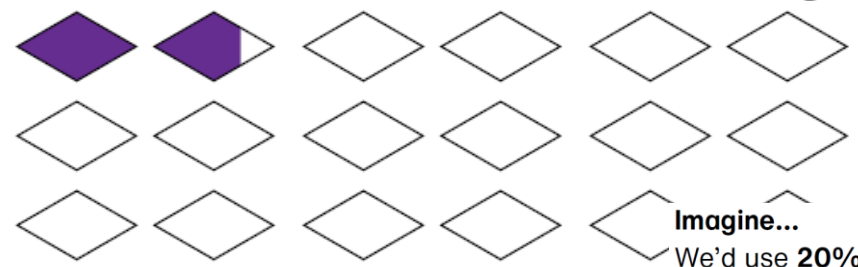


**Golden roofs combine multiple functions.**

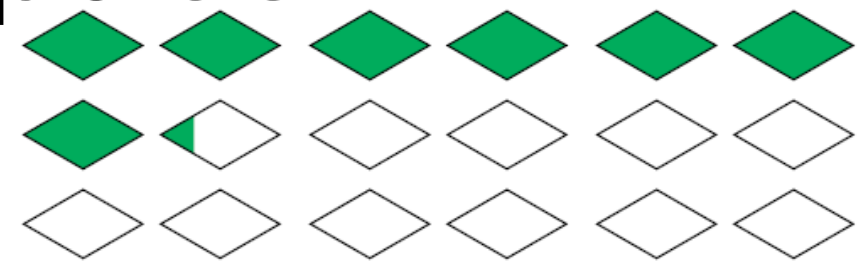


# The battle for space

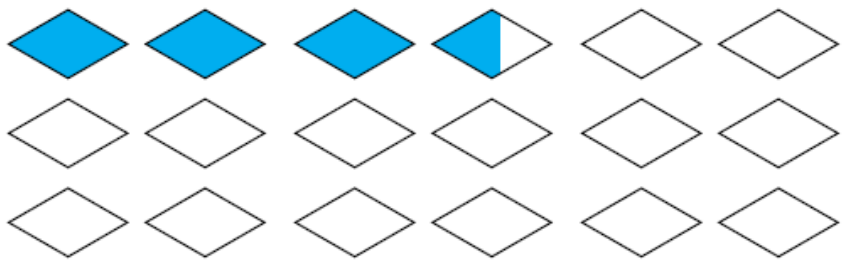
Imagine...  
We'd use **10%** of the (Rotterdam) rooftop landscape for housing...




Imagine...  
We'd use **40%** of the (Rotterdam) rooftop landscape for greenery...



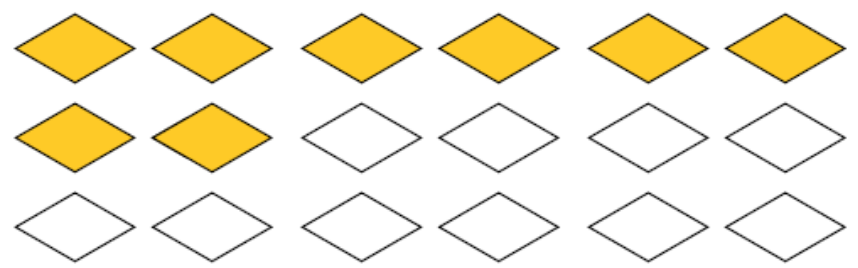
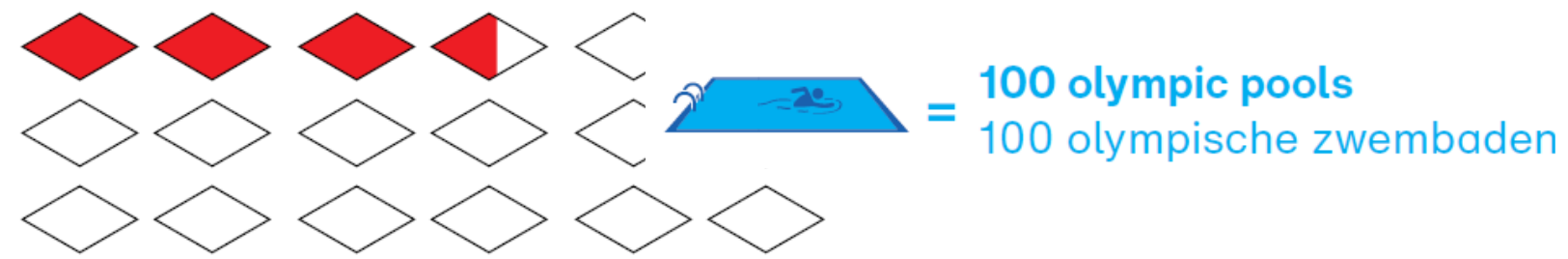
 = **15,000 homes**  
15.000 woningen



 = **2 times Central Park NY**  
2 keer Central Park NY

Imagine...  
We'd use **20%** of the (Rotterdam) rooftop landscape

Imagine...  
We'd use **45%** of the (Rotterdam) rooftop landscape for solar power generation...



 = **500 football fields**  
500 voetbalvelden

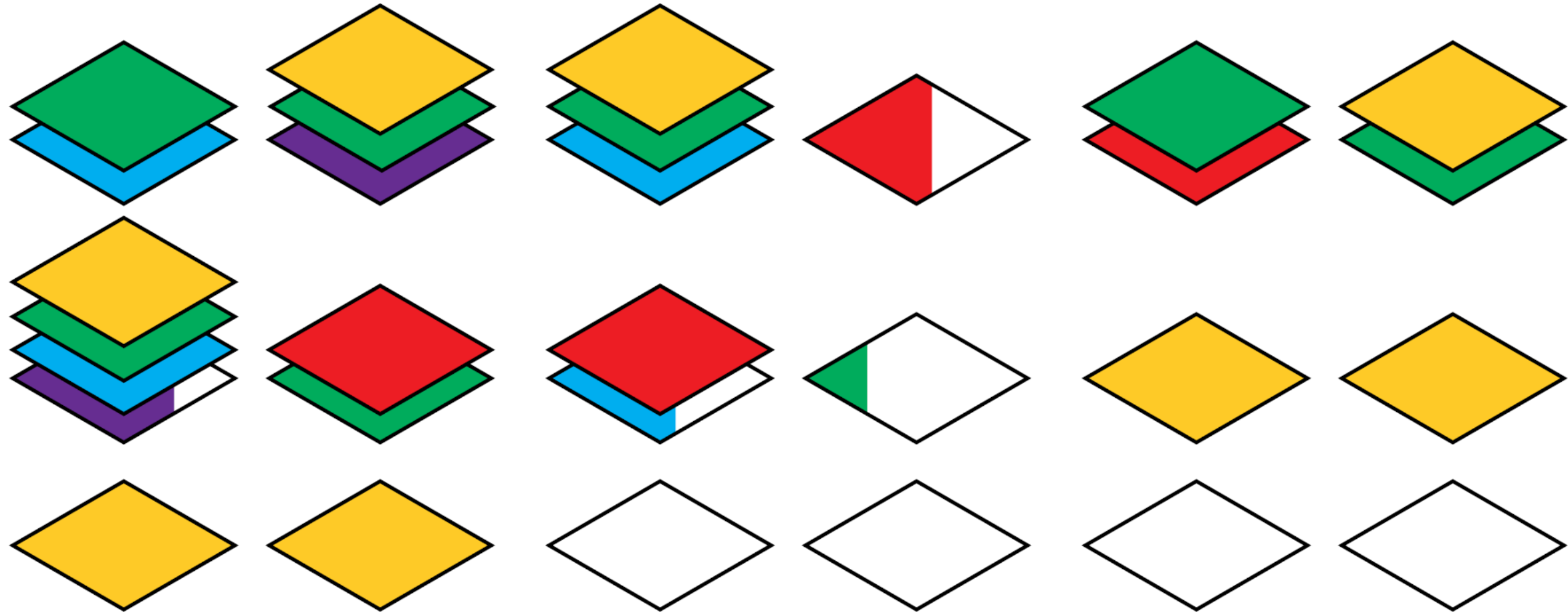
 = **1,000,000 households**  
1.000.000 huishoudens



# Integral approach

Imagine...

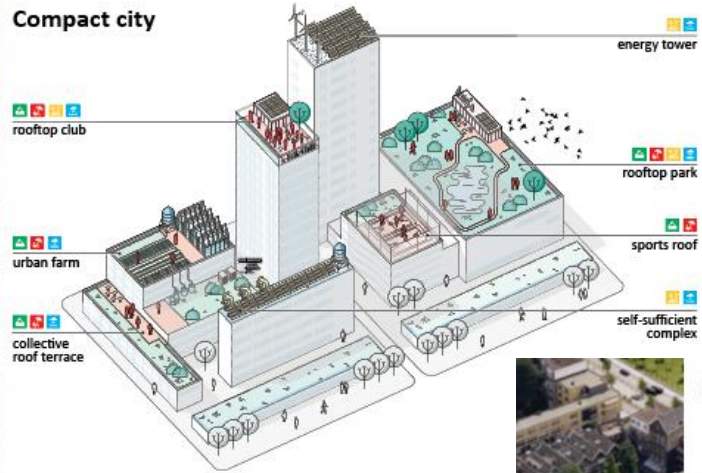
We'd combine all this potential to one multifunctional roofscape...



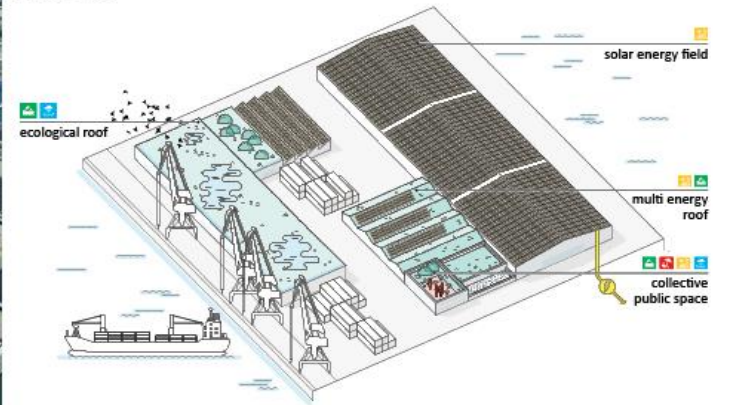
# Area-oriented



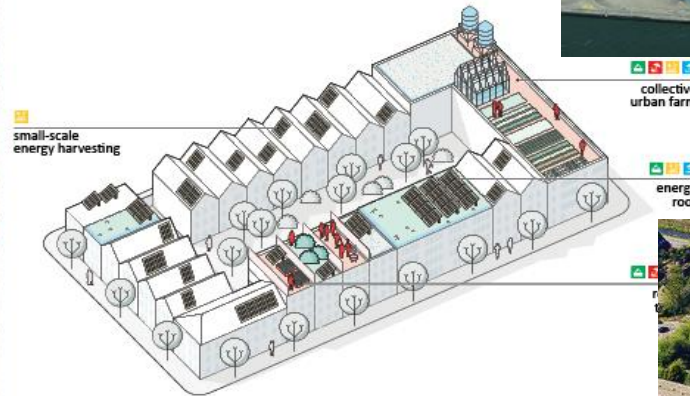
Compact city



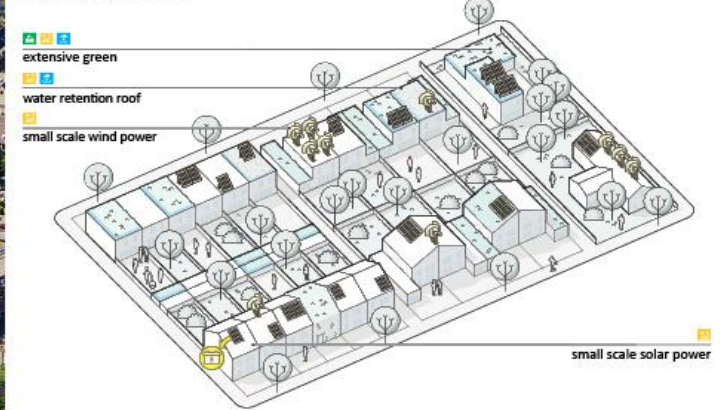
Harbour



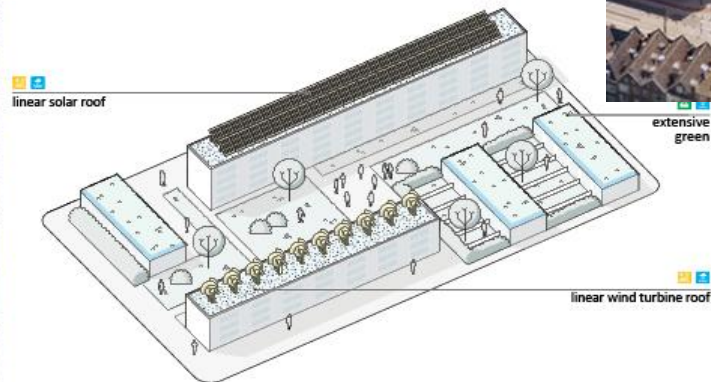
19<sup>th</sup> century district



Suburban area



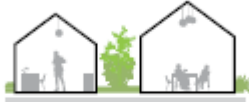
Post-war district



# Functional benefits



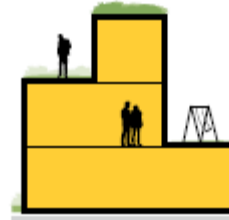
Adding (private) gardens [often in short supply in the city centre]



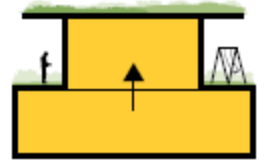
Adding facilities for the block



Adding another function for the purpose of a 16-hour neighbourhood

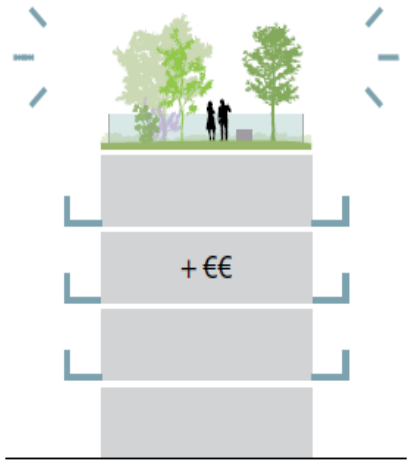


Adding a new type of housing for a more inclusive neighbourhood

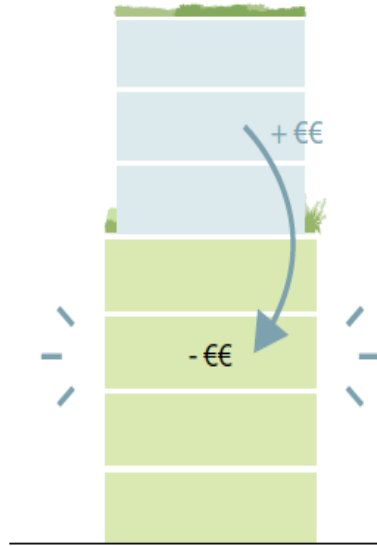


Expanding homes to keep people in the neighbourhood (reducing the need for people to move)

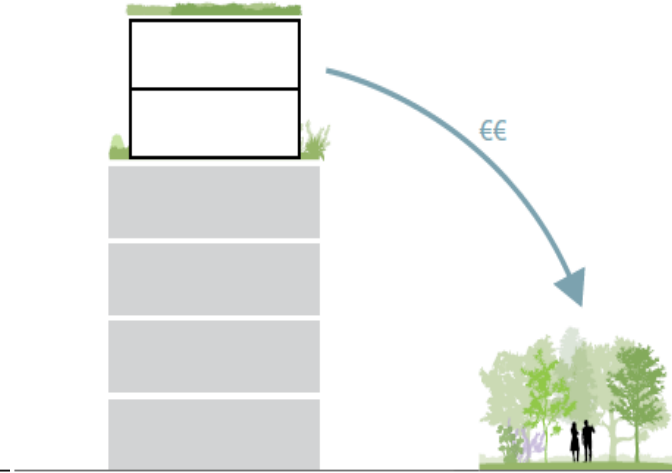
# Financial benefits



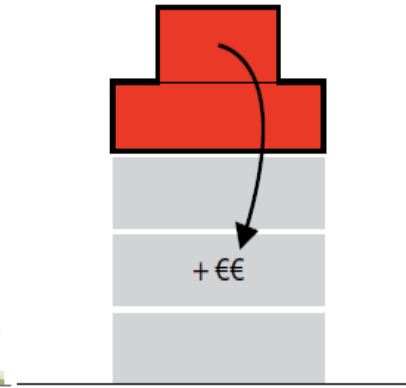
Increasing value of building below



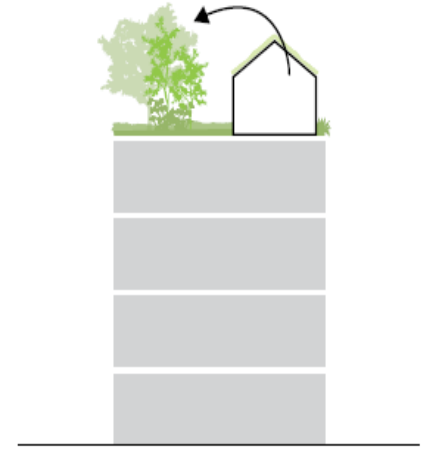
Generating income for the Owners Association and making the rooftop more sustainable



Contribution new construction for making the street level more green




Contribution new construction to make building below more sustainable



Contribution for community functions on the rooftop

# Value based approach

 Real estate value


 CO2 emissions

 Water retention

 Exploitation

 Avoided healthcare

 Air quality


 Alternative land use due to water retention

 Social cohesion

 Avoided workloss

 Renewable energy

 Cultural history

 Climate awareness

 Biodiversity




 Water quality

 Business climate

 Heat-stress

 Water reuse

 Image

 Reduction of particulates

 Living space

 Mobility



**Green roofs provide a green environment and are useful in cases of extreme dry, hot and wet weather.**

How much surface area would you like to cover?  m<sup>2</sup>  
 How many people have a view onto your roof?  persons  
 Are you combining multiple types of green roofs?   
 If you select "No", the tool will assume you will use a extensive or sedum-roof.  
 What type of green roof would you like to use?

How does a green roof work?	Type 1	Type 2	Type 3
<input type="radio"/> Sedumroof	<input checked="" type="radio"/> Sedumroof	<input type="radio"/> Nature roof	<input type="radio"/> Roof garden

*\*multiple types are possible*

**Costs**

Investment costs	€ 50,00	per m <sup>2</sup> without tax
Yearly maintenance costs	€ 1,20	per m <sup>2</sup> without tax
Replacement period (after X years)	60	Year

An extensive green or sedum roof system contains vegetation, ranging from sedums to small grasses, herbs and flowering herbaceous plant.

**Total**

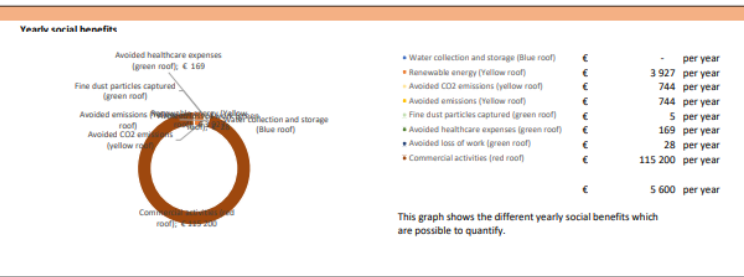
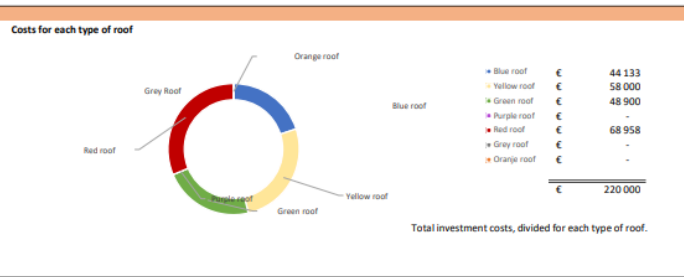
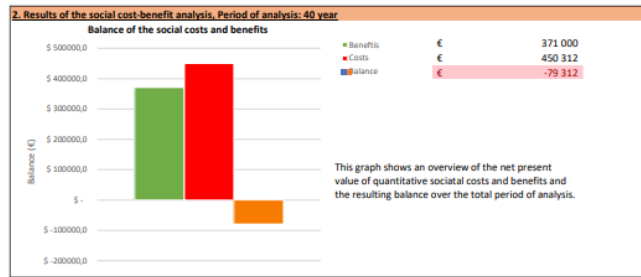
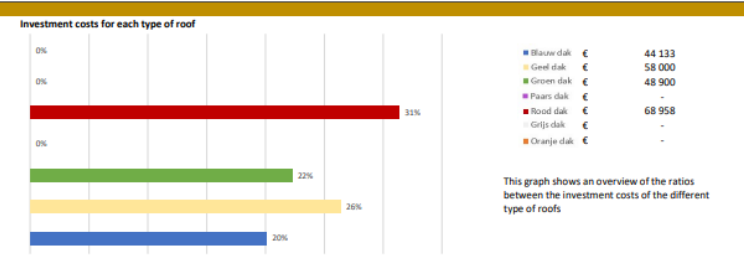
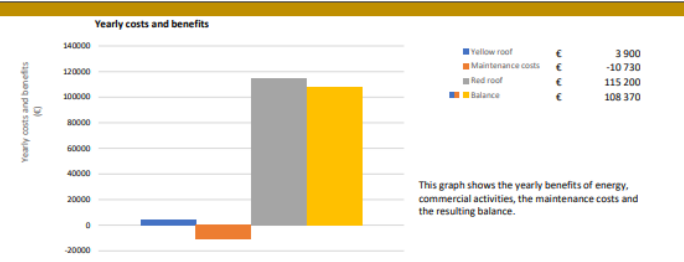
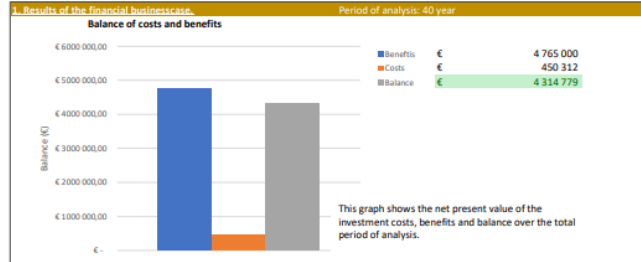
Surface area green roof	1.450	m <sup>2</sup>
Investment costs	€ 103.800	without tax
Maintenance costs	€ 2.180	without tax per year

# Value based approach

Project		Type of	
Project name	Beehives	Neighbourhood	Hoogbouw
Version	0		
Date	29/04/2022		
Variant	Beehives		

Results
On this sheet, you will find the results of your calculations. The results are divided into three parts:
1. The financial businesscase.
2. The social cost-benefit analysis
3. The social benefits further elaborated upon.

Multifunctional roof as part of a greater construction project
The investment costs of the multifunctional roof are 0% of the total construction costs
Investment costs multifunctional roof: € 450 300 without tax
Investment costs total construction project: € - without tax



### 3. The social benefits further elaborated upon.

Blue roof: Water retention	Other social benefits (qualitative)	Contribution to BREEAM credits*	Applicable?	Contribution to biodiversity according to the nature point system**	Applicable
Number of filled waterbarrels: 185	Living area	SYN 5 Encouraging the administrative and/or financial participation of the users in the area to increase involvement and responsibility of the area.	Yes	1 Green roof with sedum (>5-7cm)/30%	Yes
Yellow roof: renewable energy	Mobility	SYN 6 Encouraging cooperation and financial arrangements between stakeholders to increase the feasibility of the sustainability goals.	Yes	2 Green roof with sedum, grass, and herbs (>7-15cm)/30%	Yes
Equivalent number of household: 4,3	Heatstress	BRO 3 Boosting local renewable energy production	Yes	3 Green roof with (sedum), grass and herbs, dwarf shrubs and shrubs (15-30 cm)/30%	Yes
Red roof: commercial activities of the Terrace/Bar	Image owner	RO 4 Reducing the use of drinking water in the area	No	4 Green roof with (grass), herbs, dwarf shrubs and shrubs (30-50 cm)/30%	Yes
Benefits (x € 1.000): 115	Business climate	RO 7 Preserving and increasing biodiversity and the ecological value and function on local and regional level.	Yes	5 Green roof with herbs, dwarf shrubs, shrubs, and trees (>50 cm) /30%	Yes
	Social cohesion	RO 8 Encouraging intensive use of space to minimise land use of the built environment.	Yes	6 outdoor spaces such as roof gardens. At least 40% of this must be designed with greenery that contributes to biodiversity	Yes
	Waterquality	RO 11 Minimizing flood risk in the area after development	Yes		
		RO 12 Preventing damage to the built environment and vital and vulnerable functions due to extreme precipitation	Yes		
		RO 13 Stimulating an optimal system for the use of people and transport needs (products) of an area and its environment with the lowest possible environmental impact.	No		
		WEL 2 Promoting social cohesion in the area	Yes		
		WEL 3 Improving the quality of the environmental experience	Yes		
		KLI 1 Stimulating a good thermal outdoor climate for users and preventing heat stress	Yes		
		KLI 3 Optimizing local air quality.	Yes		

Number of nature points earned: 0

Disclaimer: the use of the nature point system is indicative. No rights can be derived from this

\* With the BREEAM-NL Area quality mark, a complete area is assessed for sustainability. This can be a redevelopment of existing areas, but the certification of new area developments is also possible. The sustainability label addresses various current themes such as heat stress, climate adaptation and health by improving local air quality and social cohesion. This makes BREEAM-NL Area the measurement instrument for sustainable area development in the Netherlands. Multifunctional roofs can contribute to this measurement.

\*\* The nature points system is used by, among others, the municipality of The Hague and the Covenant Climate-proof Building South Holland (Bouw Adaptief). For a small project (500m² footprint) 2 points were requested on the facade and the roof. For a medium-sized project (<2000 m²) 4 points, and for a large project (> 2000 m²), 6 points.

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# LIFE Project Peperklip



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# LIFE Project De Heuvel



Gemeente  
Rotterdam



# LIFE Project De Doelen



# LIFE Project Experimental roof



Gemeente  
Rotterdam

# Start in 1-2-3

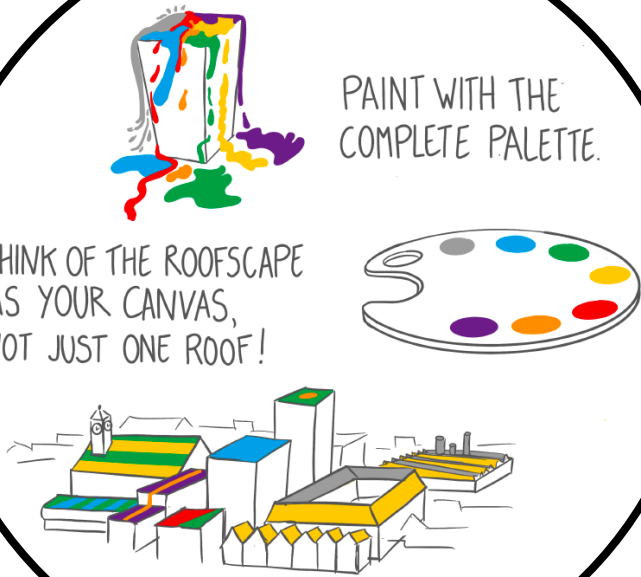
LOOK AT THE TYPE OF ROOF & ITS SURROUNDINGS...

... BEFORE YOU CHOOSE A COLOUR.

An illustration within a circular frame. At the top, text reads 'LOOK AT THE TYPE OF ROOF & ITS SURROUNDINGS...'. Below this, a palette with various colored dots is shown next to a house with a yellow roof. To the left, a flat roof with chimneys is depicted. At the bottom, a cityscape with buildings of different colors (purple, orange, red) is shown.

PAINT WITH THE COMPLETE PALETTE.

THINK OF THE ROOFSCAPE AS YOUR CANVAS, NOT JUST ONE ROOF!

An illustration within a circular frame. At the top, text reads 'PAINT WITH THE COMPLETE PALETTE.' Below this, a palette with various colored dots is shown next to a house with a multi-colored roof. At the bottom, a cityscape with buildings of different colors (purple, orange, red) is shown.

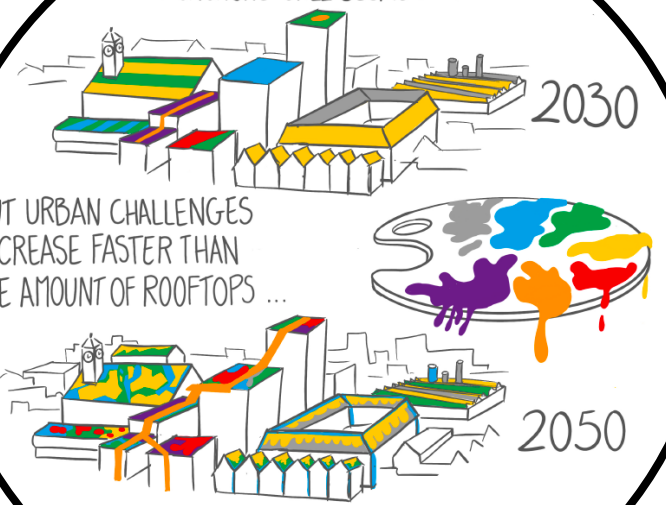
FOR NOW, MIXING ROOFTOP FUNCTIONS STILL SEEMS A WISH.

2030

BUT URBAN CHALLENGES INCREASE FASTER THAN THE AMOUNT OF ROOFTOPS ...

2050

THE CREATION OF A FUTURE PROOF ROOFSCAPE STARTS TODAY!

An illustration within a circular frame. At the top, text reads 'FOR NOW, MIXING ROOFTOP FUNCTIONS STILL SEEMS A WISH.' Below this, a cityscape with buildings of different colors (purple, orange, red) is shown. To the right, a palette with various colored dots is shown. The year '2030' is written next to the cityscape. Below this, text reads 'BUT URBAN CHALLENGES INCREASE FASTER THAN THE AMOUNT OF ROOFTOPS ...'. Below this, a cityscape with buildings of different colors (purple, orange, red) is shown. To the right, a palette with various colored dots is shown. The year '2050' is written next to the cityscape. At the bottom, text reads 'THE CREATION OF A FUTURE PROOF ROOFSCAPE STARTS TODAY!'.

# No more empty roofs!



# Thanks for your attention.



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LIFE project.	LIFE@Urban Roofs
LIFE code.	LIFE16 CCA/NL/000096

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