Urban Resilience for Climate Change Adaptation

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DP Resilient Cities | Direzione Transizione Ambientale | Comune di Milano
The context

Milan in transition

Nowadays, public administrations face more than ever the so-called ‘wicked problems’, complex and articulated challenges among which climate change stands out.

Milan is therefore learning to act in a practical and tangible way, through innovative tools and actions to develop a new framework for growth and development.

Milan is experiencing a period of profound renewal that has demonstrated the great level of adaptation of the city.
Urban Resilience

It is the **ability** of individuals, communities, institutions, businesses to **survive, adapt and grow** regardless of what chronic stress and acute shocks they suffer.
RESILIENCE STRATEGY JOURNEY

**PHASE I**
- Selection: July 2015
- Agenda Setting Workshop: December 2017
- Resilience Department

**PHASE II**
- November 2018: Preliminary Resilience Assessment - PRA
- January 2019: First Meeting with the Scientific Committee
- June 2019: Second Meeting with the Scientific Committee
- 8-11 July 2019: Urban Resilience Summit, Rotterdam
- December: Presentation of the Document

**June - December**
- Processing phase

**Internal and external validation process**
The City Profile
POPULATION AND HOUSING REQUIREMENTS

1.380.873 inhabitants (2017)
- 5.7% (2008-2016)
- 3.6% (2050)

181.76 km² surface
7.439 /km²

19% foreigners
160 nationalities


- Singles 62.2%
- Couples without babies 14.4%
- At least one children 10.4%
- Single-parent 7.7%
- others 5.3%

+ 84.123 families:

Environment and Climate Change

79 exceedances of the Daily Limit Value for PM10 concentrations (year 2018)

+2°C annual average temperature from 1901 to 2017
- average summer ground temperature (2013-2017)

2° agricultural city of Italy

2.910 ha of agricultural surface used

2.370 farms (metropolitan area)

50 farmers markets

2017 data

Fonte: Comune di Milano, *Istat, **Bloomberg Associates, Aratos.net
**MOBILITY, SERVICES, QUALITY OF SPACE AND LIFE**

**5.300.000** trips per day
(2013)

-2% border crossings
(2005-2013)

**25.614.580 m²**
of urban green (2017)
18,54 m²/inhab (2017)
+ 3.200 m² of accessible green
(2011-2017)

- **Public transport** 56,7%
- **Private transport** 30,2%
- **Walking** 13,1%

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**Modal split**

(PUMS 2017)

- **26** libraries
- **11** Universities (public and private)
- **23** local markets
- **91** weekly markets
- **16.000** bicycles
- **3.454** car sharing
(2018)

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**ECONOMIC AND EMPLOYMENT CONTEXT**

**+ 6,2% GDP in four years**
2014-2017

GSP per person 10% of national GDP
(2017)

- **208.261** businesses

<table>
<thead>
<tr>
<th>Typology</th>
<th>%</th>
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<tbody>
<tr>
<td>servizi alle imprese</td>
<td>39%</td>
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<tr>
<td>commercio ingrosso e dettaglio</td>
<td>25%</td>
</tr>
<tr>
<td>costruzioni</td>
<td>9%</td>
</tr>
<tr>
<td>alloggio e ristorazione</td>
<td>7,6%</td>
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<tr>
<td>manifattura</td>
<td>7,3%</td>
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<tr>
<td>servizi alle persone</td>
<td>7,1%</td>
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<tr>
<td>trasporto e magazzino</td>
<td>3,7%</td>
</tr>
<tr>
<td>servizi energetici e rifiuti</td>
<td>0,7%</td>
</tr>
</tbody>
</table>

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**70,7% unemployment rate**
6,4% of unemployment 15-64 (2016)
22% of youth unemployment (2016)

**34%** of multi-nationals in Italy are based in Milan

**15%** foreign companies in the metropolitan area (2016)

**52,000** companies in Milan are managed by women (2016)*

**+12,000** new start-ups (2007-2013)

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*Fonte: Comune di Milano, "Camera di commercio di Milano"
The Environmental Transition Department

**UNITS INVOLVED**
- City Resilience Department
- Climate and Energy Area
- Water Resources and Environmental Hygiene Area

**RESPONSIBLE FOR:**
- The implementation of environmental and energy policies;
- Resilience issues;
- Functions in the field of environmental protection and the fight against pollution
Plans and projects for a greener Milan
The ecosystem of Plans, actions and projects

City Masterplan 2030 - PGT

PAC
Air and Climate Plan

FORESTAMI- Forestation Program

Greening Plan

Greening Plan

Geoportale

Green roofs mapping

Veg Gap

Depaving Program - De-pavimentazione

Milano School Oasis

Adaptation Strategy - Milano 2020

NRG2peers

Clever Cities

Resilience Strategy

Sharing Cities
Milan 2030 wants to give itself a green footprint. To this end, the PGT has downsized land use forecasts for building, thus reducing land consumption. Water is once again the protagonist, thanks to the reopening of the Navigli (canals) and the plans for Lambro and Seveso rivers. The green belt which will connect twenty new city parks eventually becoming the urban threshold of the Metropolitan Park. New environmental standards favor the reduction of greenhouse gas and carbon emissions and help mitigate climate events.
strategy 5 _ MAKE WAY FOR THE ENVIRONMENT

Green and Blue infrastructure
Art. 10 of PGT
New quality standards for all buildings

Minimizing energy consumption, re-naturalizing and maximizing the city's permeable surface, reducing the carbon footprint of both new buildings and in the regeneration of the building stock.

Shocks & stresses
• Floods – flooding
• Air and water pollution
• Heat waves and extreme heat

Stakeholders
Direzione Generale, Urbanistica, AMAT

Status
Approved
Emissions reduction and climate impact reduction index (CCPI)

Reduction of CO2 emissions
Reduction of emissions for the requalification of the existing buildings;
Carbon neutrality for new buildings

Design elements that can be used in an alternative or composite way
- Solutions with high energetic performance;
- Re-naturalizing interventions, also through green integrated in buildings;
- Technologies for a reduced hydric consumption and for a reuse of rainwater;
- Use of sustainable materials and/or with recycled content;
- Adoption of surface finishes with a high coefficient of solar reflectance;
- Solutions for sustainable mobility.

Achievement of a climate impact reduction index -RIC
as the relationship between green areas and the territorial surface of the intervention

Design elements that can be used in an alternative or composite way
- Permeable surfaces on the ground;
- Greened permeable surfaces on the ground;
- Paved permeable surfaces on the ground;
- Green roofs architecturally integrated and equipped with a drainage layer;
- Green covers for buried artifacts equipped with a drainage layer;
- Green walls architecturally integrated in buildings.
Air and climate plan

1. ADAPTING to Climate Change
   - Flooding
   - Extreme Heat

2. Climate Change MITIGATION
   - Decarbonization
   - CO2 Storage

3. AIR QUALITY
   - Reduction of concentration of Nox, PMx and Ozone

Resilient Cities Department
Energy and Climate Area; AMAT
Air and climate plan

Focus 4: Cool Milan

4.2 Urban cooling and reduction of the heat island effect in the city

4.3 Milan Sponge-City
Piano Piantumazioni of Milan Municipality

Tree-planting Plan

+ 122% in three years

2020/2021
27,721 plants
20,120 trees
7,621 shrubs
Care and adopt public green

Milan Municipality

The City of Milan starts **collaboration agreements** or **sponsorship contracts with privates** to help the Administration to improve the green management in the city.

**Who?**
public or private, individual citizens, associations, condominiums, institutions, universities, schools, companies, stores, professional firms ...

» In ten years sponsorships increased by **900%**, from **50** to **504** green spaces given to privates
(update at 2019)
ForestaMI
Forestry Program

Planting of **3 million trees by 2030** in the metropolitan area.
+5% increase in tree canopy cover
Absorption of **5 million tons of CO2** per year

**Shocks & stress**
- Air and water pollution
- Heat waves and extreme heat
- Degradation of urban spaces

**Memorandum of Understanding between:**
Comune di Milano, Città Metropolitana di Milano, Parco Nord, Parco Agricolo Sud, con il coordinamento scientifico del Politecnico di Milano

**Status**
Ongoing (2018-2030)
Focus on planting

Schools

Productive areas - industrial

Areas to be reclaimed

Uncultivated green
**LIFE VEG-GAP**

**Vegetation for Urban Green Air Quality Plans**

- Evaluation of **direct and indirect effects of vegetation on air quality, temperatures** and human **health**

- Identification of the **most suitable tree species** for the city of Milan according to the meteorological, climatic and air quality components.

**Shocks & stress**
- Air and water pollution
- Heat waves and extreme heat
- Degradation of urban spaces

**Stakeholder**
Comune di Milano, ENEA, ARIANET, CREA, Ayuntamiento de Madrid, Città metropolitana di Bologna, MEEO S.r.l., Universidad Politécnica de Madrid

**Status**
on-going (2018-2021)
To keep heatwaves at bay and bring nature into the everyday lives of residents, the CLEVER Cities Milan team is advancing its plan to spread **green roofs and walls throughout the city**, while applying innovative business, finance and governance models to engage private actors in their design and implementation.

**CLEVER Cities aim to:**
- increase and improve **local knowledge of nature-based solutions**,  
- demonstrate that **greener cities work better for people and communities**,  
- contribute data and information to EU policy-making, and ultimately,  
- **promote and enable the uptake of nature-based solutions** in urban planning world-wide.
Sharing Cities

The Sharing Cities programme is a proving ground for a better, common approach to making smart cities a reality.

By fostering international collaboration between industry and cities, the project seeks to develop affordable, integrated, commercial-scale smart city solutions with a high market potential.

**District smart city development focus on:**
- Co-design: Citizen engagement in co-developing innovative services incentivising positive behaviour change
- Building retrofit
- Shared e-mobility
- Sustainable energy management service
- Urban sharing platform
- Smart lamp posts
Shocks & stress
• Degradation of urban spaces
• floods and inundations
• heat waves
• air and water pollution

Stakeholder
Direzione Generale, Dir. Transizione Ambientale, Dir. Urbanistica, Dir. Quartieri e Municipi, Dir. Mobilità e Trasporti, AMAT

Status
Ongoing

DEFINE A GOAL FOR THE DEPAVING PROGRAM of the city of Milan

TO EXPERIMENT INNOVATIVE PROJECTS of high environmental value, as pilot cases for the city.
Depaving Program

Possible depaving areas

Tav. S03 PGT
ca. 174,000 mq

+ 

Mapping*
ca. 278,000 mq

Total
ca. 452,000 mq

Assignment of a depaving coefficient for each type of area

ca. 249,000 mq
of possible new depaving areas

Mapping resulting from the identification of possible new depaving areas, identified with the City Council Departments, citizens, municipalities or associations. Still ongoing.
City mapping and Geoportale

Milan Municipality is moving forward toward the use of satellite data and existing database interaction. This allows both a real time mapping of the city and it helps supporting sustainable urban planning and design.

The advantage of Geoportale tool is being open source and accessible both to Administration and citizens.

**Mapping Tool**

The tool collects a set of layers on a map, and is conceived as a strategic tool for analysis at the urban scale for internal use of the Administration, both for the prioritization of interventions and the identification of opportunities/criticism.