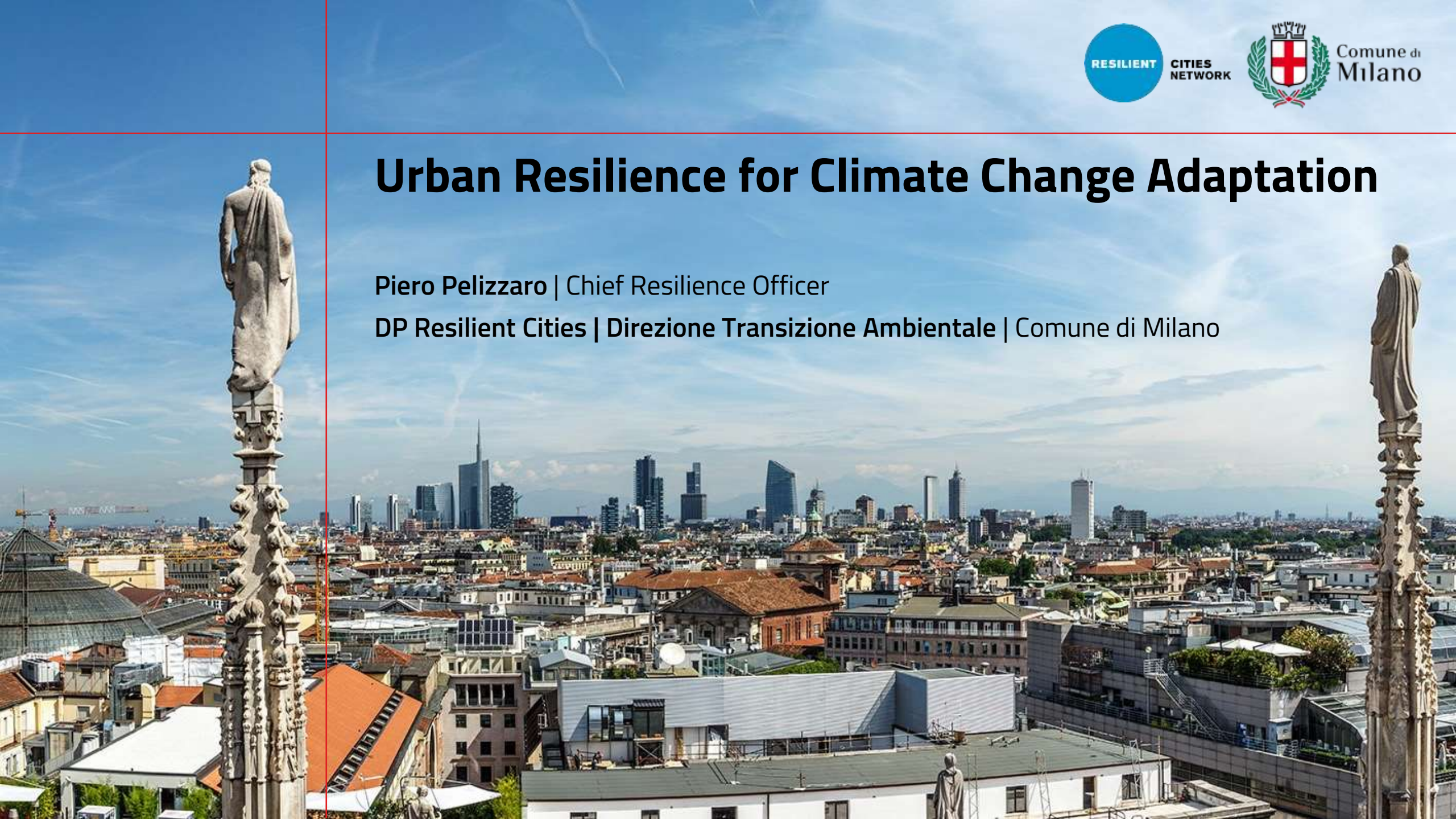




Urban Resilience for Climate Change Adaptation

Piero Pelizzaro | Chief Resilience Officer

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**.

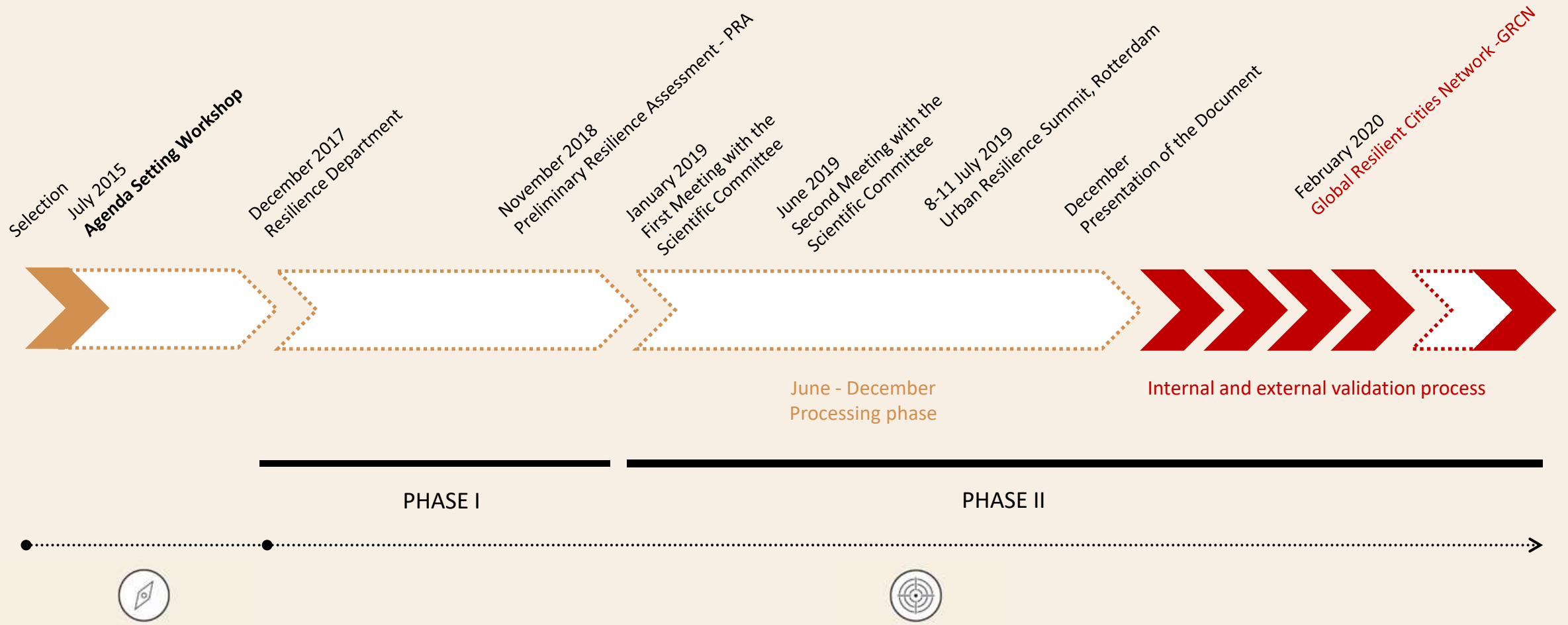


— Urban Resilience

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



The City Profile



POPULATION AND HOUSING REQUIREMENTS



Potential housing demand:
Population 18-35 years (2015)

- Singles 62,2%
- Couples without babies 14,4%
- At least one children 10,4%
- Single-parent 7,7%
- other 5,3%



Fonte: Comune di Milano

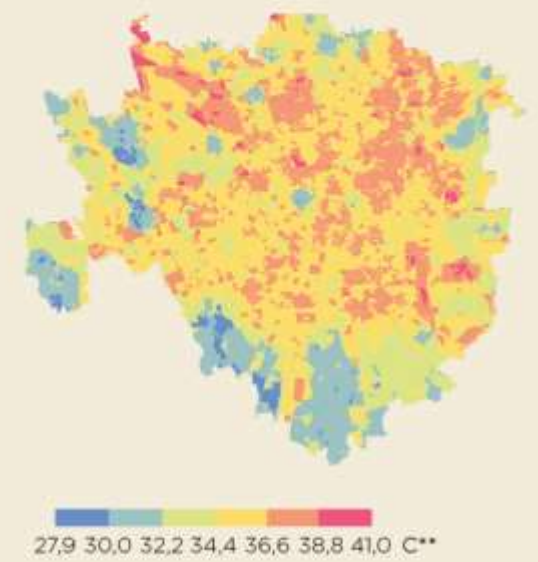
ENVIRONMENT AND CLIMATE CHANGE

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%**



26 libraries
11 Universities (public and private)



23 local markets
91 weekly markets



16.000 bicycles
3.454 car sharing
(2018)

Fonte: Comune di Milano

ECONOMIC AND EMPLOYMENT CONTEXT



+ 6,2% GDP in four years
2014-2017
GSP per person 10% of national GDP
(2017)



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

208.261 businesses

% per typology

servizi alle imprese	39%
commercio ingrosso e dettaglio	25%
costruzioni	9%
alloggio e ristorazione	7,6%
manifattura	7,3%
servizi alla persona	7,1%
trasporto e magazzino	3,7%
servizi energetici e rifiuti	0,7%



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



15% foireign companies in the metropolitan area (2016)



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



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

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:

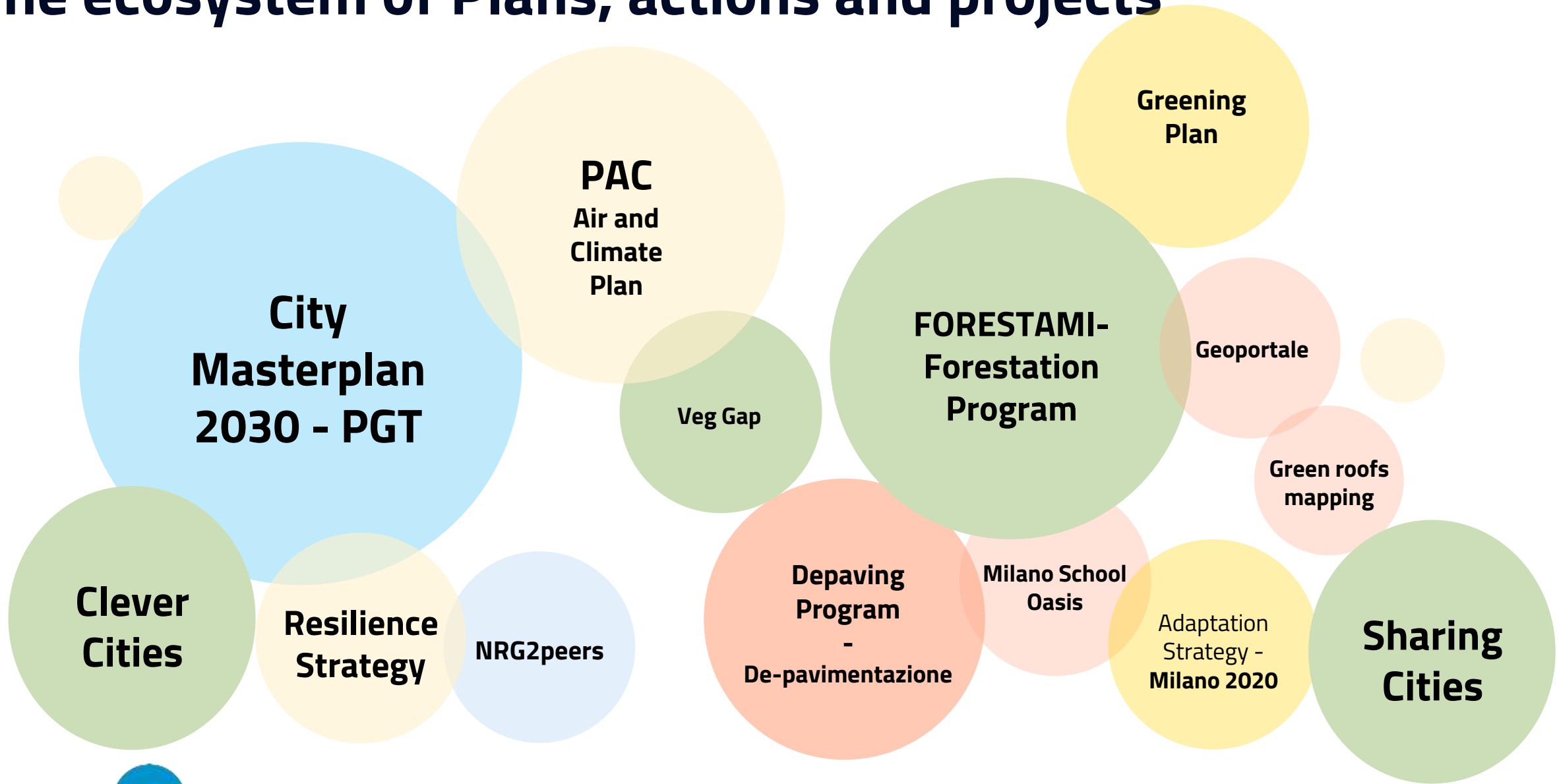
- The implementation of environmental and energy policies;
- Resilience issues;
- Functions in the field of environmental protection and the fight against pollution





Plans and projects for a greener Milan

The ecosystem of Plans, actions and projects



PGT MILANO 2030

City Masterplan Milano 2030

A Green, Livable, Resilient City

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



STRATEGIES 5 and 6





strategy 5 _ MAKE WAY FOR THE ENVIRONMENT

Green and Blue infrastructure

Azioni capillari





-  Ambiti di rigenerazione ambientale
-  Ambiti prioritari drenaggio urbano sostenibile (tramite NBS)

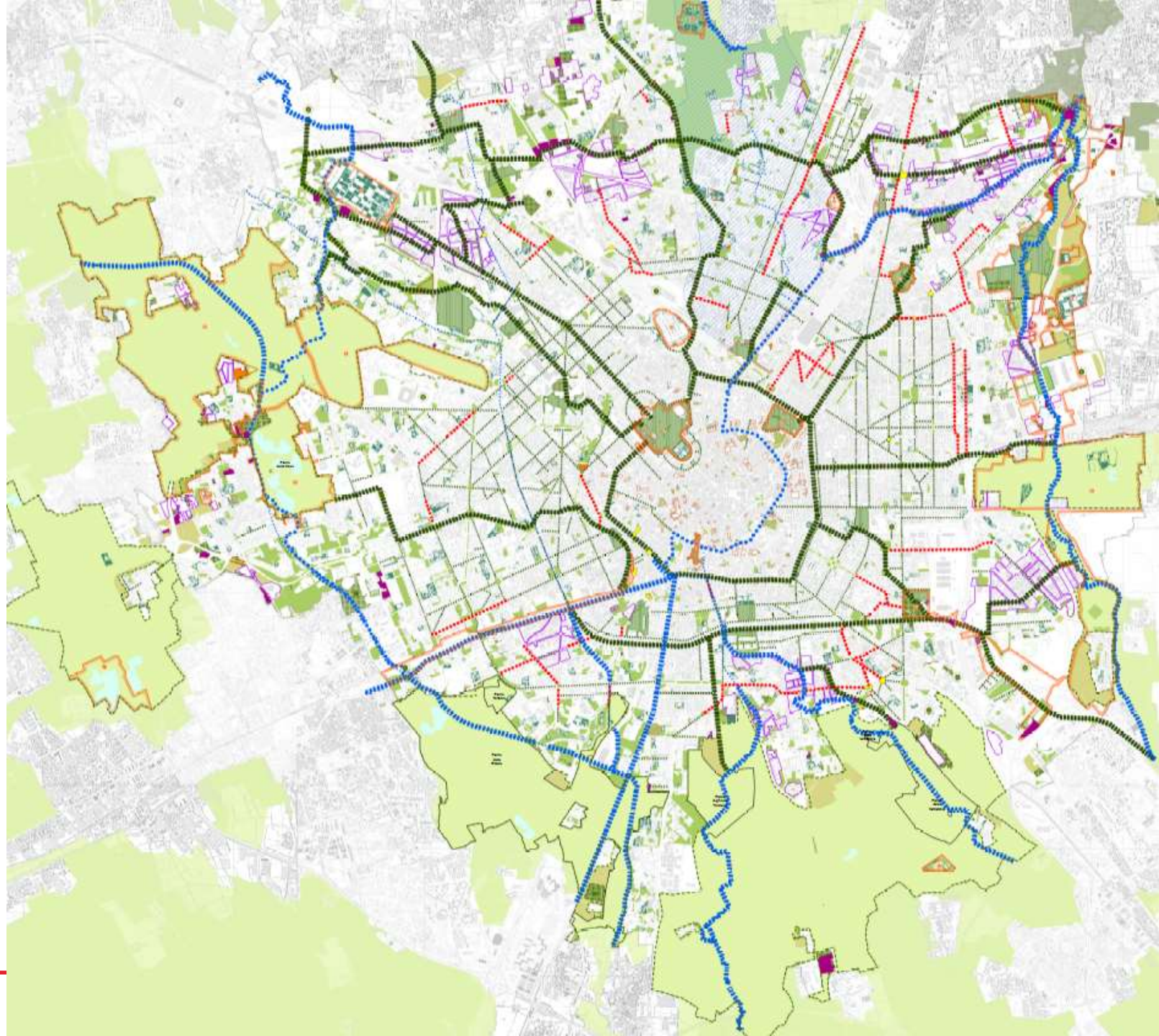
Aree per forestazione/piantumazione

-  Aree pubbliche da forestare/piantumare
-  Spazi per la sosta da depavimentare e piantumare

Aree da depavimentare in parte e piantumare

-  Spazi per la sosta
-  Piazze

-  Connessioni verdi lineari esistenti
-  Connessioni verdi lineari da realizzare
-  Infrastrutture blu
-  Infrastrutture blu - corsi d'acqua tombinati da valorizzare



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

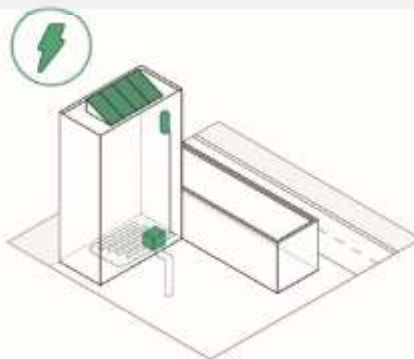
Design elements that can be used in an alternative or composite way

- 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.

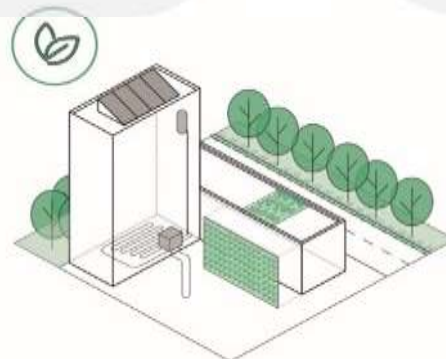
➤ **Achievement of a climate impact reduction index -RIC** as the relationship between green areas and the territorial surface of the intervention

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.



ENERGY EFFICIENCY / RENEWABLE ENERGIES



RENATURALISATION



CARBON FOOTPRINT REDUCTION

Air and climate plan

1

ADAPTING to Climate Change

Flooding
Extreme Heat

Resilient Cities
Department

2

Climate Change MITIGATION

Decarbonization
CO2 Storage

Energy and
Climate Area;
AMAT

3

AIR QUALITY

Reduction of concentration
of Nox, PMx and Ozone



Air and climate plan

Focus 4 : Cool Milan

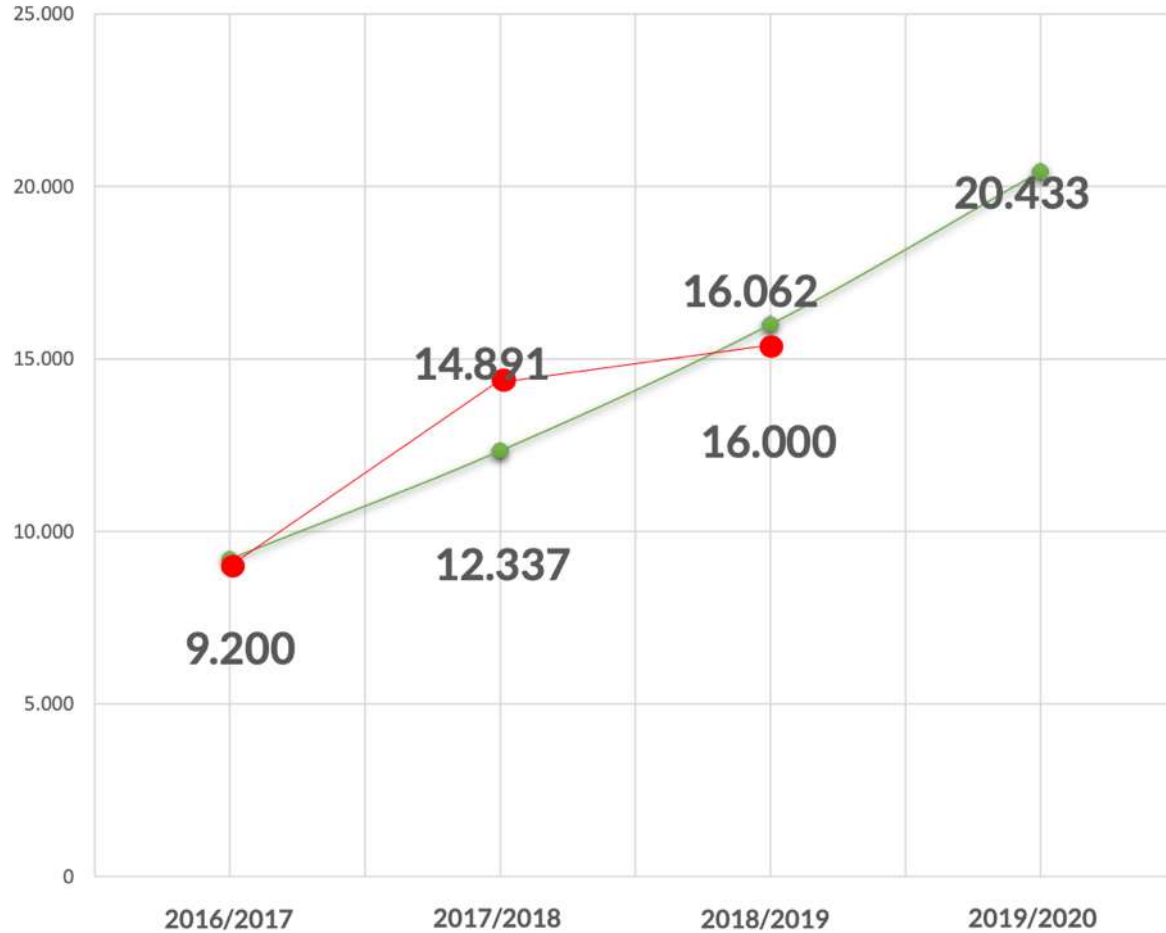


4.2
Urban cooling and
reduction of the heat
island effect in the city

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)



ForestaMi_

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)

Veg
Vegetation for
Urban Green Air
Quality Plans
Gap



La vegetazione per un'aria
più pulita e un clima migliore:
un'integrazione olistica
verso le città del futuro.

CLEVER Cities Milan



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.



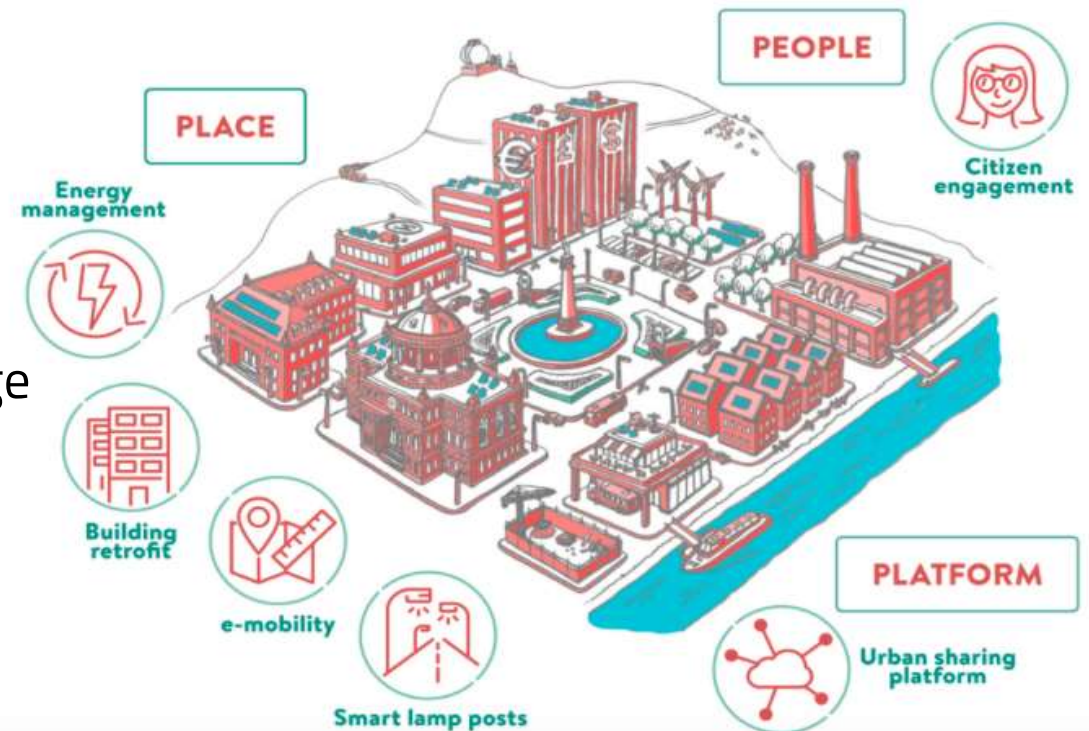
Sharing Cities

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



Depaving Program

- **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.

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

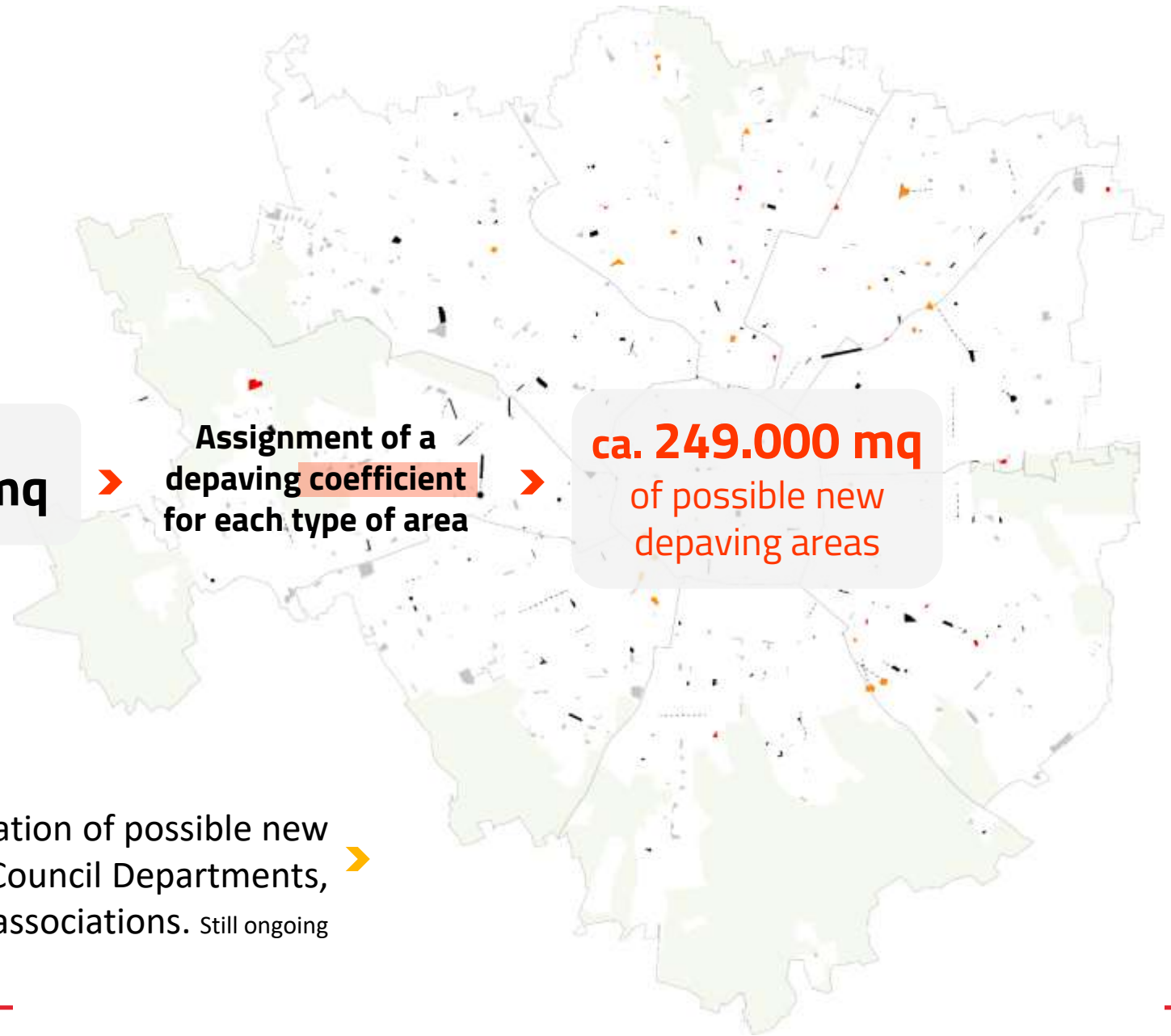
Status

Ongoing



Depaving Program

Possible depaving areas



Tav. S03 PGT
ca. 174.000 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*
ca. 278.000 mq

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**.



Layer geografici

- Suddivisione territoriale
- Mobilità
- Pedonalità
- Ciclabilità
- Piazze Aperte
- Verde
- Livelli di Falda
- Temperature Superficio
- Depavimentazione
- Case dell'Acqua
- Edilizia Sociale
- Edifici Pubblici
- Edifici
- Reinventing Cities
- Sottoservizi
- PGT - Piano delle rego
- PGT - Piano dei Serviz
- PGT - Documenti di p
- PGT - Geologica
- PGT - Attrezzature reli



CITIES
NETWORK



Comune di
Milano

