City of Milan - improvement of air quality and the environment

TOKYO FORUM FOR CLEAN CITY & CLEAR SKY
May 22 - 23, 2018
Levels of environmental criticality

PM10 has declined since 2002, by the number of Daily Value Limits exceeded, however, the legal limit (35 exceeds a year) has never been respected.

It is estimated that the annual average concentrations of PM10 should drop below 25 ug/m³, in order to meet this limit in the typical weather conditions of Milan.

EMISSIONS IN THE ATMOSPHERE (2015)

<table>
<thead>
<tr>
<th></th>
<th>CO2</th>
<th>1.080 kTon/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>2.885 Ton/year</td>
<td></td>
</tr>
<tr>
<td>PM10</td>
<td>209 Ton/year</td>
<td></td>
</tr>
</tbody>
</table>

![Graph showing PM10 concentrations in Milan](image)
Milan’s Mobility Figures

Inhabitants Milan city:
~ 1.3 M
180 km², ~ 7300 inh/km²

Inhabitants Metro area:
~ 3.2 M
1570 km², ~ 2000 inh/km²

Daily city users: ~ 1 M

Overall Mobility
(trips/day, 2013):
5,255,000

Trips in Milan:
2,978,000 (56%)

Trips between Milan and the metropolitan area:
2,277,000 (44%)

Motorization Rate: 50.5 cars per 100 inhabitants
Milan’s Mobility Figures: public transportation

- **Suburban Lines**
  - 12 lines
  - 599 km

- **Subway Lines**
  - 4 lines
  - 180 km

- **Tram**
  - 18 lines
  - 323 km

- **Filobus**
  - 4 lines
  - 77 km

- **Bus**
  - 117 lines
  - 2106 km
Milan’s Mobility Figures

<table>
<thead>
<tr>
<th>City</th>
<th>Registered Vehicles /1000 inh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milan</td>
<td>505</td>
</tr>
<tr>
<td>Madrid</td>
<td>480</td>
</tr>
<tr>
<td>Barcellona</td>
<td>380</td>
</tr>
<tr>
<td>Munich</td>
<td>350</td>
</tr>
<tr>
<td>Hamburg</td>
<td>330</td>
</tr>
<tr>
<td>London</td>
<td>310</td>
</tr>
<tr>
<td>Berlin</td>
<td>290</td>
</tr>
<tr>
<td>Paris</td>
<td>250</td>
</tr>
</tbody>
</table>

2006: 5,66 cars / 10 inh (736,805 cars)

2016: 5,05 cars / 10 inh (690,824 cars (-6%))
Milan’s Mobility Figures

TREND PASSENGERS OF PUBLIC TRANSPORT SERVICE DURING LAST 10/15 YEARS

Urban Public Transport Passengers and Urban Area
Index 100 – Year Base 2003

[Bar chart showing the trend of urban public transport passengers from 2007 to 2017]
Starting from 2020, ATM (Milan public transport company) will buy only electric vehicles. At the end of 2030, the fleet is expected to consist of 1200 electric public buses

- 70% of the public transport’s fleet is electrically powered
- 25 electric buses to put into service during this year
- 80 new trolleybuses
- Expected purchase of 83 electric cars used for fleet assistance and maintenance
- Start of a study for the conversion of ATM depots into full electric hubs and the construction of 3 new innovative depots.
New Commitments for 2030

For the 2030 target Milan wants to further strengthen its action in the following fields:

- Energy retrofit of buildings
- Further development of the district heating service
- A mobility strategy for 2030 that could further develop the measures included in Milan’s Sustainable Urban Mobility Plan
- New Smart Cities Projects

Target by 2030: 40% CO2 emissions reduction
ACTIONS for the improvement of air quality and the environment

- ENERGY EFFICIENCY
- IMPROVING WASTE MANAGEMENT
- ROAD PRICING AND ROAD CONTROL
- INTEGRATED MOBILITY
## Mobility

<table>
<thead>
<tr>
<th>Measure/Action</th>
<th>CO2 emission reduction kton</th>
<th>Saved energy MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed actions (SUMP Reference Scenario)</td>
<td>270</td>
<td>966000</td>
</tr>
<tr>
<td>Public transport improvement in Milan and in the Metropolitan Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle and pedestrian mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People and freight transport demand side management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SUMP (additional measures)</strong></td>
<td>99</td>
<td>404000</td>
</tr>
<tr>
<td>Public transport improvement in Milan and in the metropolitan area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycle and pedestrian mobility</td>
<td></td>
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<td>People and freight transport demand side management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharing mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measures dedicated to freight transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of electric mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>369</td>
<td>1370000</td>
</tr>
</tbody>
</table>
The SUMP is the document that indicates Milan’s mobility strategy for the next ten years.

The SUMP follows 4 main directives:
1. Milan as a Metropolitan City
2. Urban Accessibility for everyone
3. Urban Space as a common good
4. Governance of people and goods mobility.

By investing on the development of public transport and on sharing mobility, and by the exploitation of public spaces the SUMP confirms Milan’s change of pace in the field of Mobility and Transport policies.
Additional targets of the SEAP

Besides CO₂ emissions reduction there are additional targets:

- Energy saving in final uses, in the residential, tertiary and transport sectors
- Diversifying sources of energy supply, with a focus on renewable energy sources
- Giving a contribution to air pollution reduction policies
- Informing citizens about energy saving and environmental sustainability in order to increase the general level of awareness
- Creating the conditions to enable the development of the energy efficiency market in the building sector
SEAP fields of action

Public Buildings
Fuel and electricity use in municipal buildings (schools, offices, facilities and residential buildings)

Private buildings, tertiary sector and industry
Fuel and electricity use in private buildings (residential and non residential)

Public lighting
Street lighting and traffic lights system

Renewable energy sources
Energy production from renewable energy sources (solar, geothermal, aerothermal)

Mobility
Public and private transport

Waste
Urban waste management and treatment
Energy use in Milan 2013

Total final energy consumption: 23.9 TWh:
- Total electricity consumption: 6.8 TWh
- Total fuel consumption: 17 TWh (1409.7 MTOE)
- Total heat consumption (DH): 0.64 TWh
CO2 emissions in Milan

2005: 7418 ktCO₂ (*)
5,7 tCO₂/inhab

2013: 6948 ktCO₂ (*)
5,1 tCO₂/inhab
### BAU Scenario and CO2 emission reduction target

<table>
<thead>
<tr>
<th>Sector</th>
<th>2005 (Kt/year)</th>
<th>BAU-2020 (Kt/year)</th>
<th>Var%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings (residential, tertiary and industry)</td>
<td>3.629</td>
<td>3.444</td>
<td>-5%</td>
</tr>
<tr>
<td>Public Lighting</td>
<td>51</td>
<td>52</td>
<td>4%</td>
</tr>
<tr>
<td>Industry/Tertiary</td>
<td>2.566</td>
<td>2.686</td>
<td>5%</td>
</tr>
<tr>
<td>Transport</td>
<td>1.172</td>
<td>911</td>
<td>-22%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7.418</strong></td>
<td><strong>7.093</strong></td>
<td><strong>-4%</strong></td>
</tr>
</tbody>
</table>

- **Target vs BAU**: 1.158 -16%
- **Target vs 2005**: 1.484 -20%

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![CO2 emissions chart](chart.png)

- tertiary/industry
- public lighting
- transport
- building heating and domestic uses

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![Comune di Milano logo](logo.png)
**SEAP target**

How is Milan planning to achieve its target?

The SEAP sets, describes and accounts in details Milan’s actions to reduce global emissions, including measures that are already in place and additional measures essential to achieve the 2020 (and futures) target.

*Target contribution per sector*
SEAP: Energy Help desks and awareness raising

Energy Help Desk (sportello energia) experts are available in fixed days in 9 institutional locations, in the different districts of the city, to provide citizens information concerning:

- available incentives and financing sources for building energy retrofit and renewable energy use
- building energy performance assessment and advice on feasible retrofit interventions
- maintenance and management of heating plants
SEAP: District Heating

Planned development of the district heating service by the Milano Energy utility A2A
**SEAP: District Heating**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Generated Heat (MWh/year)</th>
<th>Generated Electricity (MWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste to energy (Silla 2)</td>
<td>300.717</td>
<td>345.159</td>
</tr>
<tr>
<td>Combined Heat and Power (Canavese, Tecnocity, Famagosta, Linate)</td>
<td>122.890</td>
<td>144.501</td>
</tr>
<tr>
<td>Groundwater Heat Pumps (Canavese, Famagosta)</td>
<td>25.011</td>
<td></td>
</tr>
<tr>
<td>Integrating Boilers (1)</td>
<td>207.103</td>
<td></td>
</tr>
<tr>
<td>Minor local centralised heating plants (gas boilers)</td>
<td>101.066</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>756.787</strong></td>
<td><strong>489.659</strong></td>
</tr>
</tbody>
</table>

(1) boilers annexed to Heat and Power plants to cover peaks of heating demand
SEAP: Private buildings. The new Building Code

The new building code sets minimum compulsory energy performance requirements for new buildings.

Incentives are provided for new and retrofitted buildings respecting specific parameters concerning energy performance and sustainability.

Incentives are provided in terms of additional authorized building volume.

Besides the building code, energy efficiency in buildings is fostered also by providing a reduction of infrastructure charges for new and retrofitted buildings that respect specific criteria regarding energy performance and renewable energy use.
SEAP: BE2

Milan Municipality’s BE2 Notice will allocate a grant of **24 millions euros to promote and facilitate the energetic refurbishment of private buildings.** This non-repayable grant will cover up to 20% of the intervention’s cost.

Furthermore, those admitted to the Notice may request a **soft loan** to the Credit Institutions that have subscribed an agreement with Milan Municipality.

Thanks to the non-repayable grant, the preferential financing and the opportunity to obtain the **ecobonus** granted by the State, **citizens must not anticipate any construction cost and starting from the first year they can save from 10% to 20% of the cost and afterwards up to 60%.**

**AIMS**
- To reduce the atmospheric emissions
- To renovate the urban areas
- To boost the local economy
SEAP: BE2

FORUM PA 2018
Sustainable Public Administration Award: 100 projects to achieve the goals set by the 2030 Agenda

Distrust and lack of information among tenants

Usually the building manager does not have the appropriate financial capacity and technical skills

The Economic benefit is not immediate because the tax deduction takes place after a year

Energy Renovation pays for itself

• Information campaign
• Surveillance and control
• Non-repayable Grant (BE2 Notice)

No measures taken

Economic resources to support the building manager in making the required interventions

Agreement with credit institutions to finance, on favourable terms, the energetic refurbishment of private buildings (BE2)

Measures implemented
SEAP: Energy Procurement, Renewable sources

The Administration is currently purchasing green electricity for its buildings: offices, schools, museums, health care structures, local police stations, for a total electricity consumption of about 94 GWh and it’s going to apply the same conditions in the next call.

The Contractor, upon request of the Administration, will be obliged to prove, with appropriate documentation, the production of a quantity of Green Energy for an amount not lower than the total consumption turnover.
SEAP: Public lighting LED retrofit - expected results

The expected benefits of the implementation of the Plan are:

- 52% reduction in electricity consumption (from 14 Million KWh to 55 Million KWh)
- reduction of CO2 emissions: 23,650 Tons /year
- 31% reduction in expenditure for electricity and management (maintenance included)
What are the actions implemented by the City of Milan?

**Tree-planting Program:**
Planting of 14,500 trees a year and enhancement of tree species diversity.

**Green Management Strategies and Resilience:**
Collaboration with 100 Resilient Cities & ARUP, Bloomberg Associates and the Metropolitan City of Milan.
SEAP: Waste management

Separate waste collection

Door to door collection of:
- glass
- plastic and light metals
- paper
- biowaste (for households it started in 2012 and was progressively extended to the whole city)

54% waste separate collection rate in January 2018
Milan Pollution Charge – ECOPASS

The Ecopass program was a traffic pollution charge implemented in Milan, as part of the overall sustainable mobility strategy of the Municipality of Milan and has been designed to discourage the use of polluting private vehicles inside the central Milan “Cerchia dei Bastioni” area (the internal ring), by applying an entrance charge related to the polluting emission levels (PM10).

Some motorists had to pay an urban toll when traveling within a Limited Traffic Zone corresponding to the central Cerchia dei Bastioni area and encircling around 8.2 km².
From Pollution Charge to Congestion Charge

Ecopass resulted in a drastic traffic drop in 2008 (-21%), however, over time, the increase in the share of exempted vehicles (while in 2007 50% of vehicles entering the area would have been exempted from Ecopass, in the first year of the scheme this percentage went up to 75% and in 2010, the share of exempted vehicles was as high as 90%! ) gradually reduced the dissuasive power of Ecopass.

Moreover, following the results of a bottom-up referendum in which a large majority of voters (79%) demanded an upgrade of the Ecopass measure, the scheme was upgraded to a congestion charge in 2012.
Milan Congestion Charge – AREA C

“Area C” is a road pricing measure launched by the Municipality of Milan in 2012 in order to improve life conditions of those who live, work, study and visit the city. “Area C” is the restricted traffic zone in the center of Milan (C as Cerchia Bastioni).
AREA C – The aims

Decreasing vehicular access to the Area C therefore:

- Decreasing traffic congestion;
- Improving public transport speed;
- Decreasing the occupation of on-street parking;
- Reducing road accidents;
- Reducing pollutant emissions caused by traffic;

- Reducing health risks related to air pollution;
- Increasing the share of sustainable modes of travel;
- Improving urban center quality and attractiveness;
- Raising funds for sustainable mobility services and infrastructures.

<table>
<thead>
<tr>
<th>Resident vehicles</th>
<th>Service vehicles</th>
<th>Other paying vehicles</th>
<th>Green vehicles</th>
<th>Vehicles exempted by the payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td>11%</td>
<td>30%</td>
<td>40%</td>
<td>13%</td>
</tr>
</tbody>
</table>
AREA C – Mobility results

Improving the life conditions of those who live, work, study and visit the city is the goal of the Congestion Charge - Area C.

In 2015:

- **Decreasing road traffic** in “Cerchia dei Bastioni” = - 29.2% compared with 2012
- **Decreasing Road accidents** = - 26% compared with 2012
- **Increase public transport speed** = +2% for buses between 9:00-10:00 and + 5.9% between 18:00-19:00 and + 2.2% for tram between 09:00-10:00 and + 4.4 between 18:00-19:00;
- **Increase Public Transport users**: +12% on surface PT; + 17% on Underground
- **Raising funds for soft mobility infrastructures** = +10%
AREA C – Environmental results

Pollutant vehicles: - 49% (-2,400 pollutant vehicles entering every day the Area C)

Cleaner vehicles + 6,1 % (from 9,6% to 16,6% of the total vehicles)

Less emissions of pollutants:

Total PM10 -18% ; Exhaust PM10 -10%;
Ammonia -42%; Nitrogen Oxides -18%;
Carbon Dioxide -35%

Less Black Carbon (BC):
28% to 52% reduction of BC concentration
AREA C – Economic and social results

The reduction of the cars circulating in the city center enables the reuse of the public spaces once reserved to the parking. For instance, an area of approximately 15,000 sqm near Castello Sforzesco was turned into a pedestrian area, and new bike sharing stations and car sharing services were set up in the city.

Incomes reinvested in Sustainable mobility

2016 incomes = more than 28 million €
Towards a LEZ

Control of the most pollutant vehicle and control and tracking of access for heavy vehicles and for the transport of dangerous goods
Towards a LEZ

Starting Date: 1° October 2018
Monday-Tuesday 7 am - 9 pm except public holidays

Target for 2025: No Diesel in Milan

- Petrol vehicles Euro 0 class
- Gasoline vehicles Euro 0,1,2,3 class
- Gasoline Bus M3 Euro 0,1,2 class
- Cycles Euro 0 class
Towards a LEZ – Class of vehicles

MILAN MODEL IS INSPIRED BY MANY OTHER CITIES.

Currently, LEZ is in use in London, in Paris, in Berlin (and in 60 more cities in Germany), Amsterdam, Rotterdam, Anversa and many more. [www.urbanaccessregulations.eu](http://www.urbanaccessregulations.eu). The rule is also enforced through the establishment of the Vehicle Registry and Environmental Bulletin (which has long been in Germany, and in January 2017 the stamp will also be used in Paris).

The advantages:

- **The color of the stamp provides greater understanding and better control effectiveness.**
- **The registry maximizes regulatory compliance and contributes to simplifying and unifying database data. The model would contribute to a national standard.**
SEAP: MOBILITY – other scenario -

Interventions for cycling and pedestrian mobility ('zero risk' view)

- Road network hierarchy, with a speed extension to 30 km / h on local roads
- Cycling routes system organized in a hierarchical structure
- Bike Sharing extension to cover the City
The target to 2020 of the PAES is 50,000 electric/hybrid vehicles circulating in the Metropolitan Area (PUMS estimates, without strong incentives at national and regional level).
Car sharing in Milan

<table>
<thead>
<tr>
<th>Service</th>
<th>Date</th>
<th>Members</th>
<th>Vehicles</th>
<th>Electric Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car2Go</td>
<td>07/2013</td>
<td>829</td>
<td>160,000</td>
<td>0%</td>
</tr>
<tr>
<td>DriveNow</td>
<td>10/2016</td>
<td>473</td>
<td>93,000</td>
<td>4%</td>
</tr>
<tr>
<td>Enjoy</td>
<td>12/2013</td>
<td>982</td>
<td>392,000</td>
<td>0%</td>
</tr>
<tr>
<td>GuidaMi/Ubeego</td>
<td>2004</td>
<td>154</td>
<td>5,000</td>
<td>7%</td>
</tr>
<tr>
<td>Share’ngo</td>
<td>06/2015</td>
<td>700</td>
<td>60,000</td>
<td>100%</td>
</tr>
<tr>
<td>E-Vai</td>
<td>11/2010</td>
<td>106</td>
<td>33,000</td>
<td>75%</td>
</tr>
</tbody>
</table>

Total: 3,394 members, 743,000 vehicles, 28% electric vehicles
Bike sharing station based

BikeMi is the service of Bike-Sharing Station Based, developed by ATM and operated by Clear Channel. Born in December 2008, it provides a user-friendly, practical and ecological service.

- 280 stations (October 2017);
- 3,650 traditional bikes;
- 1,000 electric bikes;
- 57,000 yearly subscriptions;
- More than 11,700 rents per day on average;
- 4,285,000 million rents in 2016;
- 1,738,000 Kg of CO2 saved in 2017 (Defra’s carbon convertor factor)
Bike sharing free floating

One of the new challenge of the Municipality is to improve the use of bicycle in Milan, according to the goals of SUMP.

- Start on October 2016;
- traditional bikes;
- no electric bikes;
- 200,000 active members
- 12,000 total bikes
- 1,800,000 million rents in 2017
- More than 14,000 rents per day on average
Scooter sharing

• **Milan was the first Italian city to launch a Public call for identifying companies to perform the Scooter Sharing Service (December 2014).**

• The **first scooter sharing in free-floating mode** in Italy was launched in Milan on 15 July 2015 with 150 Piaggio Mp3 three-wheel vehicles.

• At the end of the test, **Milan has republished the public call, still open. In October 2017, a new operator, Mimoto, re-launched the service with 100 scooter Askoll ES2.**

• At December 2017, this service counts **6,000 subscriptions and 7,000 trips.**
Towards an integrated mobility - MAAS

- Taxi, Taxi sharing and Demand Responsive Transport (DRT) Bus (Bus a chiamata)
- Car Sharing
- Park Booking
- Valet Parking
- Traffic Control Room/Big Data
- Trip Planning App
- Big Data
- Micro-mobility solutions
- Electric mobility Use/booking of charging posts
- CAR Intercity
- Public Transport Intercity
- Car Pooling
- Car Rental
- Local Public Transport
- Flight + Train Integration

INTEGRATED MOBILITY
Thanks for the attention

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