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Panel: Challenges for Sustainable Cities For Climate Change Mitigation: Implementing SDGs for Sustainability

SUSTAINABLE DEVELOPMENT GOALS AND CLIMATE-PROOF URBAN AND ENVIRONMENTAL DESIGN

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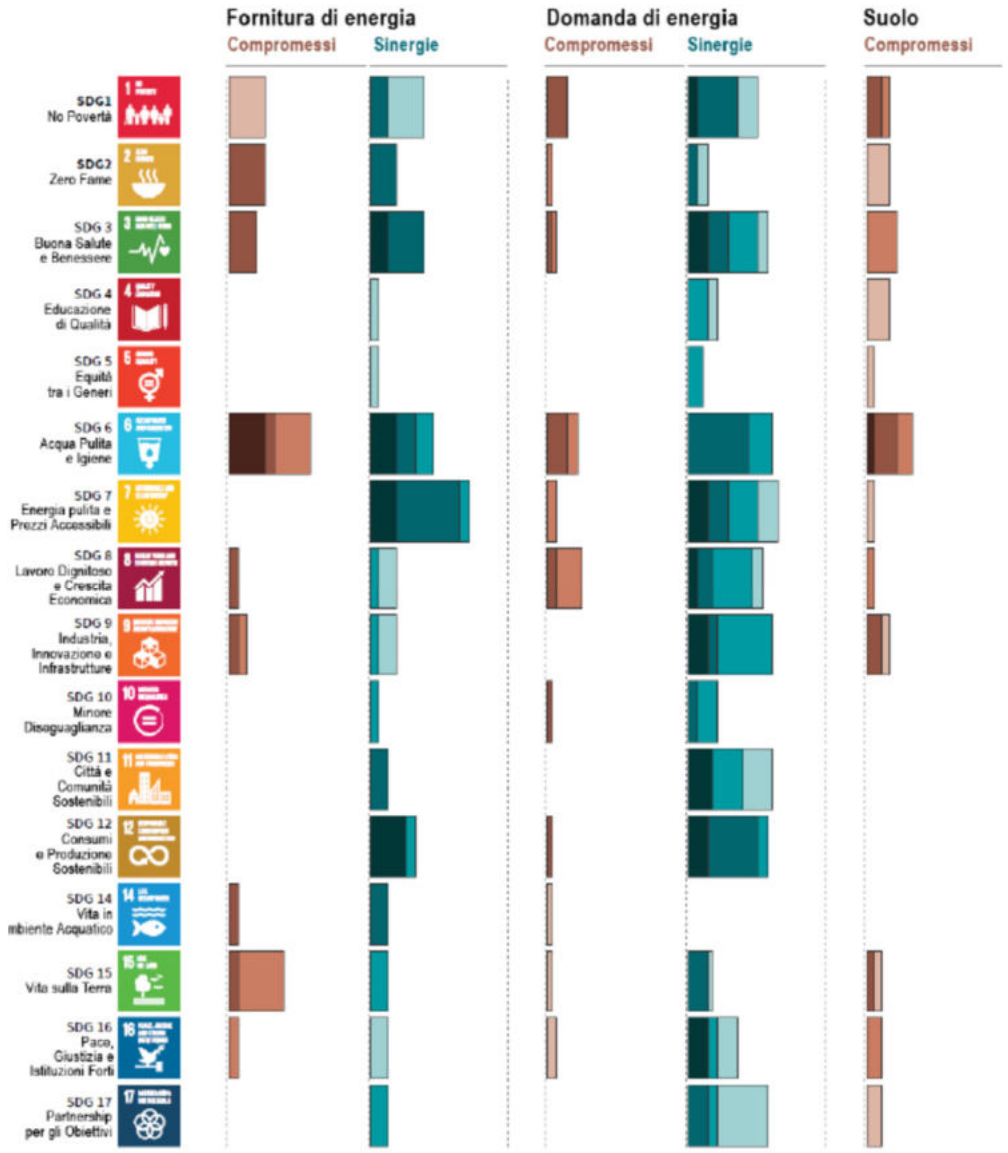
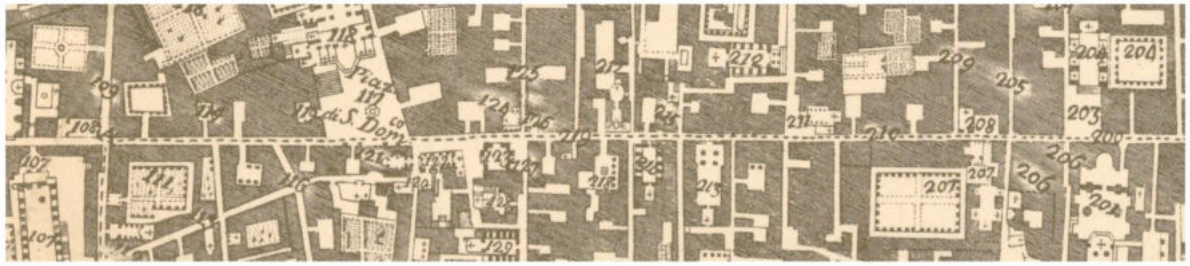
Climate proof actions and SDGs

Potential **conflicts and synergies** between the sectoral mix of **climate change adaptation/mitigation options and the Sustainable Development Goals (SDGs).**
The SDGs provide an analytical framework for assessing the **different dimensions of sustainable development**.
Particularly, **SDG 13 (Climate action)** does not appear in the list because is considered in terms of its interaction with the other SDGs. The bars indicate the **strength of the connection** between SDG 13 and the other sectors. The **energy demand sector** includes behavioural responses, fuel switching and energy efficiency options in transport, industry and buildings as well as carbon sequestration options in the industrial sector.

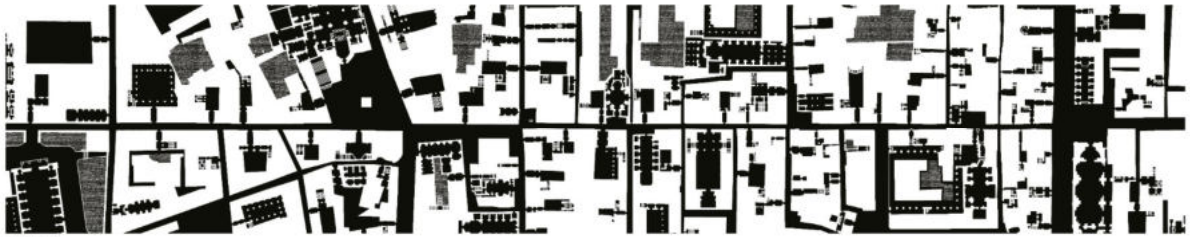


The ancient city as a climate responsive and sustainable urban system

The ancient city was conceived as a **sustainable habitat in unicum with the environment**: small spatial dimensions, **buffer spaces** for urban comfort, porosity for **accessibility**, **micro-ventilation**, courtyard building types and local construction techniques that favoured a **low carbon footprint**.



Pianta del Duca di Noja

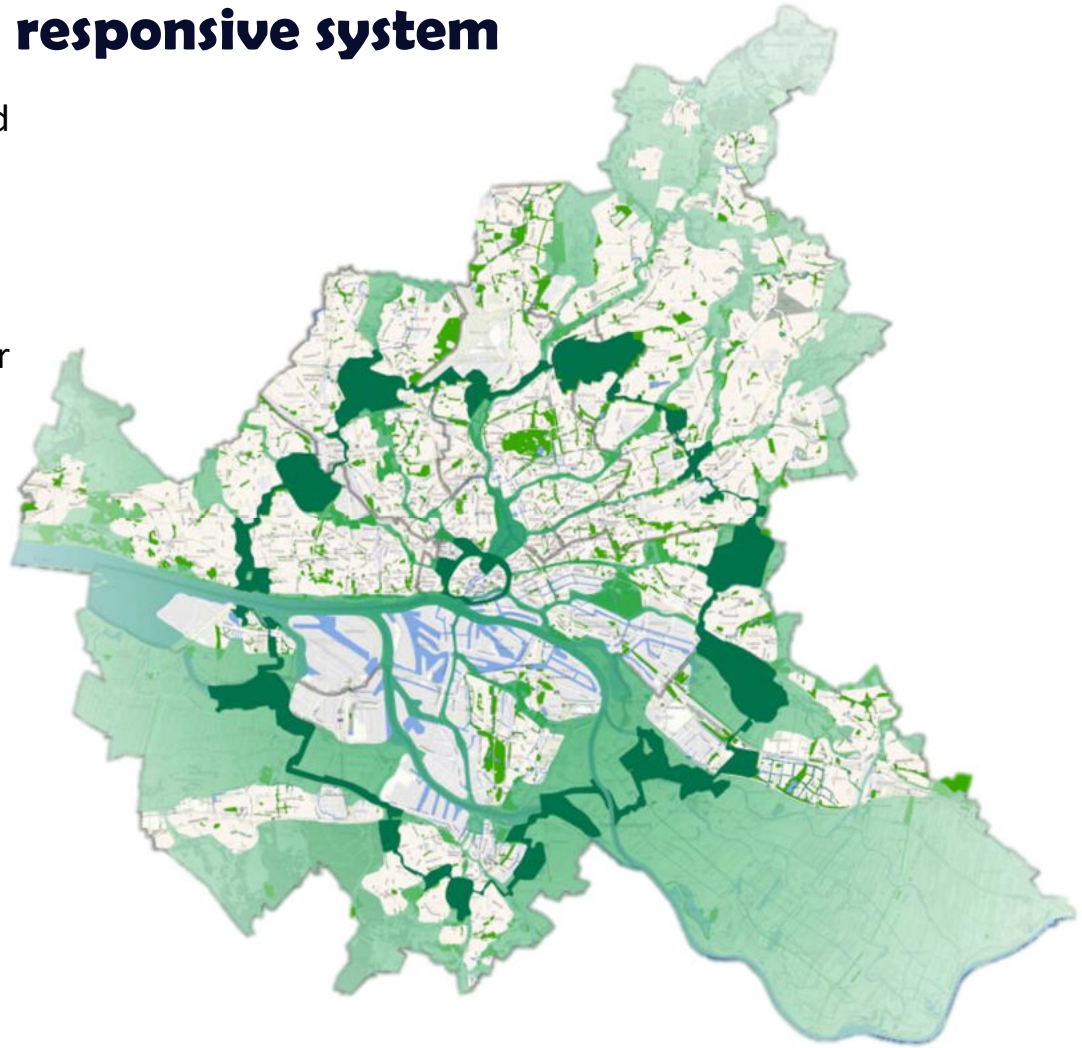


Spazi vuoti

Tipologico

The contemporary city as a climate responsive system

Hamburg's Green Network Plan foresees a cycling and walking network covering 40% of the urban area by 2034.
Effective **results for climate mitigation**:
- reduction of **waterproof surfaces**
- reduction of **pollutant** and **GHG emissions**
- **urban comfort** with reduced **energy consumption** for heating and cooling
- **ecological mobility**
- promoting **energy self-sufficiency**
- **carbon dioxide sequestration**

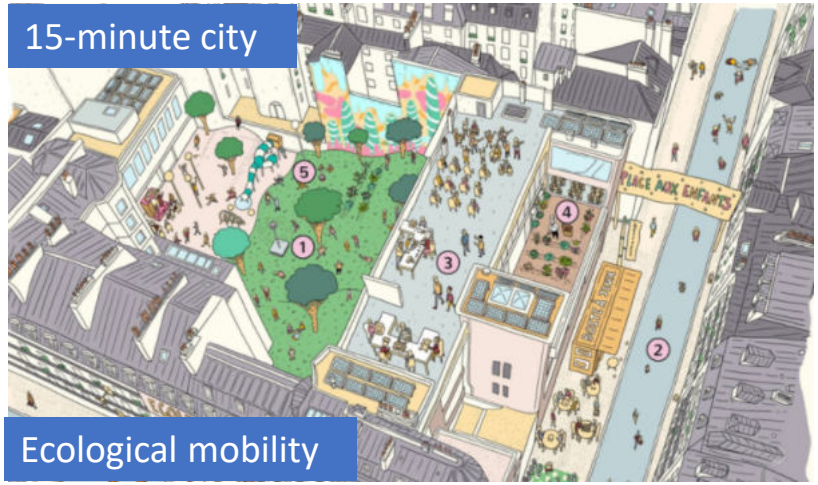


Actions for climate proof design integrated with SDGs

- Self sufficient city (energy, food, etc.)
- 15-minute city
- Proximity spaces
- Building and urban greening
- Ecological mobility
- Energy efficient networks and communities
- Zero carbon district
- Climate proof architectural quality
- Decarbonization and integration renewable energy sources
- Zero-km supply chain
- Circular economy
- Life cycle thinking
- High health and environmental standards
- Affordability
- Twin challenges of green and digital transition

Urban and building innovations and carbon neutral goals

15-minute city



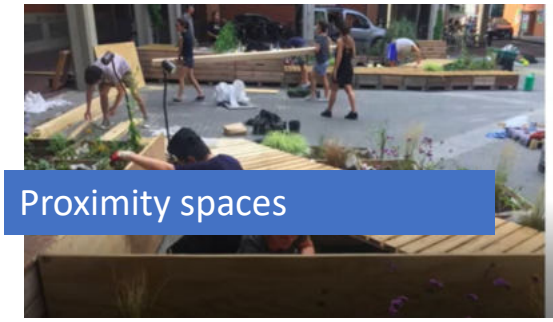
Ecological mobility

Zero carbon district

Building and urban greening, social inclusion

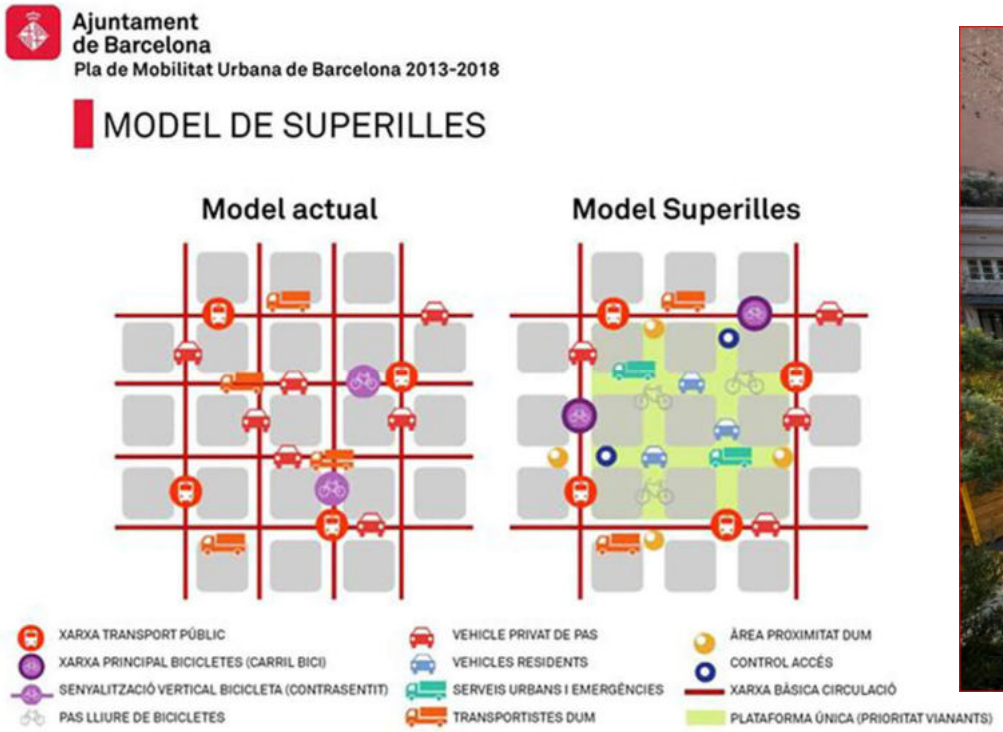
Zero-km supply chain

Self-sufficient city: energy, food, low tech production



Proximity spaces

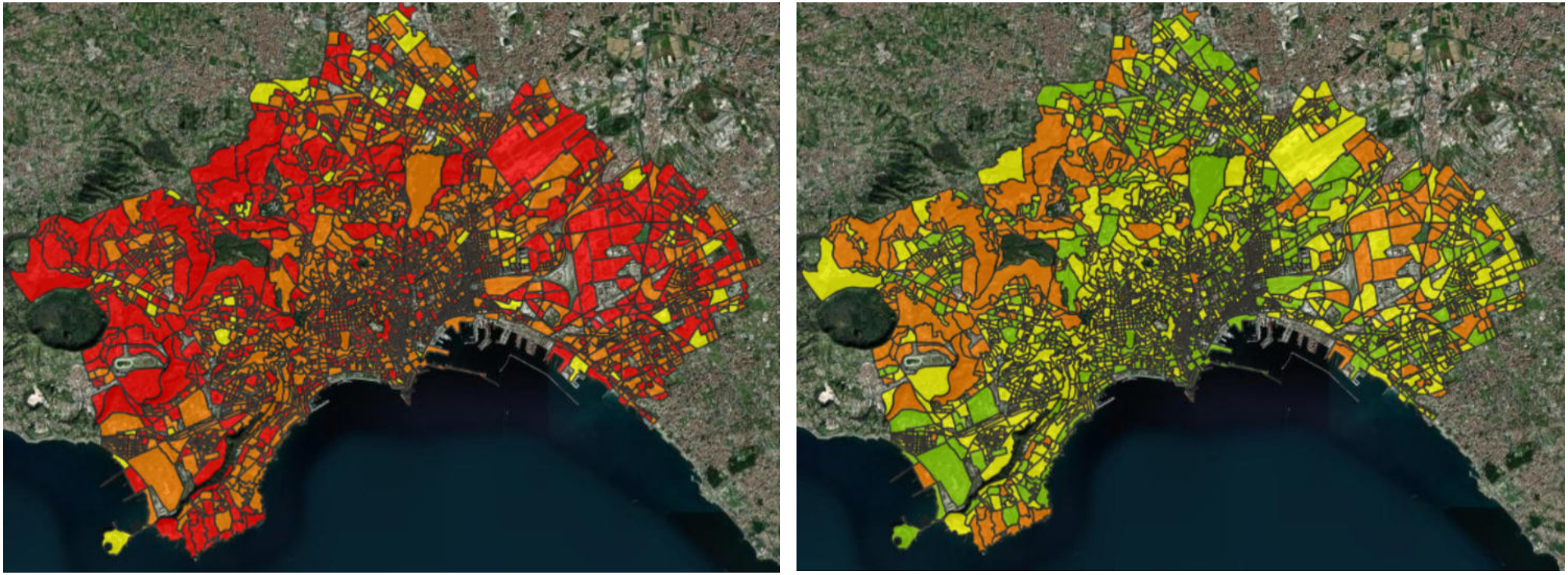
Climate proof design and greening urban renovation for Eco-district



Urban renovation proposed by the urban planner Salvador Rueda for **Barcelona's Superillas**, **walking** in the neighbourhoods concerned the **increasing of 10 %, cycling by 30 %** and **car traffic** on the inner streets **decreased by 26 %.** In addition, **thousands of square metres of public space** were made available to residents.

Environmental design evaluation for carbon neutral goals

In order to understand the **contribution of design and planning to climate mitigation**, it is essential to carry out **measurements and assessments of available options**.



CO_2 emissions levels before (on the left) and after the application of climate proof interventions (on the right) (Source: PLANNER Research, DiARC, UNINA, Scientific Responsible: V. D'Ambrosio)

Environmental design assessment for Hydraulic Invariance
Calculation of Storage and Lamination Volumes

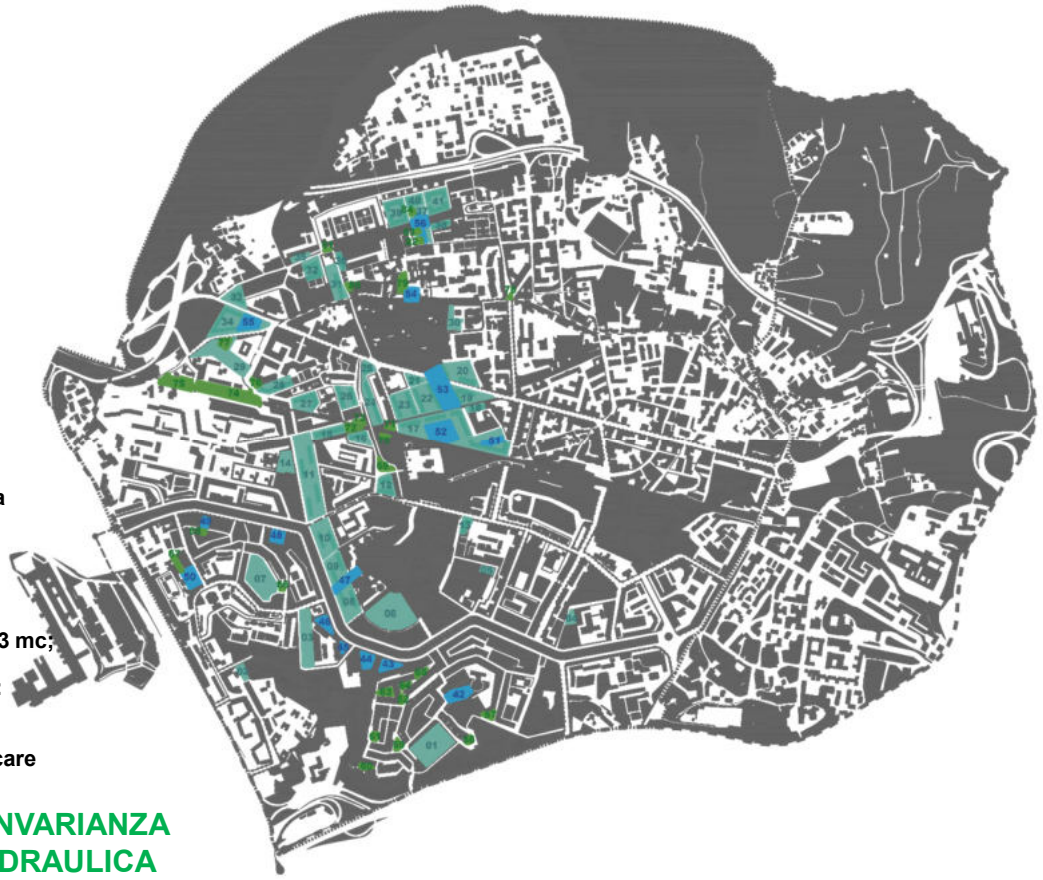
Stoccaggio in Corrispondenza dei Parcheggi Interrati

Stoccaggio Relativo ai Sistemi Adattivi delle *Water Square*

Stoccaggio Relativo ai Sistemi Adattivi dei *Rain Garden*

I DATI DI PROGETTO:

- **Superficie soggetta a verifica: 1.424.360 mq;**
- **h media di pioggia annuale = 1.000 mm;**
- **Volume di pioggia medio annuale relativo alla nostra superficie:**
  1 m * 1.424.360 mq =
  = 1.424.360 mc
  ~1.400.000 mc;
- **Volume di Stoccaggio Totale di Progetto: 153.803 mc;**
- **Volume di Stoccaggio Destinato a Riutilizzo:**
  circa 140.000 mc
  (10% Volume di pioggia medio annuale ricadente sulla nostra superficie da stoccare e riutilizzare a uso non potabile)
  +
  10.000 mc > 9.750 mc
  (Volume di laminazione riservato ad eventi meteorici eccezionali)
  =
  150.000 mc



INVARIANZA IDRAULICA VERIFICATA

Environmental design assessment: Analysis of Environmental Indicators

The following Environmental Indicators were analysed to verify the design solutions:

- P.M.V. (*Predicted Mean Vote*) – *ENVI-Met Software*
- Temperatura Potenziale dell'Aria (C°) – *ENVI-Met Software*
- Indice di Riduzione dell'Impatto Edilizio R.I.E.
- G.S.F. (*Green Space Factor)*
- B.A.F. (*Biotope Area Factor*)
- Invarianza Idraulica

CRITERIO / FATTORE/ INDICE	*RANGE* VALORI	VALORE MEDIO SCENARIO STATO DI FATTO AREA ESTESA 2020	VALORE MEDIO SCENARIO STATO DI FATTO AREA ESTESA 2050	VALORE MEDIO SCENARIO PROGETTO AREA ESTESA 2050 / Δ	VALORE STATO DI FATTO / PROGETTO AREA PRELIMINARE	VARIAZIONE PERFORMANCE AREA Δ	VALORE STATO DI FATTO / PROGETTO SUB – AMBITO "PILOTA"	VARIAZIONE PERFORMANCE AREA Δ	VALORE STATO DI FATTO / PROGETTO AREA ESTESA DI INTERVENTO	VARIAZIONE PERFORMANCE AREA Δ	ESITO
P.M.V .	-4 <P.M.V.< +4 VALORE OTTIMALE: 0	2,16	2,53	2,30 Δ= - 0,23	/	/	/	/	/	/	
TEMPERATURA DELL'ARIA (C°)	t < 27,30°C t > 32,40°C	29,98 °C	31,40 °C	30,63 °C Δ= - 0,77 °C	/	/	/	/	/	/	
R.I.E.	0 <R.I.E.< 10 VALORE MINIMO: 4	/	/	/	0,96 4,91	Δ= + 3,95	0,54 4,32	Δ= + 3,78	1,97 4,16	Δ= + 2,19	
G.S.F.	0<G.S.F. ≤1 VALORE OBIETTIVO: 0,5	/	/	/	0,453 0,655	Δ= + 0,202	0,283 0,532	Δ= + 0,249	0,343 0,586	Δ= + 0,243	
B.A.F.	0<B.A.F. ≤1 VALORE OBIETTIVO: 0,30 <V.< 0,60	/	/	/	0,387 0,606	Δ= + 0,219	0,234 0,551	Δ= +0,317	0,291 0,565	Δ= + 0,274	
INVARIANZA IDRAULICA	VALORE OBIETTIVO: V_{Lam} ≥ 9750 mc	Volume di laminazione di progetto riservato ad eventi meteorici eccezionali = 10,000 mc > 9750 mc									

Layers overlapping for climate proof and SDGs integrated urban design

Strategy to regenerate 40,000 urban voids in downtown Philadelphia: Van Alen Institute NY and the Municipality of Philadelphia 2006-2008, Concept Design by Ecosistema urbano