

MADRID'S AIR QUALITY PLAN 2011 – 2015



General Directorate of Sustainability

Government Division of Environment, Safety and Mobility

Madrid City Council

Approved by the Governing Board of Madrid City Council on April 26, 2012.

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1. INTRODUCTION

Madrid's Air Quality Plan 2011-2015 is a key document from the Council as part of its strategy to consolidate and strengthen the process of transforming the city from a conventional model into a sustainable urban model.

If Madrid has been able to make the profound socioeconomic change required to become one of the most dynamic cities in Europe over the last decade, this has largely been made possible by its ability to implement environmental considerations into its development model. Among these considerations, those concerning an item as vital as air quality have been a priority. This has enabled the essential need for sustainability to be made a reality in Madrid, by breaking the link between socioeconomic growth and air pollution.

True to its tradition of being on the cutting edge in the fight against air pollution, the City of Madrid aspires to meet current objectives concerning air quality, in order to offer its residents ongoing improvement in their quality of life. To that effect, Madrid's Air Quality Plan 2011-2015 has been conceived not simply to consolidate progress already made, but especially to meet the specific quality objectives of current legislation for all pollutants, within the planned timeframes.

1.1 Background and achievements

This Air Quality Plan represents a new milestone in the long history of the fight against air pollution implemented by the City of Madrid. Since approval of the first Ordinance against air pollution in 1968¹, Madrid City Council has been a leader among public administrations in adopting emission control measures. At each stage the Council has implemented measures designed to meet the challenges of the moment, according to the demands of the circumstances.

In this context, the immediate predecessor to this Plan is Madrid's Local Air Quality Strategy (2006-2010), approved by Mayoral Decree on February 9, 2006 and adopted to comply with the demands of Directive 96/62 of September 27 from the Council on ambient air assessment and management, also known as the Framework Directive and its regulations.

The efforts made since 2006 in applying the Strategy (76% of its 54 measures have been implemented), together with additional actions taken, such as re-routing portions of the M30 to underground tunnels, have resulted in a substantial reduction in air quality polluting emissions.

According to the 2011 edition of the City's Emissions Inventory, emissions of primary pollutants have dropped continuously during the period from 1990 to 2009. Nitrogen oxides have been reduced by 39.4%, suspended particulates by 59.2% and volatile organic compounds (ozone precursors) by 40.9%. Despite the significance of this reduction, it is no less important to mention that those same polluting emissions have reduced by 20.5% during the period from 2006 to 2009.

¹ Plenary Session June 28, 1968: Regulatory Ordinance from the Municipal Action to fight air pollution in Madrid.

■ 1.1 Polluting emissions reduction rate ■

		1990-2009	2006-2009
Nitrogen Oxides		0,394	0,208
Particulates	PM 2,5	0,4806	0,2434
	PM 10	0,5684	0,2302
	PTS**	0,5927	0,224
COVNM*		0,4099	0,1887

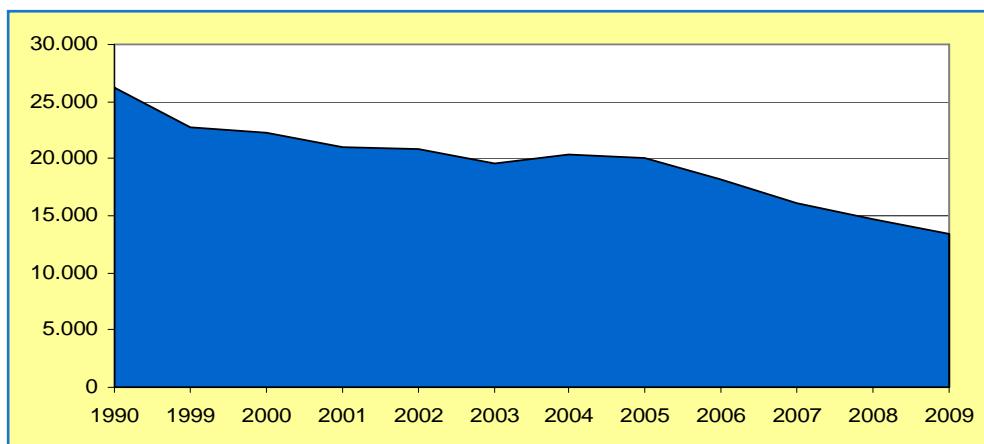
* Non-methane volatile organic compounds

** Suspended particulate matter

Source: *Emissions Inventory of Madrid City. 2011 Ed.*

In this respect, the reduction in NO_x emissions originating from traffic stands out. As shown in Figure 1.2, there was a drop of 48.9% recorded during the period from 1990 to 2009, with 26.3% occurring between 2006 and 2009.

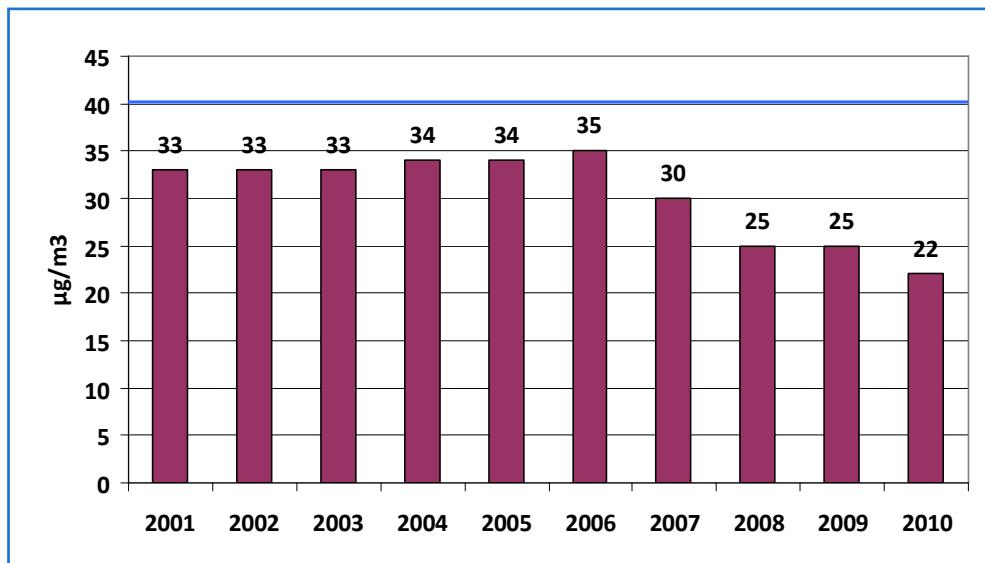
■ 1.2. NO_x evolution of emissions originating from traffic ■



Source: *Emissions Inventory of Madrid City. 2011 Ed.*

This effort to reduce emissions at the source has been the driving force to the substantial improvement in air quality in the city, and has significantly reduced concentrations of the main pollutants. As a result, current levels of sulphur dioxide, carbon monoxide and lead are much lower than those required by the laws in force. There have also been significant reductions in nitrogen dioxide, suspended particulates and tropospheric ozone recorded. This reduction of emissions derived from measures taken has been augmented during the past two years due to the economic crisis, which has lowered traffic levels in the city, thus contributing to the reduction.

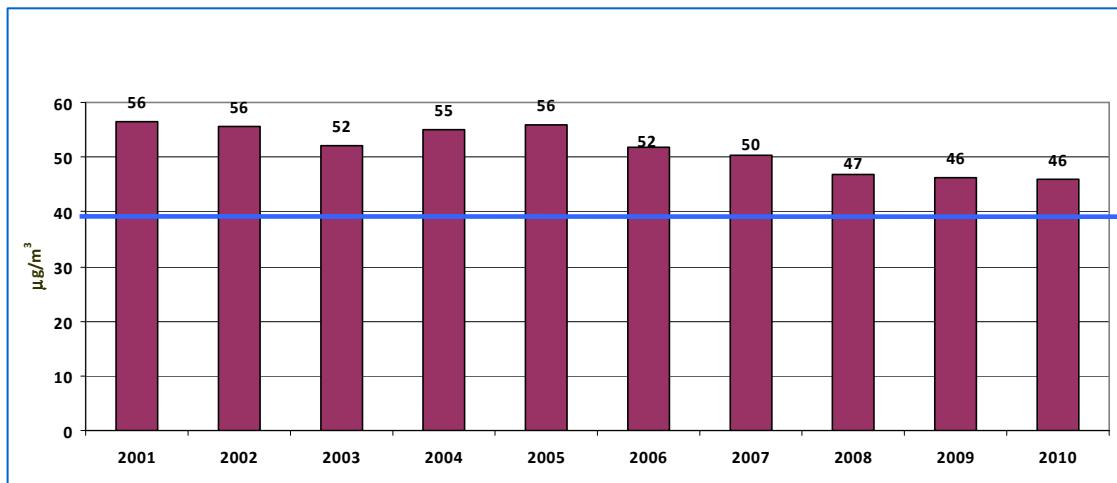
 1.3. Suspended particulates evolution from 2001 to 2010 



Source: Madrid Air quality monitoring network

As shown in Table 1.3, PM₁₀ levels are down 37% since 2006, which makes 2010 the fourth consecutive year that the average daily value has stayed below the 35 days per year maximum permitted.

 1.4. Nitrogen dioxide (NO₂) evolution from 2001 to 2010 



Source: Madrid Air quality monitoring network

As shown in Table 1.4, NO₂ concentrations have also shown very significant reductions: there was an 18% drop during the period from 2001-2010 with 11.5% occurring since 2006. Nevertheless, despite this achievement, it has not been possible to reach the annual limit value of 40 µg/m³ and the hourly limit values at certain stations are still being exceeded, even though the alert threshold has never been breached.

1.2 Plan challenges and objectives

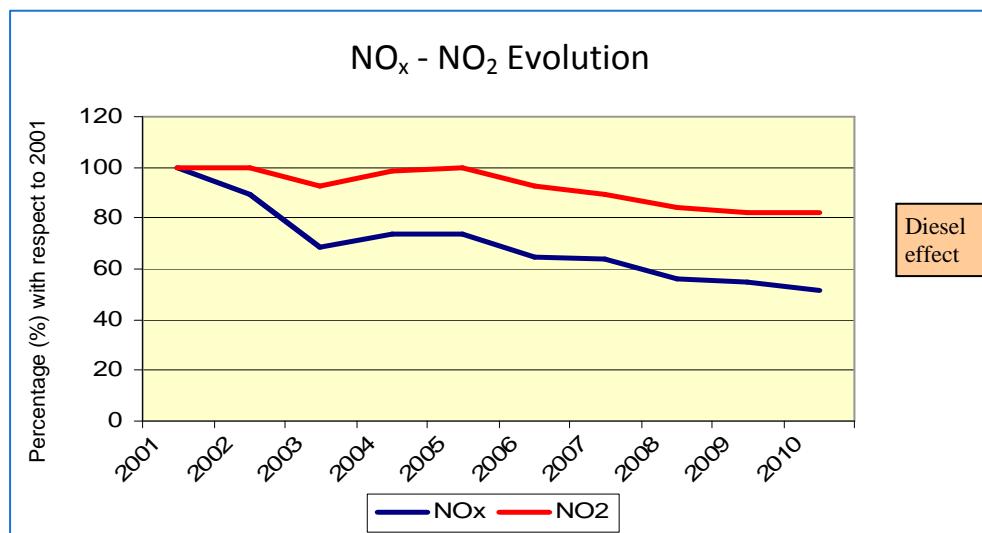
1.2.1 Challenge posed

As shown above, despite significant emission reduction efforts at the source and notable improvement in air pollutant concentrations in the city, in Madrid, like most large European cities, there are still problems with meeting the objectives set for NO₂ and, sometimes, localized areas where particulates and ozone are exceeded.

In the case of NO₂ (the only pollutant that exceeds annual and hourly limit values), the difficulty in meeting the objectives is mainly due to two factors. On the one hand, the objectives for NO₂ are more demanding, and on the other hand, there is a structural problem caused by the large dieselization of the vehicles in the city. As a result of this phenomenon, of the 56% of NO₂ emissions caused by car traffic in the City of Madrid, 98% are a result of cars (excluding taxis) that use diesel fuel. The reason for this is that 63.6% of traffic is made up of privately-owned diesel cars, and 96% of privately-owned diesel car traffic comprises vehicles that are less than 10 years old. Consequently, this situation has been largely due to the fact that technological improvements introduced in recent years to reduce NO_x emissions from diesel-powered cars have entailed a substantial increase in the portion of primary NO₂ emitted, which is the pollutant recorded at air quality measuring stations.

This phenomenon explains why, despite having substantially reduced NO_x emissions from traffic, as well as NO_x concentrations in the ambient air, there has not been a proportional drop in NO₂ concentrations. As shown in Figure 1.5, NO_x concentrations dropped 48.2% during the period from 2001 to 2010, but NO₂ concentrations dropped only 18%.

 1.5. NO_x and NO₂ concentrations evolution at urban stations
of traffic pollution measurement 



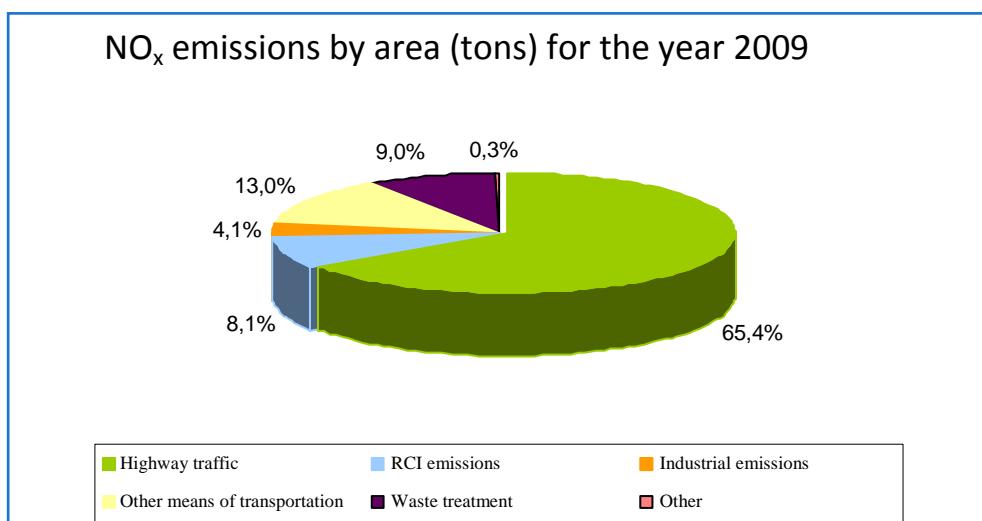
Source: Madrid Air quality monitoring network urban stations of traffic pollution measurement

Madrid has always been a leader in the fight against air pollution. It was the first city in Spain to make air quality monitoring available during the 1960's and was the first city to adapt its air quality monitoring network to comply with the most recent EU demands (Directive

2008/50/EC)². Therefore, Madrid City Council does not seek to lower the required levels. The Council is committed to meeting them, to the extent that such compliance improves the quality of life of its residents.

In this regard, the Council is aware that the main challenge is to further reduce emissions originating from various pollution sources, especially from traffic, which represents 65% of nitrogen oxide emissions. This is a challenge that must be faced because if appropriate structural and technological measures that will bring about a sustainable and less-polluting traffic model have not been incorporated into the growth model, , this will entail a corresponding increase in emissions from mobility as the economy recovers.

1.6. NO_x emissions structure of the City of Madrid



Source: *Emissions Inventory of Madrid City. 2011 Ed.*

1.2.2 Plan objectives and time frame

In order to overcome the challenge posed and to comply with current law, the Council has prepared this 2011-2015 Air Quality Plan with the following specific objectives:

- To consolidate what has already been achieved in improving the city's air quality by driving its ongoing improvement comprehensively.
- To ensure fulfilment of all established objectives under current law within the legally planned time frame, and in particular, to give Madrid an Air Quality Improvement Plan for nitrogen dioxide as per the provisions of Article 24 of Royal Decree 102/2011 of January 28, on improvement of Air Quality.³

² Directive 2008/50/EC, of May 21, from the European Commission and the Council concerning ambient air quality and a cleaner atmosphere in Europe.

³ Official State Journal no. 25 dated 1/20/2011) Royal Decree via which Directive 2008/50/EC is incorporated into domestic law.

- To comply with the requirements for requesting an extension from the European Commission, in order to meet the nitrogen dioxide limit values provided for in Article 23.1 of Royal Decree 102/2011, in accordance with Commission Guidelines for preparation of postponement request notifications.⁴

With respect to the Plan timeframe, considering the requirements of Directive 2008/50/EC regarding measures to be adopted and the extension period, which ends 1/1/2015, and bearing in mind that its immediate predecessor is the Local Air Quality Strategy that ended 31/12/2010, the Plan must cover measures implemented from 1/1/2011 through 1/1/2015.

1.3 Plan approach

Based on the experience gained in applying policies and measures to fight air pollution, bearing in mind that the proposed goal is very demanding, and acting from the belief that it will be necessary to work within very different scopes of action in order to achieve the specific objectives, the Plan has been designed using a comprehensive and inclusive approach.

This is a comprehensive Plan to the extent that it proposes actions pertaining to various areas and activities, which may have an impact on air quality, with special emphasis on the most relevant sources of pollution.

In addition, the Plan responds to an inclusive principal in that its measures are not limited to direct actions on emission sources but also include actions to achieve and integrate considerations relative to air quality in other municipal policies ranging from taxation, city planning to education.

A clear example of this approach comes in the form of the set of measures meant to reduce traffic emissions, which is the primary source of emissions. In order to further reduce emissions in this area, and bearing in mind the challenge that arises therefrom, the Plan devotes 42 of its 70 municipal measures (i.e., 60%) to such. Moreover, by following the criteria provided by experts on the subject, these measures are not only based on technological solutions, but also cover structural items in a very relevant way. Therefore, along with the 4 measures aimed at promoting cleaner technologies and cleaner fuels, there are 8 measures designed to deter and restrict the use of private motor vehicles, 13 measures to promote a more efficient and sustainable public transport, 3 to improve other passenger transport, 6 measures to support alternative means of mobility, 3 to promote more sustainable commercial transport and another 3 to increase research and investigation concerning sustainable transport and mobility.

Following this same comprehensive approach, the Plan also devotes specific measures to the remaining emission sources, as is done in the area of handling residential, commercial and industrial waste. In turn, in order to perform its inclusive mission, the Plan also includes measures relating to urban planning, governance and public contracting, among others, not to mention those relating to monitoring systems and the critical area of training, information and awareness.

⁴ Final European Commission document SEC (2011)300 dated 4/7/2011.

Lastly, it is worth noting that, along with measures driven from a strictly municipal standpoint, the Plan also includes actions specific to other entities and administrations with a unique impact on both road transport and the aviation sector.

1.4 Adoption procedure

Per current law, the Plan was subjected to the following adoption procedure:

- Report of the draft by all Governmental Departments of Madrid City Council.
- Mandatory report from the Air Quality Commission of the City of Madrid with prior opinion from its Technical Committee, per the provisions of Mayoral Decree dated January 2010 by which the Commission was created.
- Initial Approval of the Plan by Resolution of the Government of the City of Madrid on February 9, 2012.
- Submission of the Plan to a public information period in accordance with Law 34/2007, on Air Quality, and Law 27/2006 of July 18, which regulates rights covering access to information, participation of the public and access to justice on environmental matters, as well as Law 30/1992, of November 26, on the Legal Regimen of Public Administrations and Common Administrative Procedure.
- Final approval by the Governing Board of Madrid City Council on April 26, 2012.

1.5 Legal framework

Directive 2008/50/EC of May 21 from the European Commission and the Council, concerning ambient air quality and a cleaner atmosphere in Europe, provides for the creation of plans and programmes meant to contain and reduce limit values on pollutants present in highly-populated or urban areas.

This Directive has been incorporated into the domestic legal Ordinance via Royal Decree 102/2011 of January 28 on improvement of air quality, Article 24 of which provides for creation of air quality improvement plans, and Article 23.1 of which sets forth the requirements for requesting extensions on complying with nitrogen dioxide limit values.

In turn, Article 5.3 of Law 34/2007 of November 15 on air quality and protection of the atmosphere states that Local Entities shall be the competence on issues relating to air quality and protection of the atmosphere and provides for them to adopt respective plans.

1.6 Competent authorities

According to the provisions of the Resolution of the City of Madrid's Governing Board dated January 5, 2012, which establish the organization and structure of the Government Division of Environment, Safety and Mobility and delegates competence to its head and the head of its managing divisions, the Government Division of Environment, Safety and Mobility has executive competence on the matter of environmental protection and quality, among others.

Furthermore, per the distribution of competence between the various higher divisions and directives of said Department provided for in the above Resolution, the General Directorate

of Sustainability has competence on matters concerning preparation and monitoring of sustainability plans and programmes, regarding air quality in particular, efficient use of energy, climate change prevention and mobility in the City of Madrid.

Regarding the subject of protection of the atmosphere, the following are the specific authorities of this General Directorate:

- a) To promote the implementation and execution of policies and measures for improving air quality and fighting climate change in the City of Madrid.
- b) To capture, process, exploit and update variable information on air quality in the City of Madrid.
- c) To maintain, preserve and exploit the environmental equipment and infrastructure of the General Directorate relative to air pollution.

2. SOURCES AND EVOLUTION OF POLLUTING EMISSIONS

2.1 Emissions Inventory of Madrid City

The Government Division of Environment, Safety and Mobility of Madrid City Council, in accordance with its plan to have the most appropriate tools for implementing its competences in the area of air quality management, prepares and maintains the Inventory of emissions of pollutants into the atmosphere, via its General Directorate of Sustainability, in order to be able to comply with the reporting requirements that is imposed upon it by management efficiency with respect to awareness of such emissions.

The applications of the foregoing Inventory include the following:

- To estimate the total pollutant load released into the atmosphere and the contribution thereto from the various activities that produce emissions.
- To serve as the basis for cost/benefit analysis of the emission reduction measures and determination of pollutant load reductions policies.
- To monitor and control environmental action policies and oversee fulfilment of the commitments and objectives adopted.
- To monitor the level of integration of the environmental policy with industry and regional policies in order to reach a satisfactory level of air quality in an integrated manner.

Furthermore, the Inventory is set up as an essential instrument in the information system with which the Atmospheric Protection Service of the Government Division of Environment, Safety and Mobility of Madrid City Council has been provided, in that one of its main duties is to provide emissions data for the air quality simulation and prediction model.

The Inventory considers all activities, both man-made and natural, which may affect regions within the boundaries of Madrid municipality. After identifying these activities, basic information is gathered, the information management system is designed and implemented, emissions estimation procedures are developed and, lastly, the preliminary estimates are verified and the results are submitted and exploited using a geographical information system and a relational database.

Activities with a potential to pollute that are considered in the Inventory are shown below, grouped according to SNAP⁵ nomenclature.

⁵ SNAP: Selected Nomenclature for Air Pollution from the European project from which the Inventory of Madrid municipality is categorized.

- | | |
|----|---|
| 01 | Combustion in energy and transformation industries |
| 02 | Non-industrial combustion plants |
| 03 | Combustion in manufacturing industry |
| 04 | Industrial processes (without combustion) |
| 05 | Extraction and distribution of fossil fuels and geothermal energy |
| 06 | Solvent and other product use |
| 07 | Road transportation |
| 08 | Other mobile sources and machinery |
| 09 | Waste treatment and disposal |
| 10 | Agriculture |
| 11 | Other sources and sinks (Nature) |

The Emissions Inventory, which was implemented by Madrid City Council in 1999, includes criteria and methodology similar to that used in the National Inventory of emissions of pollutants into the atmosphere and is updated annually. The last update was the 2011 edition, which included data from the base year 1990, as well as from the 1999 to 2009 period.

2.2 Emissions evolution

Although the Inventory includes Greenhouse Gases (GHG), this section only references the primary ambient air quality pollutants⁶:

- The three primary acidifier substances are: nitrogen oxides (NO_x), sulphur oxides (SO_x) and ammonia (NH_3).
- Ozone precursor substances: nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC) and carbon monoxide (CO).
- $\text{PM}_{2.5}$ & PM_{10} particulates and total suspended particulates (TSP) are the portion of particulates with a diameter that is less than 2.5, 10 and 50 microns respectively.

Since some activities in the SNAP nomenclature that take place within the boundaries of Madrid contribute very little to total emissions, the data is grouped into a more condensed classification by area of activity, which makes a more balanced individual presentation of the emissions evolution possible.

Sectors	SNAP Groups
Residential, commercial and institutional combustion (R&C&I)	02 Non-industrial combustion plants
Industrial combustion plants	03 Combustion in manufacturing industry
Road transport	07 Road transportation
Other means of transport	08 Other mobile sources and machinery
Waste treatment and disposal	09 Waste treatment and disposal
Other	04 Industrial processes (without combustion) 05 Extraction and distribution of fossil fuels and geothermal energy 06 Solvent and other product use 10 Agriculture 11 Other sources and sinks (Nature)

⁶ The Climate Change Prevention and Sustainable Use of Energy Plan of the City of Madrid 2008-2012 only covers municipal action concerning the fight against climate change.

The data shown below correspond to the 2011 edition of the Inventory.

1. Acidifying emissions: nitrogen oxides (NO_x), sulphur oxides (SO_x) and ammonia (NH₃)

Table 2.1 and figure 2.2 below show emissions of acidifying gases in an aggregate form, considering the various substances according to their acidifying potential⁷.

2.1 Acidifying emissions (H⁺ in tons)

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	202	120	110	98	88	87	86	85	81	80	77	73
Industrial combustion plants	118	54	50	43	40	37	26	25	26	25	23	20
Road transport	648	556	530	497	492	461	480	456	411	364	332	301
Other means of transport	42	50	58	61	58	61	65	67	68	72	69	64
Waste treatment and disposal	5	47	57	66	71	111	123	120	129	114	121	112
Other	12	17	18	17	17	18	18	18	19	19	18	16
SECTOR TOTALS	1.027	844	822	782	766	775	797	771	733	674	640	586

2.2 Acidifying emissions (H⁺ in tons)

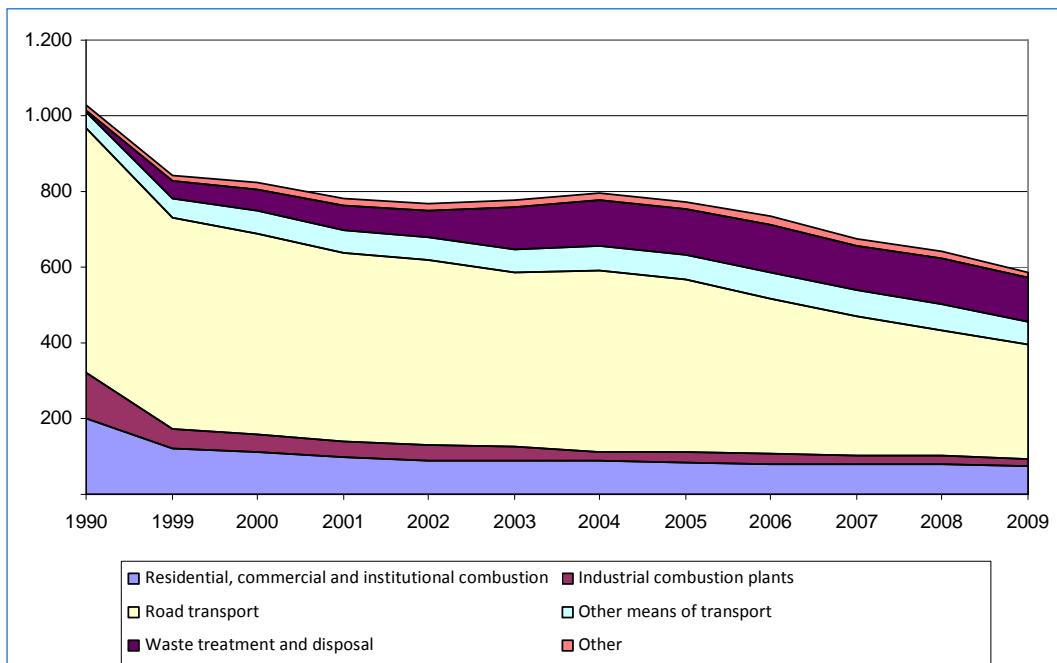
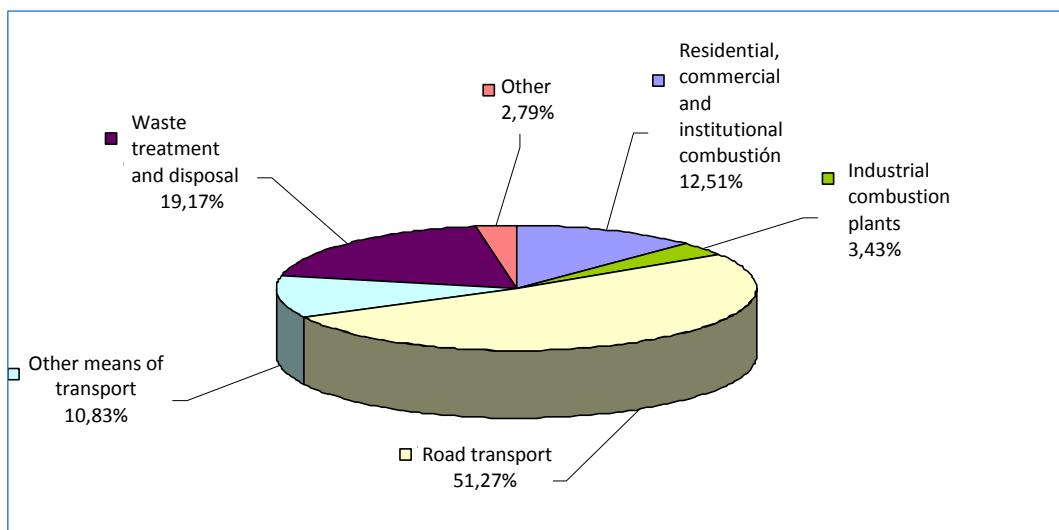


Table 2.3 shows the evolution of the percentage of total annual emissions contributed by each sector, and figure 2.4 shows the distribution by sector for the year 2009.

⁷ SO₂ = 0,0313; NO_x = 0,0217; NH₃ = 0,0588

 2.3 Percentage contribution by sector (%) 

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	19,6	14,2	13,3	12,6	11,4	11,1	10,8	11,0	10,9	11,	12,1	12,5
Industrial combustion plants	11,4	6,4	6,0	5,4	5,2	4,8	3,2	3,3	3,5	3,6	3,5	3,4
Road transport	63,1	65,8	64,5	63,5	64,2	59,5	60,1	59,1	56,1	54,0	51,8	51,3
Other means of transport	4,1	5,9	7,0	7,7	7,5	7,8	8,1	8,6	9,2	10,7	10,7	10,8
Waste treatment and disposal	0,4	5,5	6,9	8,4	9,2	14,2	15,3	15,5	17,5	16,9	18,9	19,2
Other	1,1	2,0	2,1	2,1	2,2	2,3	2,2	2,3	2,5	2,7	2,8	2,8
SECTOR TOTALS	100											

 2.4 Distribution of acidifying emissions by sector in 2009 


As shown in Table 2.3 and Figure 2.4, although the sector contributing the most acidifying emissions during the inventory period is "Road Transport," its weight has been reduced by more than 10 points to 51.27% in 2009. This reduction is due both to technological improvements and to less traffic. In order to strengthen and accelerate this trend, the Plan devotes 60% of its measures to the traffic sector.

The other relevant sector, the weight of which has dropped 7 points, is "Residential, Commercial and Institutional," which has decreased from 19% to 12%. The drop in emissions is due to a change in fuels used, with a drastic reduction in the use of coal and a significant increase in the use of natural gas, as well as an increase in the energy efficiency of facilities, which is enabling lower energy consumption while maintaining the same heating comfort levels. In order to continue to improve this trend, the Plan includes measures aimed at promoting cleaner fuels as well as improving efficiency.

In addition, the sectors which have increased their contribution are "Waste Treatment and Disposal" and "Other Means of Transport". In the case of waste, which has risen to second place, the increase is due to the appearance of new waste treatment techniques such as composting, biomethanation or thermal drying of sludge. Gas emissions from these new techniques are lower compared to those used before, but they can produce other different

types of emissions, as is the case for thermal drying of sludge, for example. Before this technique came on the scene, a great deal of sludge was dried in open air, which produced large quantities of ozone precursor emissions (NMVOC) and greenhouse gases such as methane (CH₄). Thermal drying prevents these emissions; however, it generates NO_x emissions due to the consumption of natural gas fuel used to dry the sludge. In order to reduce this unwanted effect caused by the use of new technology and maximize their advantages, this Plan includes a specific measure for improving the efficiency of motorized generators used in the treatment of waste water.

In turn, emissions from "Other Means of Transport" are largely a result of an increase in air traffic at Barajas Airport. This Plan refers to measures planned for Barajas Airport within the framework of action of other entities and administrations.

The trend mentioned in each sector is shown in Table 2.5, where the evolution of the various sectors during the inventory period is reflected. Here the main polluting sectors are seen to have made positive progress since 1990 or 1999, and in particular since the year 2006, when Madrid's Local Air Quality Strategy was put into effect (2006-2010). What stands out is the fact that emissions from all sectors as a whole have dropped 30.5% since 1999 and 20% between 2006 and 2009.

2.5 Acidifying emissions evolution (%)

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	100	59,4	54,3	48,9	43,5	42,9	42,7	42,2	40,0	39,7	38,4	36,4
Industrial combustion plants	100	45,8	42,1	36,4	34,1	31,6	22,1	21,6	21,7	20,8	19,4	17,0
Road transport	100	85,7	81,8	76,6	75,9	71,1	74,0	70,4	63,4	56,2	51,2	46,4
Other means of transport	100	118,3	135,8	142,7	136,2	143,6	152,5	157,4	159,6	170,0	161,5	149,6
Waste treatment and disposal	100	968,5	1192,6	1374,2	1472,9	2302,2	2549,2	2492,6	2679,7	2372,2	2515,8	2338,4
Other	100	141,5	143,8	139,2	142,2	147,0	147,7	146,5	152,3	151,3	148,8	133,7
SECTOR TOTALS	100	82,1	80,0	76,1	74,6	75,4	77,6	75,1	71,3	65,6	62,3	57,1

Tables 2.6, 2.7 and 2.8 below show the evolution of acidifying gas emissions, broken down by pollutant (SO_x, NO_x y NH₃).

2.6 SO_x emissions (tons)

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Residential, commercial and institutional combustion	5.002	2.612	2.311	1.993	1.682	1.594	1.527	1.480	1.383	1.358	1.263	1.192
Industrial combustion plants	1.304	441	380	288	242	210	152	149	141	96	62	62
Road transport	2.508	1.254	836	624	532	531	568	99	96	89	85	16
Other means of transport	199	174	192	197	189	197	213	220	226	242	205	188
Waste treatment and disposal	2	8	13	7	7	9	7	7	6	6	7	6
Other	46	47	53	46	48	52	59	58	71	70	65	34
SECTOR TOTALS	9.060	4.536	3.785	3.155	2.700	2.593	2.525	2.015	1.922	1.860	1.687	1.498

2.7 NO_x emissions (tons)

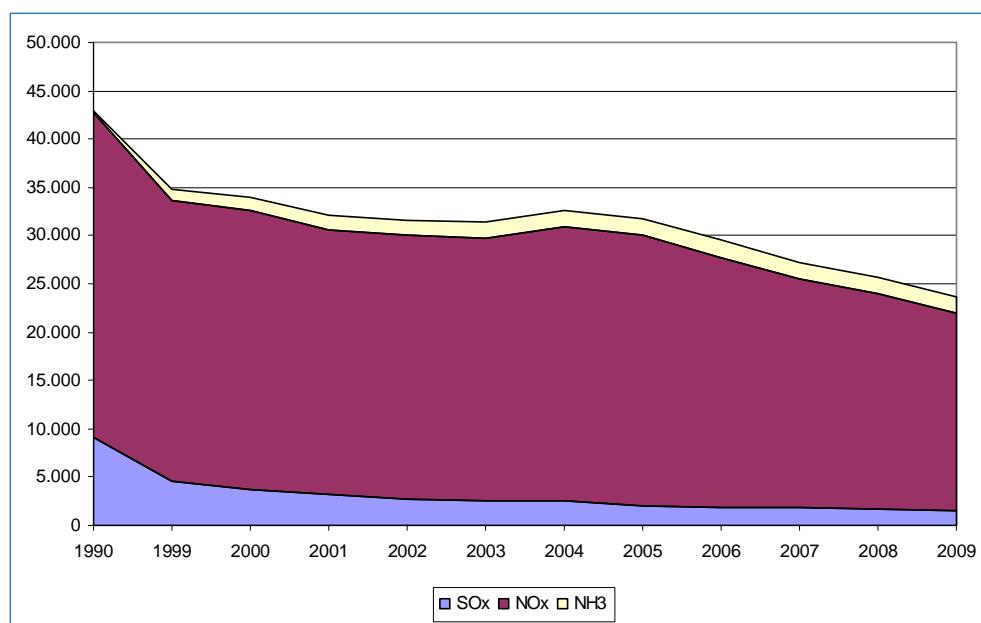
SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Residential, commercial and institutional combustion	2.073	1.754	1.715	1.665	1.616	1.687	1.767	1.785	1.716	1.731	1.745	1.661
Industrial combustion plants	3.552	1.854	1.739	1.562	1.504	1.414	981	959	978	994	962	837
Road transport	26.215	22.800	22.212	21.040	20.874	19.593	20.410	20.109	18.162	16.132	14.684	13.375
Other means of transport	1.668	2.063	2.379	2.507	2.393	2.523	2.677	2.761	2.797	2.977	2.864	2.655
Waste treatment and disposal	62	594	614	609	883	1.781	2.437	2.311	2.032	1.606	1.940	1.848
Other	77	91	101	89	92	99	108	107	128	126	116	69
SECTOR TOTALS	33.648	29.156	28.759	27.471	27.362	27.098	28.381	28.032	25.814	23.565	22.312	20.445

2.8 NH₃ emissions (tons)

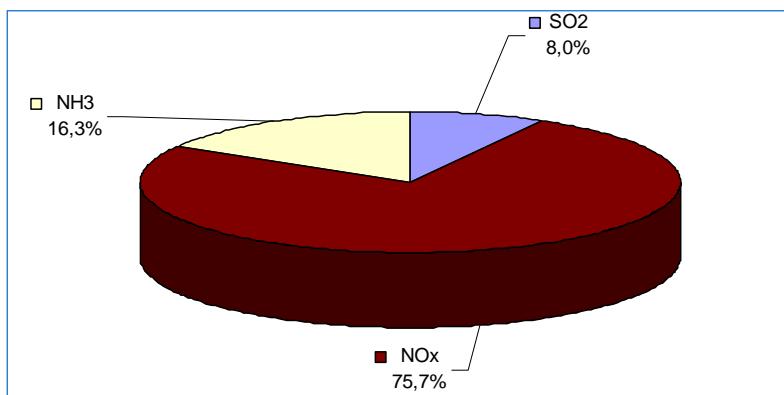
SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Residential, commercial and institutional combustion												
Industrial combustion plants												
Road transport	17	368	376	352	380	330	320	285	239	196	179	169
Other means of transport	0,13	0,10	0,10	0,11	0,11	0,12	0,13	0,13	0,14	0,14	0,13	0,11
Waste treatment and disposal	58	568	742	895	875	1.221	1.181	1.181	1.438	1.344	1.337	1.227
Other	155	236	233	232	236	242	236	234	232	231	232	234
SECTOR TOTALS	231	1.173	1.351	1.479	1.491	1.793	1.738	1.701	1.909	1.771	1.749	1.630

Figure 2.9 shows both the evolution of the three gases as well as the proportion of each one to the whole, a piece of data which is shown in Figure 2.10 for the year 2009. It is worth pointing out from this evolution that there has been a 39.4% reduction in NO_x emissions recorded since 1999 and 20.8% since 2006.

2.9 Total emissions by acidifying gas (tons)

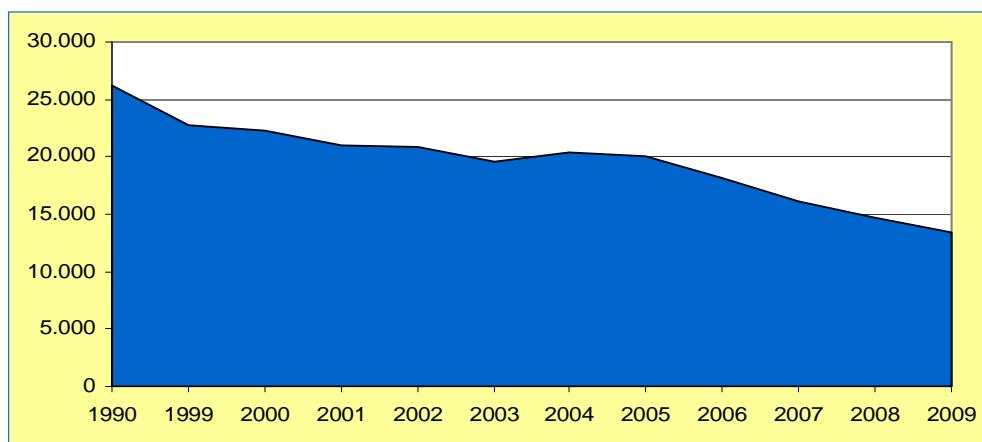


 2.10 Distribution of acidifying emissions in 2009 by type of gas 



Lastly, with reference to the evolution of acidifying emissions, due to its noteworthy individual contribution to emissions of the primary pollutant, it is worth emphasizing the drop in NO_x emissions from traffic in this summary, which went down 48.9% during the 1990-2009 period, with a 26.3% decrease between 2006 and 2009, as shown in Figure 2.11.

 2.11. NO_x emissions evolution originating from traffic 



2. Ozone precursor emissions

In this section, Table 2.12 and Figure 2.13 show emissions from Non-Methane Volatile Organic Compounds (NMVOC), broken down by the sectors generating this type of pollutant in Madrid municipality.

 2.12 NMVOC emissions (tons) 

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Industrial combustion and processes	153	140	133	121	110	106	85	79	80	76	69	60
Use of solvents and other products	21.062	27.174	28.314	27.139	26.443	27.223	27.200	26.382	25.166	24.869	23.076	20.118
Road transport	21.493	16.039	13.315	11.079	9.005	7.220	6.075	4.815	3.695	2.934	2.395	2.099
Other	4.268	5.220	4.954	5.006	4.722	5.084	5.136	5.213	5.230	5.123	5.204	5.443
SECTOR TOTALS	46.976	48.573	46.717	43.346	40.280	39.633	38.496	36.489	34.171	33.002	30.745	27.721

2.13 NMVOC emissions (tons)

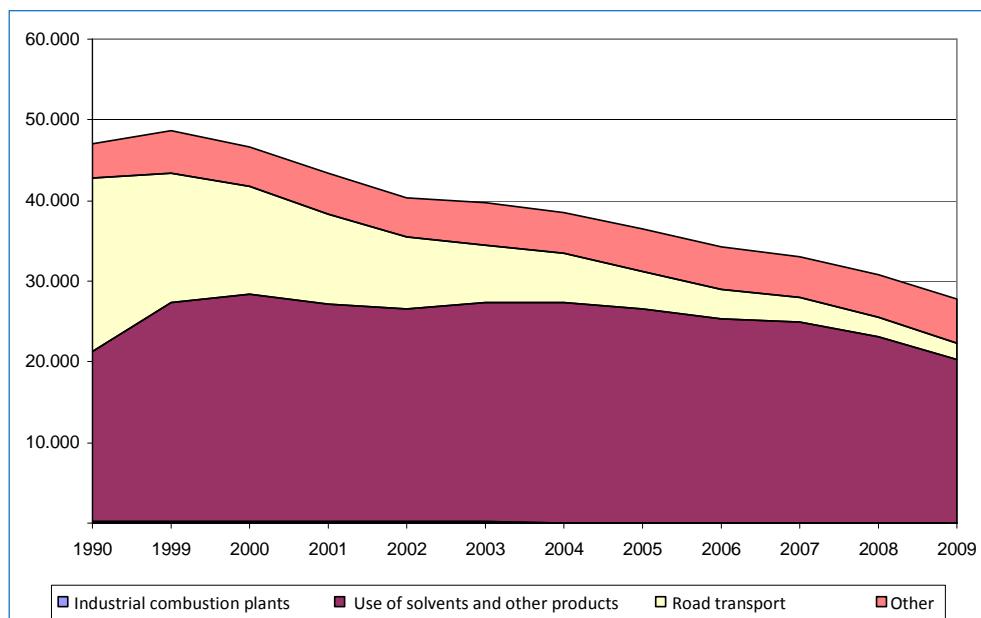
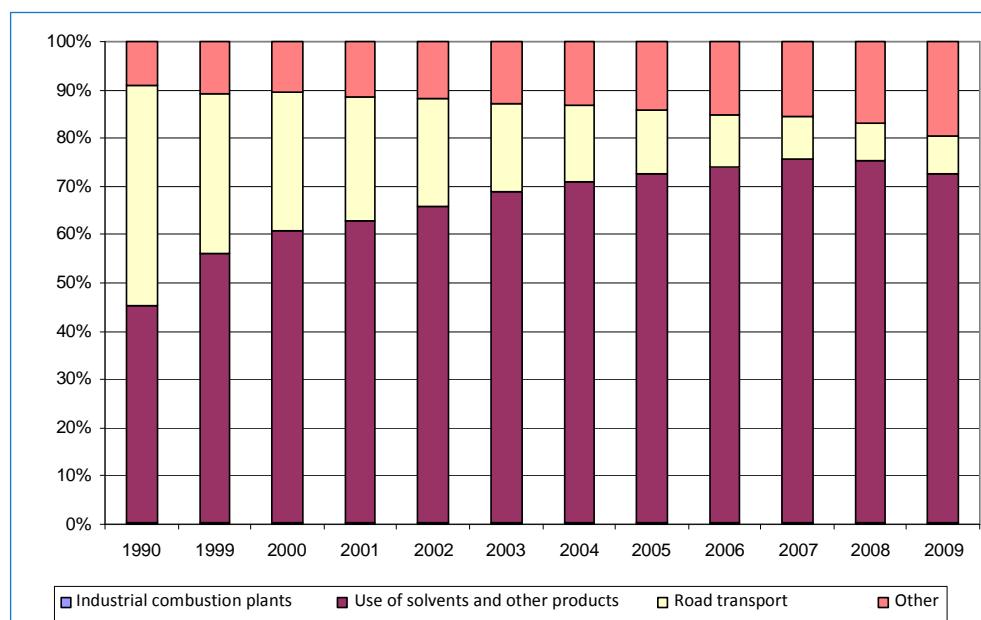


Table 2.14 and Figure 2.15 show the evolution and percentage contribution of each sector compared with total NMVOC emissions.

2.14 Percentage contribution by sector (%)

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Industrial combustion and processes	0,33	0,29	0,29	0,28	0,27	0,27	0,22	0,22	0,23	0,23	0,23	0,22
Use of solvents and other products	44,84	55,94	60,61	62,61	65,65	68,69	70,66	72,30	73,65	75,36	75,06	72,57
Road transport	45,75	33,02	28,50	25,56	22,36	18,22	15,78	13,20	10,81	8,89	7,79	7,57
Other	9,08	10,75	10,60	11,55	11,72	12,83	13,34	14,29	15,31	15,52	16,93	19,64
SECTOR TOTALS	100											

2.15 Percentage contribution evolution by sector



As shown in the tables and figures above, the sector contributing most to NMVOC emissions is "Use of Solvents and Other Products." In second place is "Road Transport", the contribution from which has dropped significantly during the inventory period. Next is the "Other" sector, with a smaller, but significant and growing contribution and last, with a barely noticeable contribution, is the "Industrial Combustion Plants" sector. Table 2.16 shows the evolution of the various sectors during the inventory period.

 2.16 NMVOC emissions evolution (%)

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Industrial combustion and processes	100,0	91,7	87,0	79,3	71,6	69,2	55,6	51,6	52,3	49,6	45,4	39,4
Use of solvents and other products	100,0	129,0	134,4	128,9	125,5	129,3	129,1	125,3	119,5	118,1	109,6	95,5
Road transport	100,0	74,6	61,9	51,5	41,9	33,6	28,3	22,4	17,2	13,6	11,1	9,8
Other	100,0	122,3	116,1	117,3	110,7	119,1	120,4	122,2	122,6	120,0	121,9	127,6
SECTOR TOTALS	100,0	103,4	99,4	92,3	85,7	84,4	81,9	77,7	72,7	70,3	65,4	59,0

Using 1990 as the base year and comparing it with 2009 levels, reductions are seen in the "Industrial Combustion", "Use of Solvents and Other Products" and "Road Transport" sectors. Conversely, the "Other" sector shows an increase due to the combined contribution of several sectors, which include non-industrial combustion plants, non-combustion industrial production processes, extraction and distribution of fossil fuels and geothermal energy, other mobile sources and machinery, and waste treatment and disposal.

To conclude this section, with respect to ozone precursors, it is worth noting that, although the smaller (other) sectors combined show an increase, the three most significant sectors show reductions, and there has been an overall reduction of 42.9% since 1999 with 18.8% occurring between 2006 and 2009.

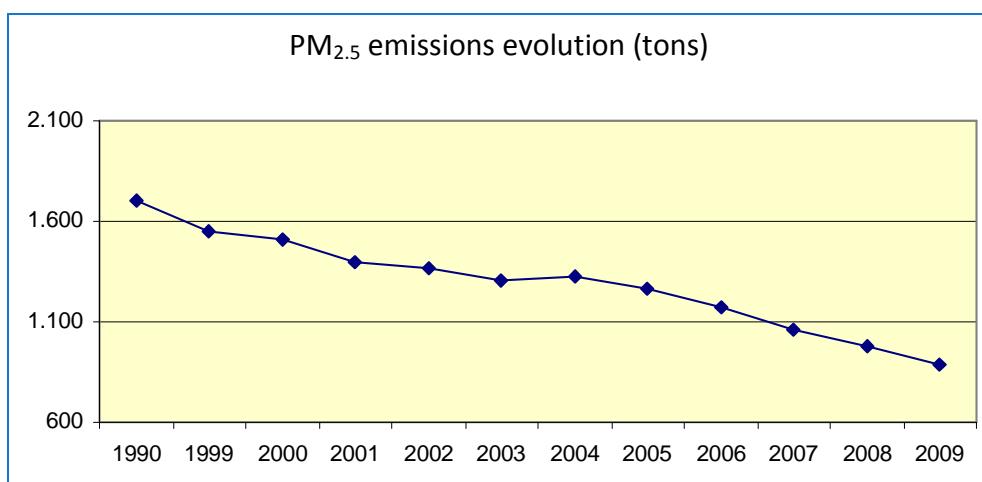
3. Particulate emissions (PM_{2.5}; PM₁₀ y TSP)

Particulates are classified based on their size, the total suspended particulates (TSP) being the portion of particulates having a diameter of 50 microns or less. Thus, PM₁₀ and PM_{2.5} are those smaller than 10 and 2.5 microns respectively. Table 2.17 shows PM_{2.5} emissions by sector in absolute terms, and Figure 2.18 their evolution.

 2.17 PM_{2.5} emissions (tons)

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	322	191	175	152	128	120	115	110	106	100	91	83
Industrial combustion	303	46	41	33	30	24	10	10	10	7	5	5
Road transport	969	1.211	1.187	1.126	1.120	1.066	1.084	1.039	951	852	786	726
Other means of transport	85	50	51	52	50	50	51	49	48	45	40	34
Waste treatment	1	29	33	11	10	20	41	32	25	24	22	19
Other	21	22	26	22	23	25	28	28	28	33	31	17
TOTAL SECTORES	1.700	1.548	1.513	1.395	1.361	1.305	1.328	1.268	1.167	1.061	975	883

 2.18 PM_{2.5} emissions evolution (tons) 

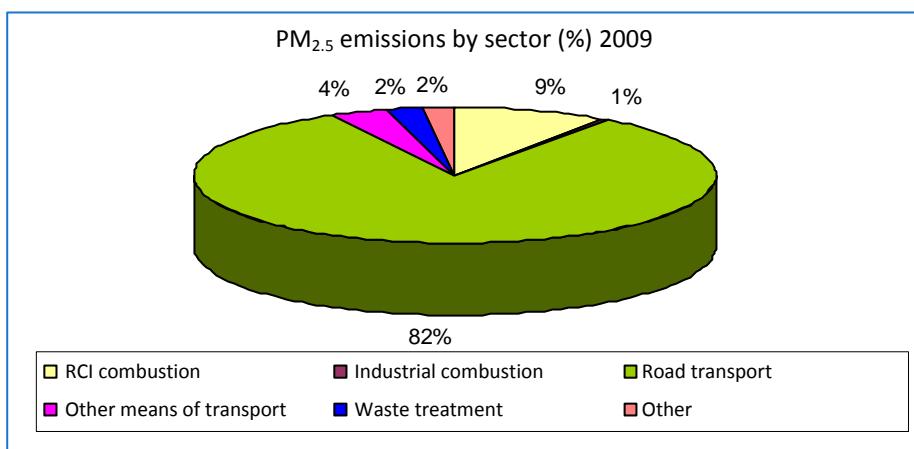


This data shows that there was a 48.06% reduction in PM_{2.5} emissions during the 1990-2009 period, 24.35% of which occurred between 2006 and 2009. Specifically, with reference to emissions from the primary sector (road transport), there was a 21.9% reduction between 2006 and 2009. Regarding the contribution of each sector to PM_{2.5} emissions overall, Table 2.19 shows that the road transport sector is increasing in relative weight, despite a significant reduction.

 2.19 PM_{2.5} percentage contribution by sector (%) 

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	18,94	12,34	11,54	10,93	9,42	9,17	8,67	8,68	9,10	9,41	9,34	9,45
Industrial combustion	17,79	2,97	2,68	2,36	2,17	1,87	0,75	0,78	0,84	0,63	0,50	0,51
Road transport	56,96	78,21	78,48	80,67	82,33	81,64	81,59	81,90	81,46	80,31	80,68	82,19
Other means of transport	5,00	3,21	3,40	3,70	3,69	3,87	3,82	3,90	4,07	4,24	4,06	3,80
Waste treatment	0,08	1,85	2,17	0,77	0,70	1,53	3,06	2,53	2,12	2,30	2,24	2,12
Other	1,23	1,42	1,72	1,58	1,69	1,92	2,11	2,21	2,40	3,11	3,18	1,92
Total	100											

 2.20 Distribution of PM_{2.5} emissions in 2009 

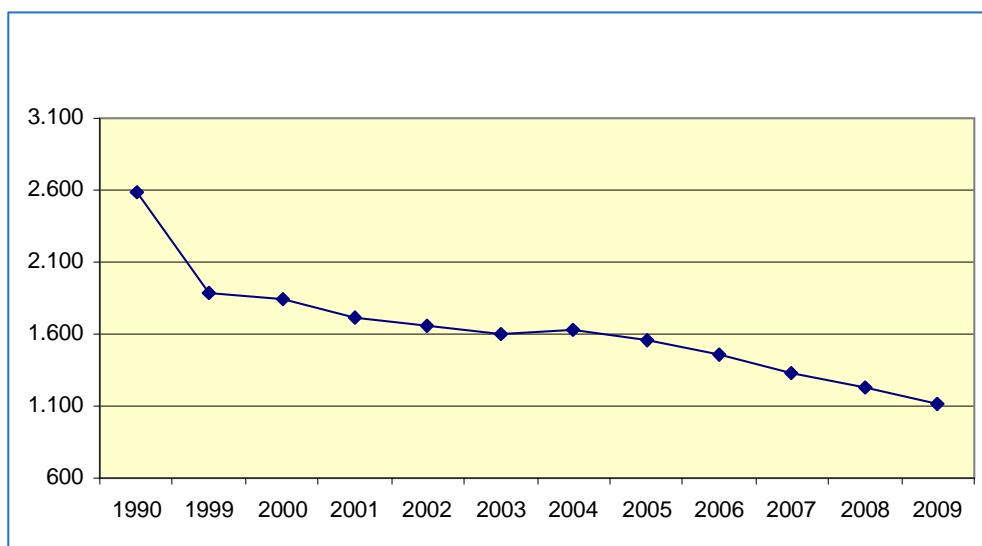


With respect to PM 10 emissions, Table 2.21 and Figure 2.22 demonstrate how evolution has been similar to that of PM 2.5, with reductions of 56.84% during the 1990-2009 period, and 23.02% between 2006 and 2009.

 2.21 PM₁₀ emissions (tons) 

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	604	352	324	283	238	221	213	203	196	184	167	152
Industrial combustion	793	50	45	36	33	27	10	10	10	7	5	5
Road transport	1.075	1.368	1.347	1.290	1.293	1.240	1.267	1.222	1.128	1.019	947	880
Other means of transport	85	50	51	52	50	50	51	49	48	45	40	34
Waste treatment	1	29	33	11	10	20	41	32	25	24	22	19
Other	33	37	43	38	39	43	47	46	46	55	51	29
TOTAL SECTORS	2.591	1.886	1.843	1.709	1.662	1.602	1.629	1.563	1.453	1.335	1.231	1.118

 2.22 PM₁₀ emissions evolution (tons) 

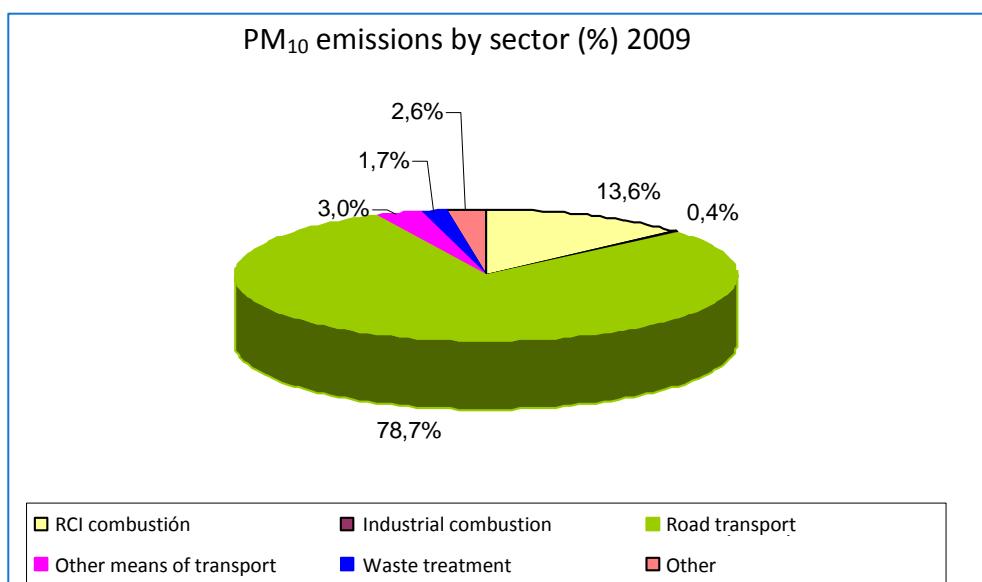


Regarding sector structure of PM₁₀ emissions, Table 2.23 shows the trend is the same as the previous case, because the sectors that have dropped the most are Industrial combustion and RCI. Likewise, the sector contributing the most is vehicular traffic, despite having dropped 21.9% between 2006 and 2009.

 2.23 PM₁₀ percentage contribution by sector (%) 

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	23,30	18,65	17,56	16,56	14,29	13,82	13,09	13,00	13,51	13,79	13,57	13,60
Industrial combustion	30,61	2,67	2,42	2,12	1,96	1,68	0,64	0,67	0,72	0,53	0,40	0,41
Road transport	41,48	72,54	73,10	75,45	77,79	77,41	77,77	78,17	77,62	76,37	76,90	78,71
Other means of transport	3,28	2,63	2,79	3,02	3,02	3,15	3,12	3,16	3,27	3,37	3,21	3,00
Waste	0,06	1,55	1,79	0,63	0,58	1,25	2,50	2,06	1,71	1,83	1,78	1,68
Other	1,27	1,96	2,33	2,22	2,35	2,68	2,89	2,94	3,17	4,12	4,14	2,59
TOTAL	100											

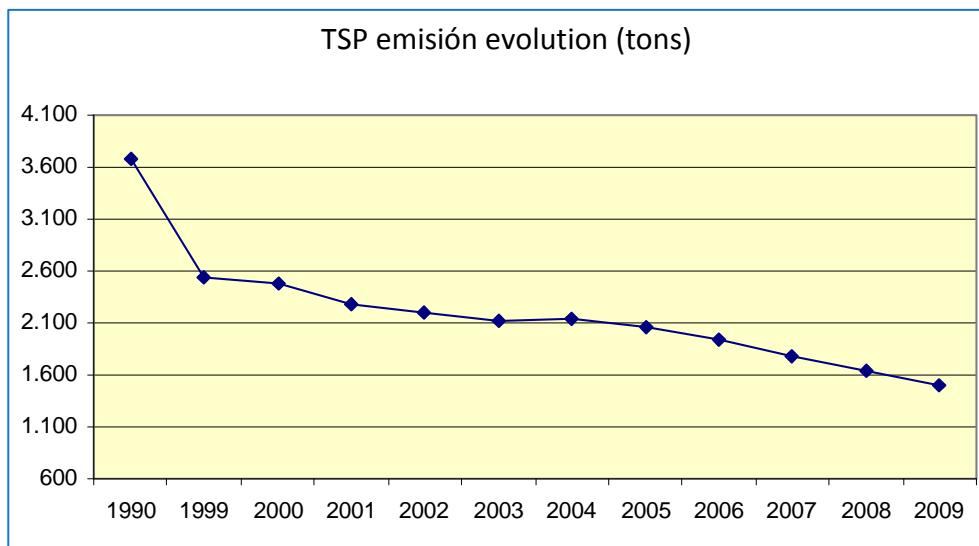
 2.24 Distribution of PM₁₀ emissions in 2009 



Total suspended particulate (TSP) emissions have also experienced significant reductions during the periods referenced. Thus, as shown in Table 2.25 and Figure 2.26, there was a 59.27% drop between 1990 and 2009, with a 22.4% drop between 2006 and 2009.

 2.25 TSP emissions (tons) 

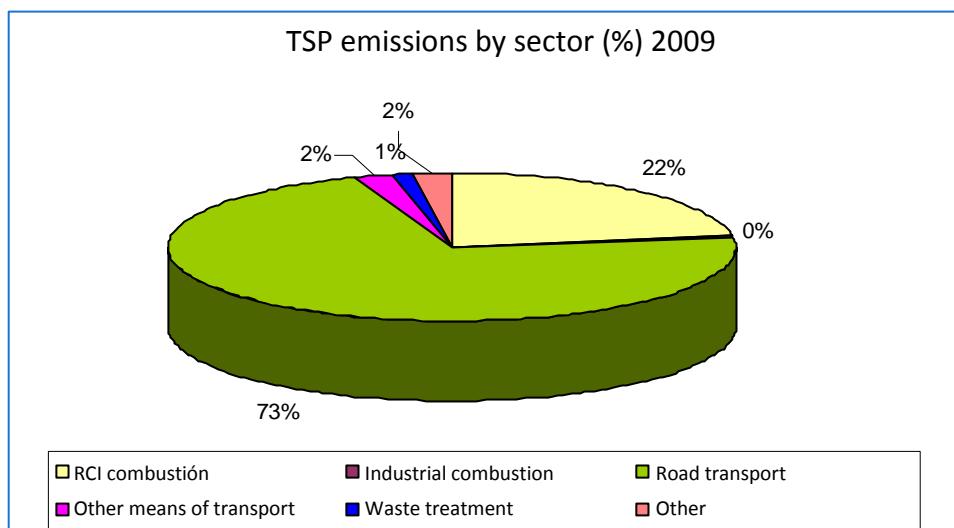
SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	1.406	801	741	647	541	502	483	458	443	414	372	336
Industrial Combustion	931	59	53	43	39	32	11	11	12	8	5	5
Road transport	1.220	1.563	1.549	1.495	1.508	1.460	1.501	1.457	1.351	1.228	1.145	1.073
Other means of transport	85	50	51	52	50	50	51	49	48	45	40	34
Waste treatment	2	30	33	11	10	20	41	32	25	25	22	19
Other	35	44	49	42	45	48	52	52	52	61	56	32
SECTOR TOTALS	3.677	2.546	2.476	2.290	2.193	2.112	2.139	2.061	1.930	1.780	1.639	1.498

■ 2.26 TSP emissions evolution (tons) ■


With respect to sector distribution, the one contributing the most emissions was road transport, despite having dropped during recent years. In second place is the RCI sector, which made up 22% of total particulates. The remaining sectors constituted a small portion as shown in Table 2.27.

■ 2.27 TSP percentage contribution by sector (%) ■

SECTORS	1990	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Combustion R&C&I	38,22	31,46	29,93	28,28	24,67	23,75	22,57	22,25	22,96	23,24	22,69	22,43
Industrial Combustion	25,31	2,32	2,12	1,86	1,76	1,50	0,53	0,55	0,61	0,43	0,30	0,31
Road transport	33,17	61,38	62,55	65,30	68,78	69,13	70,18	70,71	69,98	69,00	69,83	71,62
Other means of transport	2,31	1,95	2,08	2,25	2,29	2,39	2,37	2,40	2,47	2,53	2,41	2,24
Waste	0,04	1,16	1,34	0,48	0,45	0,96	1,91	1,57	1,29	1,38	1,34	1,26
Other	0,95	1,73	1,98	1,83	2,05	2,27	2,43	2,52	2,69	3,43	3,42	2,14
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100

■ 2.28 Distribution of TSP emissions in 2009 ■


3. AIR QUALITY DIAGNOSIS OF MADRID CITY

Since Madrid City Council began air pollution monitoring and control activities in 1968, conditions determining air quality in the City of Madrid have varied substantially. This has caused changes in which pollutants have been the most worrisome at any given moment, and to the introduction of measures to continue addressing the problems at hand through increasingly strict air quality legislation. This ongoing action of adaptation and adoption of response measures has resulted in a significant improvement in air quality in our city.

In Madrid municipality, pollution levels are the same or lower than those of other large European cities. There has been noteworthy improvement in levels of sulphur dioxide, carbon monoxide, lead and benzene, current concentrations being far below the limits set by current European and Spanish law. However, as with all the other large European cities, problems persist with nitrogen dioxide and occasionally with suspended particulates and the tropospheric ozone; the latter especially during the summer.

3.1. Air quality monitoring network

The new air quality network was put in place in the year 2010. It was designed to supplement Directive 2008/50/EC regarding ambient air quality and a cleaner atmosphere in Europe. This is the current European standard, which regulates air quality evaluation and establishes the most relevant pollutant levels based on their effects on human health. It also includes a new parameter for measuring PM_{2.5} particulates (less than 2.5 microns in diameter), which may be prejudicial to human health due to their size, according to the World Health Organization (WHO).

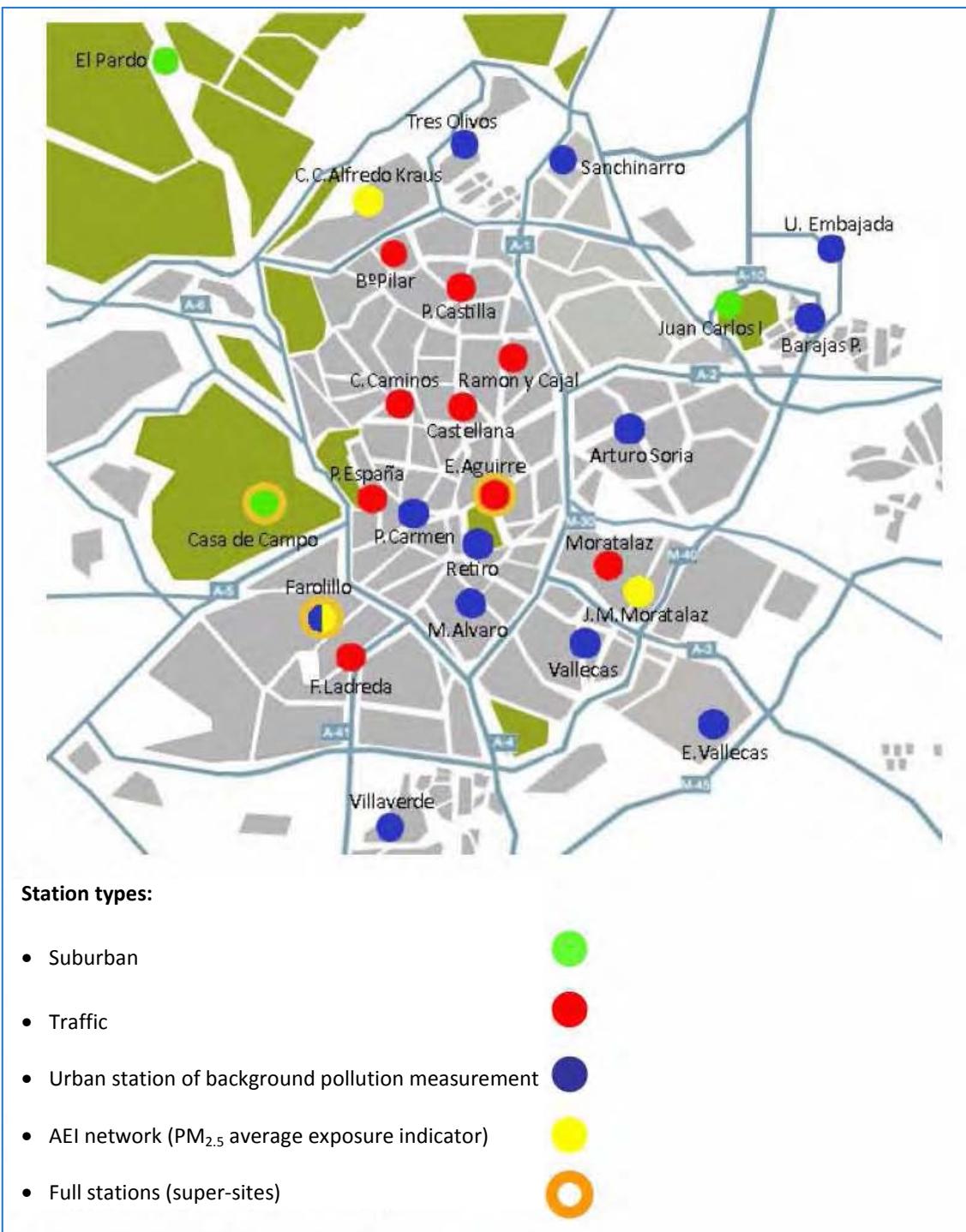
The monitoring network has been adapted by taking into account the new criteria set by the aforementioned Directive, in order to harmonize and improve comparability of air quality monitoring systems, with respect to classifying stations and their implementation criteria. Nevertheless, the main objective of this network is the protection of human health, and so it has the means required to ensure the values recorded are highly reliable.

The new air quality network comprises 24 automatic measuring stations and two additional sampling points for PM_{2.5} suspended particulates. This number far exceeds the minimum number of sampling points required by law based on population, as is shown in the following table.

Parameter	Minimum number of sampling points for the population of Madrid (Directive 2008/50/ Royal Decree 102/2011)	Number of sampling points in the network
Nitrogen Dioxide (NO ₂)	7	24
Particulates (PM ₁₀ +PM _{2.5})	10	12 for PM ₁₀ and 6 for PM _{2.5} (+3 AEI NETWORK)
Ozone (O ₃)	5 (at least 3 suburban)	14 (3 suburban)
Benzene (C ₆ H ₆)	3	6
Sulphur dioxide (SO ₂)	3	10
Carbon monoxide (CO)	3	10

Besides the minimum number of sampling points based on population, the new law establishes (and thus the monitoring network complies with) station implementation directives and additional requirements on station classification, so that the "total number of urban stations of background pollution measurement for nitrogen dioxide, particulates, benzene and carbon monoxide may not be more than two times greater than or two times less than the total number of urban stations of traffic pollution measurement, and the total number of PM_{2.5} sampling points may not be more than two times greater than or two times less than the total number of PM₁₀ sampling points."

A map of the monitoring network with the geographic distribution of each station and its classification is shown below.



 Distribution of equipment within the monitoring network. 

STATIONS	NO ₂	SO ₂	CO	PM ₁₀	PM _{2.5}	O ₃	BTX
Pza. Carmen	X	X	X			X	
Pza. España	X	X	X				
Bº Pilar	X		X			X	
Esc. Aguirre	X	X	X	X	X	X	X
Cuatro Caminos	X	X		X	X		X
Ramón y Cajal	X						X
Vallecas	X	X		X			
Arturo Soria	X		X			X	
Villaverde	X	X				X	
Farolillo (AEI network)	X	X	X	X	X	X	X
Moratalaz	X	X	X	X			
Casa de Campo	X	X	X	X	X	X	X
Barajas Pueblo	X					X	
Méndez Alvaro	X			X	X		
Castellana	X			X	X		
Retiro	X					X	
Pza.Castilla	X			X	X		
Ensanche de Vallecas	X					X	
Urb.Embajada	X			X			X
Pza. Fdez. Ladreda	X		X				X
Sanchinarro	X	X	X	X			
El Pardo	X					X	
Juan Carlos I	X					X	
Tres olivos	X			X		X	
J.M.Moratalaz (AEI network)					X		
C.C.Alfredo Kraus(AEI network)					X		

3.2. Situation in 2010 and pollutant assessment

An analysis of the data on every pollutant recorded by the Madrid City Council air quality monitoring network during the year 2010 is shown below, along with an evaluation of the last ten years.

- Sulphur dioxide (SO₂)

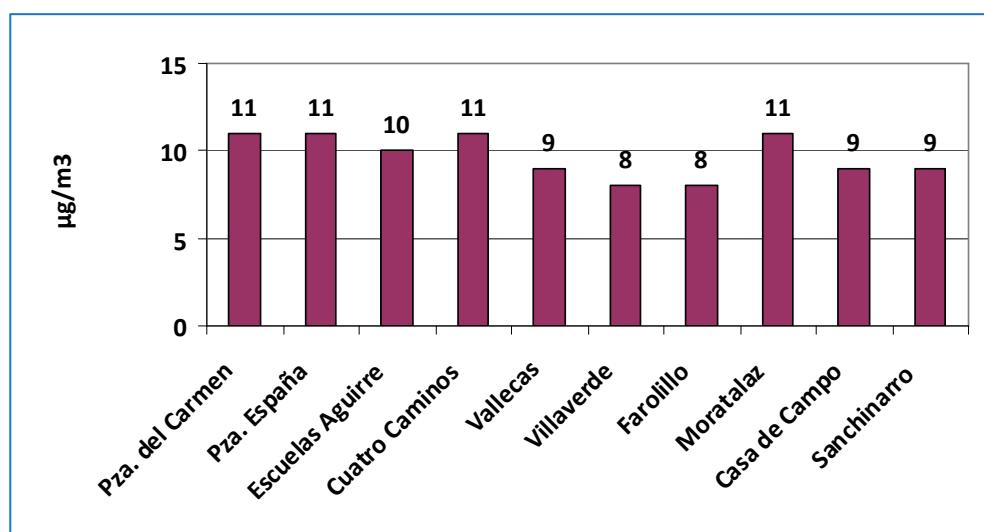
The concentration of sulphur dioxide has dropped considerably in recent years and currently sits at levels well below the legally-established limit values.

One of the main reasons for this progress is a reduction of emissions derived from the use of coal for residential heating, which is due in large part to actions by Madrid City Council through subsidies for boiler replacements and the progressive reduction of the sulphur content of liquid fuels.

HOURLY LIMIT VALUE for the protection of human health 350 µg/m³ which may not be exceeded more than 24 times per year	DAILY LIMIT VALUE for the protection of human health 125 µg/m³ which may not be exceeded more than 3 times per year	ALERT THRESHOLD 500 µg/m³ during three consecutive hours in one area > 100 km ²
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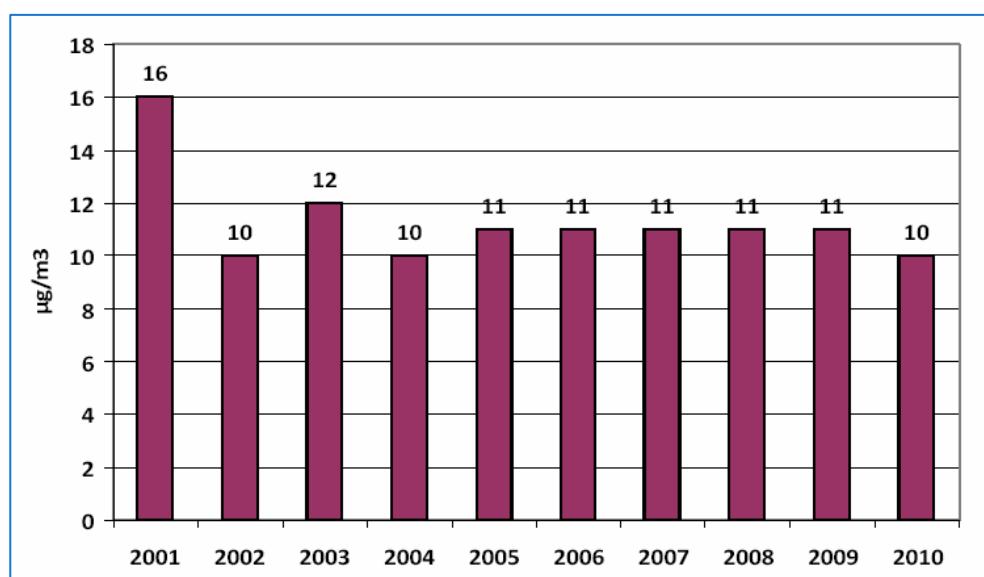
The values shown in the Figure are the average levels of sulphur dioxide measured at all stations which, as may be observed, are very low with respect to the legal limits.

■ Annual average SO₂ values by station. Year 2010 ■



Evolution over the last ten years with sulphur dioxide shows a clear trend of reduction overall.

 Annual evolution of SO₂ particulates over the last 10 years 
(Stations that remain within the monitoring network throughout the period)



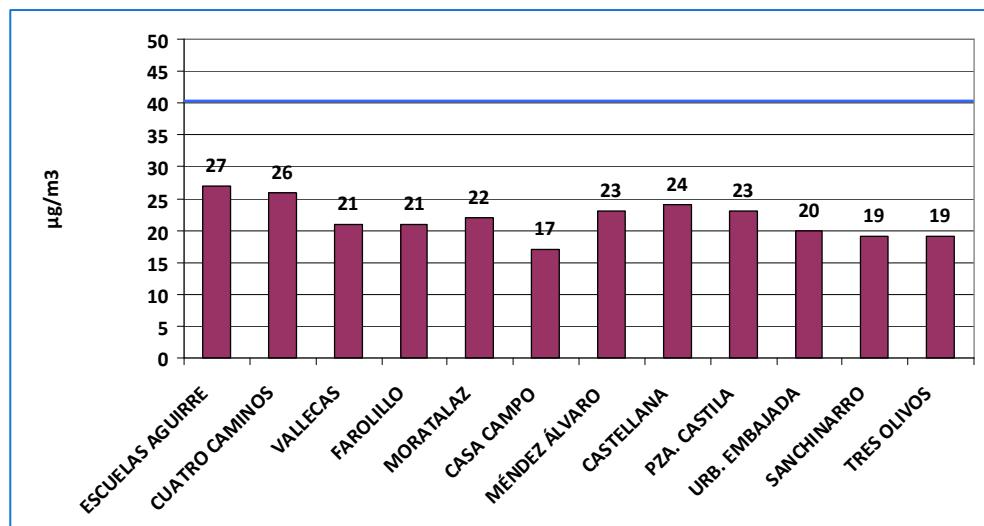
- Suspended PM₁₀ particulates

In Madrid, as with all European cities, particulate matter generated by combustion processes comes both from building heating systems and from vehicular traffic emissions. Vehicles that use diesel motors manufactured before the year 2000 account for a significant portion in particular. Moreover due to its geographic location, significant contributions from natural sources can be found in Spain, such as those originating in the Sahara Desert.

The following figures show that the values recorded at monitoring stations during the year 2010 are well below the legal limits.

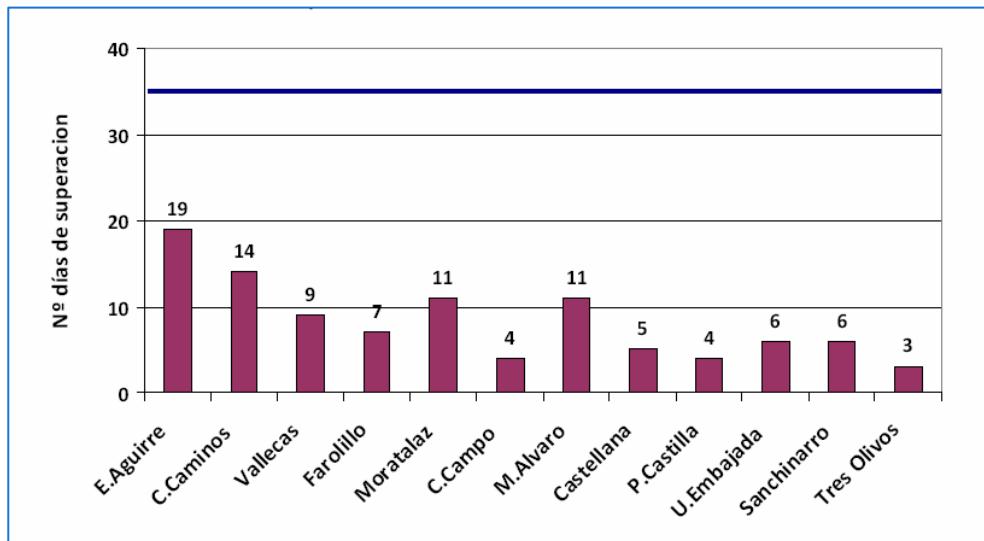
DAILY LIMIT VALUE for the protection of human health: 50 µg/m³ (Which may not be exceeded more than 35 times per year)	ANNUAL LIMIT VALUE For the protection of human health: 40 µg/m³
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 Annual average PM₁₀ values by station. Year 2010 



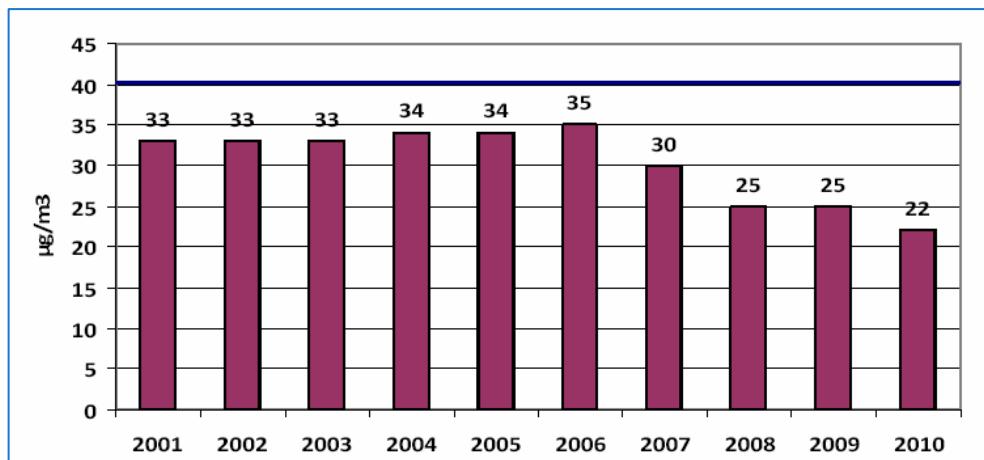
As may be seen, no station within the air quality network exceeded the daily limit value of 50 $\mu\text{g}/\text{m}^3$ on more than 35 days.

Occurrences of PM₁₀ over the daily limit value Year 2010



The evolution of PM₁₀ particulate matter over the last ten years shows a decreasing trend throughout the period studied, which has been particularly pronounced since the year 2007.

Annual evolution of PM₁₀ over the last 10 years (Stations that remain within the monitoring network throughout the period)



- Suspended PM_{2.5} particulates

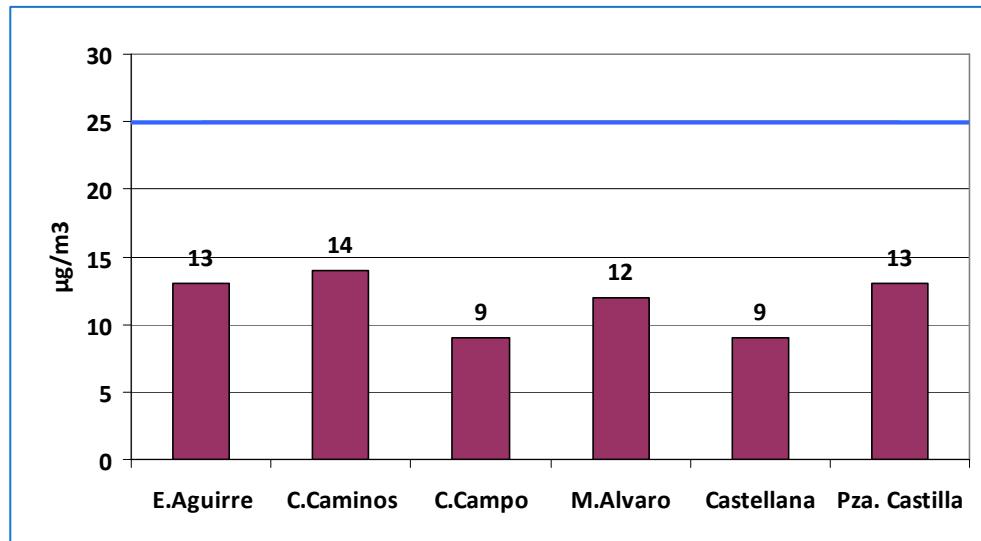
None of the network stations exceeded the target value established for this pollutant during the year 2010.

2010 ANNUAL TARGET VALUE

AND 2015 ANNUAL LIMIT VALUE:

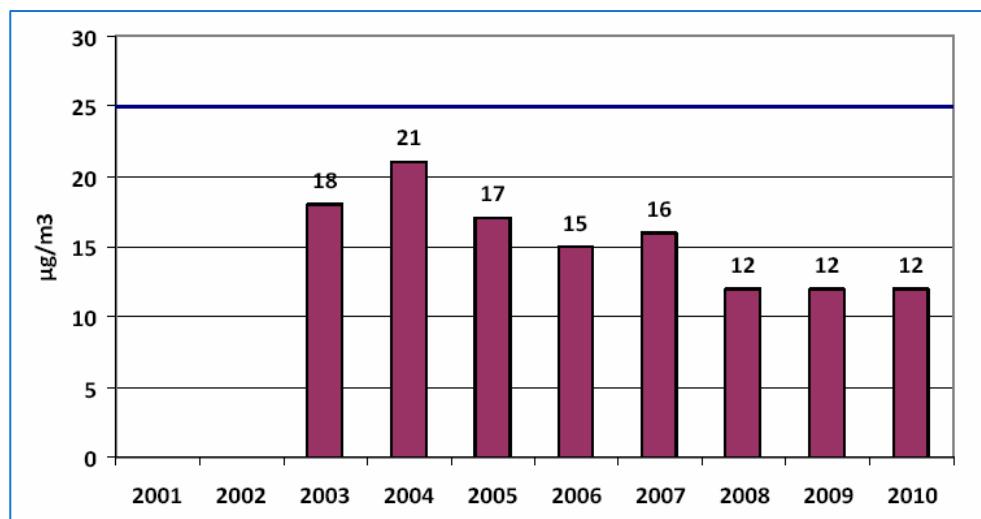
25 $\mu\text{g}/\text{m}^3$

 Annual average PM_{2.5} values by station. Year 2010 



Data on this pollutant is only available for the last eight years. Nevertheless, the same decreasing trend is observed for the PM₁₀ particulate matter.

 Annual evolution of PM_{2.5} particulates over the last 10 years 
(Stations that remain within the monitoring network throughout the period)



- AEI Network

The AEI (Average Exposure Indicator) is defined as the average level of measurements made of PM_{2.5} particulates at urban station of background pollution measurement locations of various populations throughout the nation, which reflect exposure of the population to PM_{2.5} pollution, and from which reduction levels to be reached for better protection of health are set.

There are 3 urban station of background pollution measurement locations within Madrid municipality used to determine this indicator, based on population. These stations are Farolillo, Alfredo Krauss and JMD de Moratalaz.

The data obtained from them during the last two years is as follows:

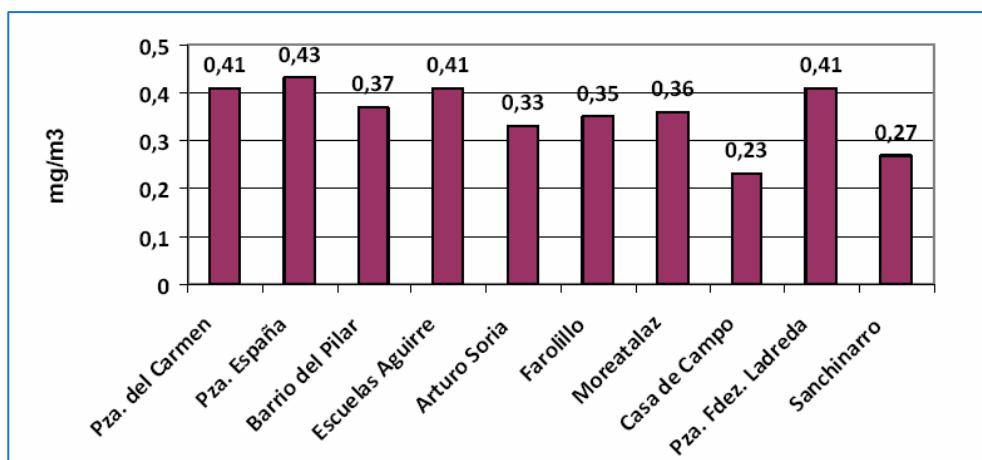
PM _{2,5}	2009 Annual Average ($\mu\text{g}/\text{m}^3$)	2010 Annual Average ($\mu\text{g}/\text{m}^3$)
Farolillo	14	14
Alfredo Krauss	13	12
J.M. Moratalaz	13	12

- Carbon monoxide (CO)

The concentration levels reached during the year 2010 are far below the legal limit value set for protection of health.

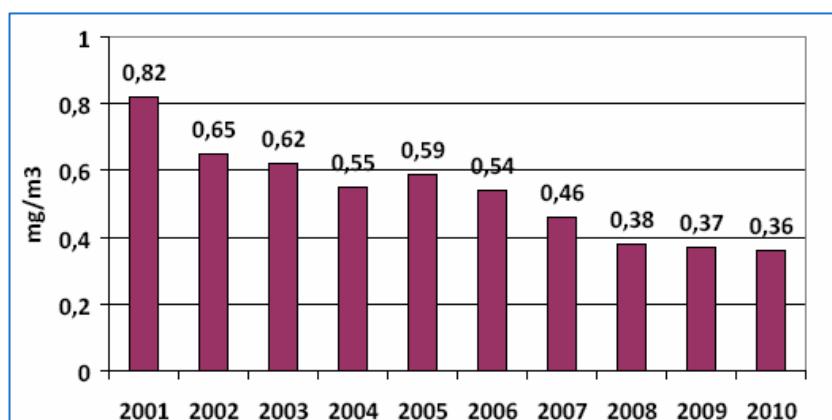
EIGHT-HOUR LIMIT VALUE
for the protection of human health:
10 mg/m³
average eight-hour daily maximum

■ Annual average CO values by station. Year 2010 ■



The evolution experienced by this pollutant over the last decade shows a reduction of values, which are well below the established limit value. This is mainly due to improvements in vehicle motor technology.

■ Annual CO evolution over the last 10 years ■ (Stations that remain within the monitoring network throughout the period)



- Benzene

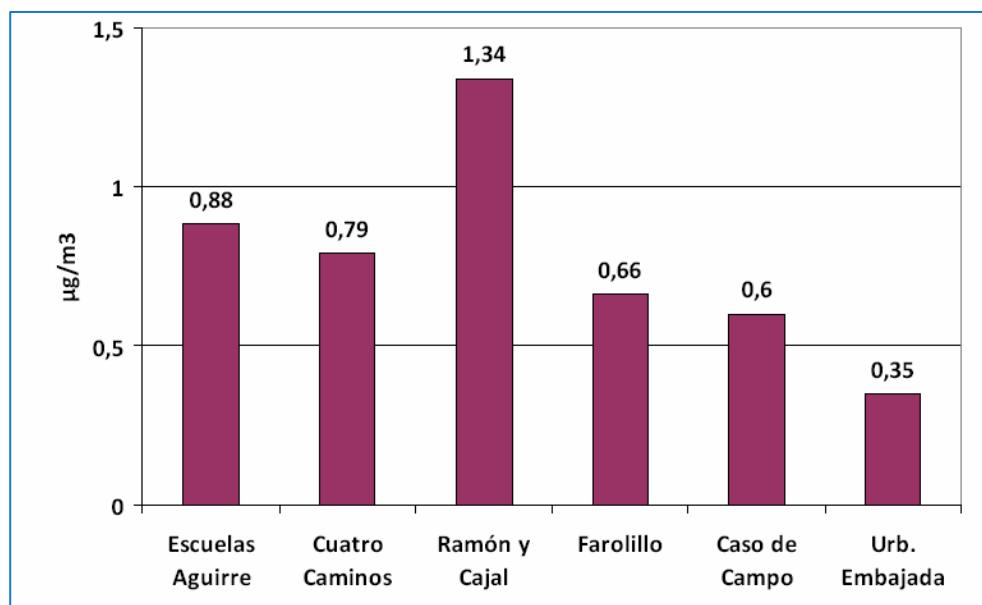
This pollutant comes mainly from vehicular traffic emissions. However, as may be seen, the values are well below the annual limit for the protection of human health.

2010 ANNUAL LIMIT VALUE

for the protection of human health:

5 µg/m³

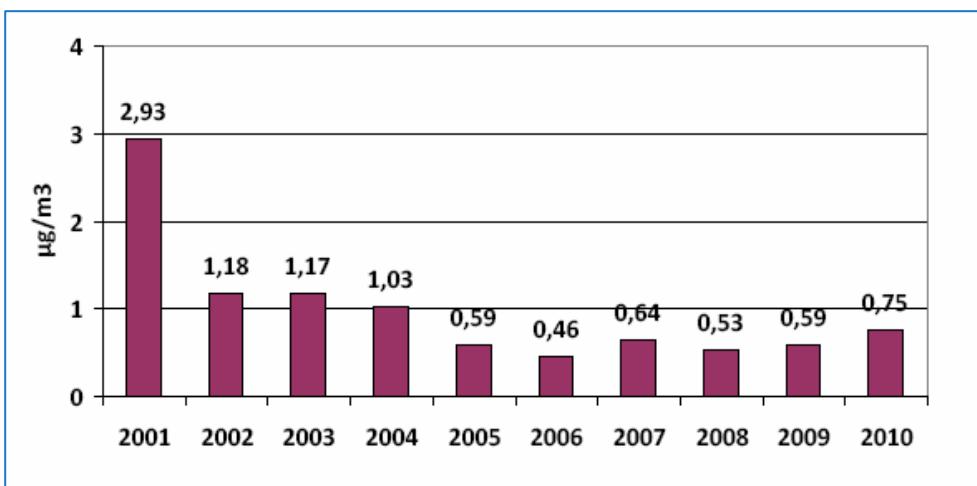
■ Annual average Benzene values by station. Year 2010 ■



Evolution of this pollutant in recent years shows a clear downward trend, especially during the early years of this decade.

■ Annual Benzene evolution over the last 10 years ■

(Stations that remain within the monitoring network throughout the period)



- Ozone (O_3)

The legal limits for ozone are as follows:

INFORMATION THRESHOLD 180 µg/m³ (1 hour average value)	ALERT THRESHOLD 240 µg/m³ (1 hour average value)	2010-2012 TARGET VALUE for the protection of human health: 120 µg/m³ (Maximum daily eight-hour mean) Not to be exceeded on more than 25 days per calendar year averaged over three years (2010-2012)
--	--	---

The alert threshold was never exceeded during the year 2010, although the population information threshold was exceeded on two occasions as shown below:

- On July 6 at the Casa Campo station from 19:00 to 20:00.

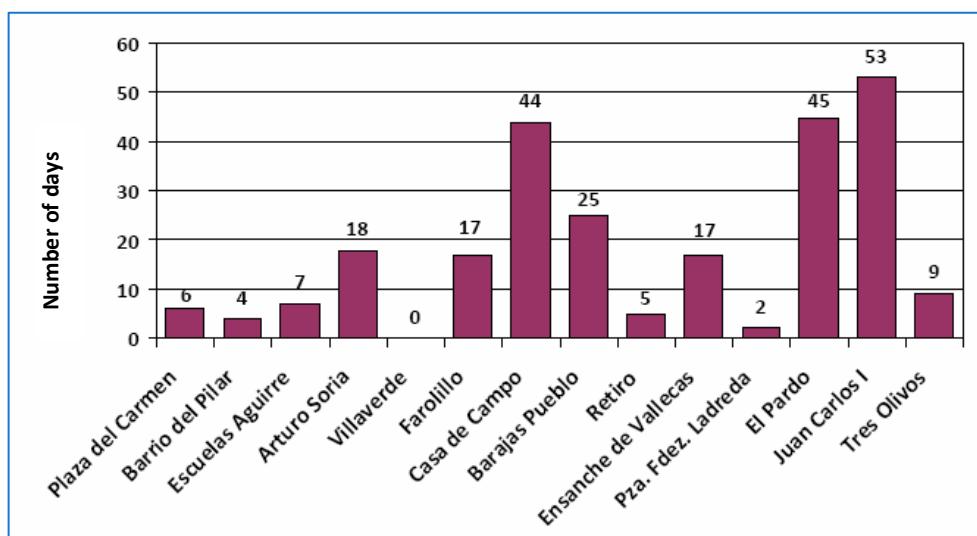
Time	Value ($\mu\text{g}/\text{m}^3$)
19	185
20	186

- On July 17 at the Arturo Soria Station from 17:00 to 20:00.

Time	Value ($\mu\text{g}/\text{m}^3$)
17	184
18	193
19	190
20	181

Regarding the target value for the protection of human health set for the years 2010 through 2012, the following table shows the situation at every station during 2010.

 Number of days with at an eight-hour value greater than $120 \mu\text{g}/\text{m}^3$ of ozone per station. Year 2010 



- Nitrogen dioxide (NO₂)

Nitrogen dioxide is basically a vehicular traffic pollutant indicator. It is mostly diesel vehicle exhaust (direct or "primary" emissions), but it is also produced by oxidation of nitrogen monoxide, which comes from vehicles as well (secondary nitrogen dioxide).

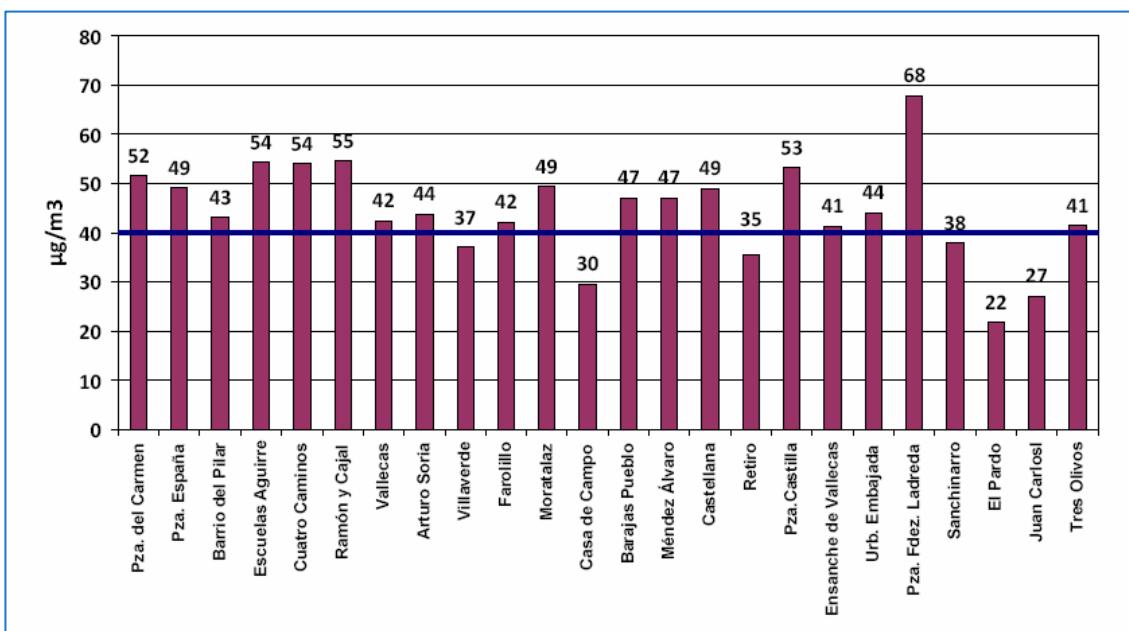
The legal limit values and thresholds are as follows:

HOURLY LIMIT VALUE	ANNUAL LIMIT VALUE	ALERT THRESHOLD
For the protection of human health 200 µg/m³ which may not be exceeded more than 18 times per year	For the protection of human health 40 µg/m³	400 µg/m³ 3 consecutive hours in a single area > 100 km ²

The alert threshold was never exceeded during the year 2010.

The values reached at every station within the monitoring network with respect to the legal limits are shown below.

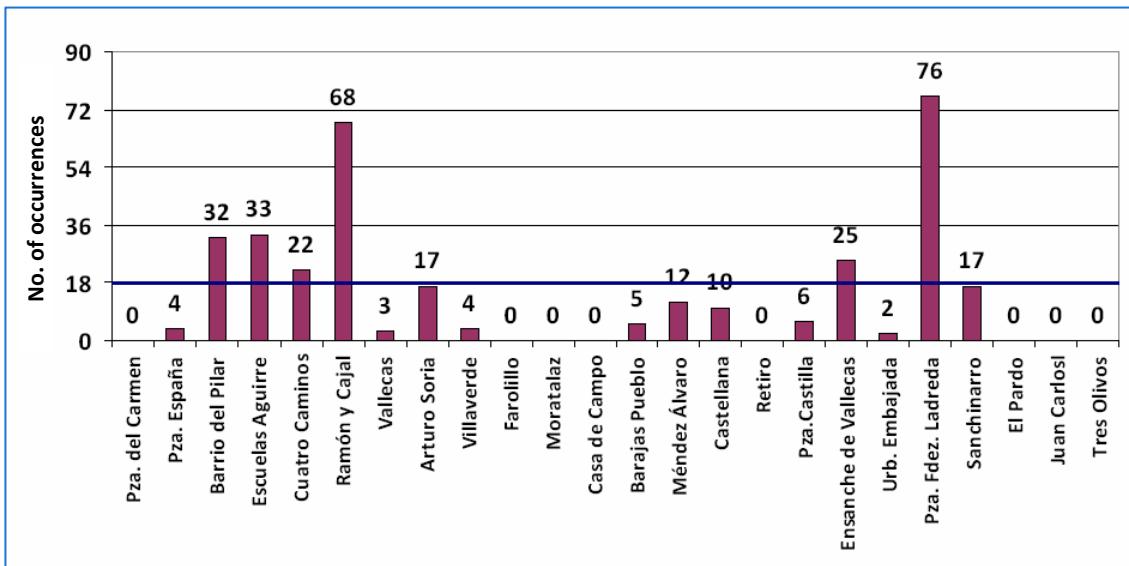
Annual average NO₂ values by station. Year 2010



Of the 24 stations within the monitoring network, 18 exceeded the annual legal limit value during the year 2010.

The following figure shows the number of times the hourly limit value was exceeded at each station within the network.

 Occurrences of NO₂ over the hourly limit value. Year 2010 

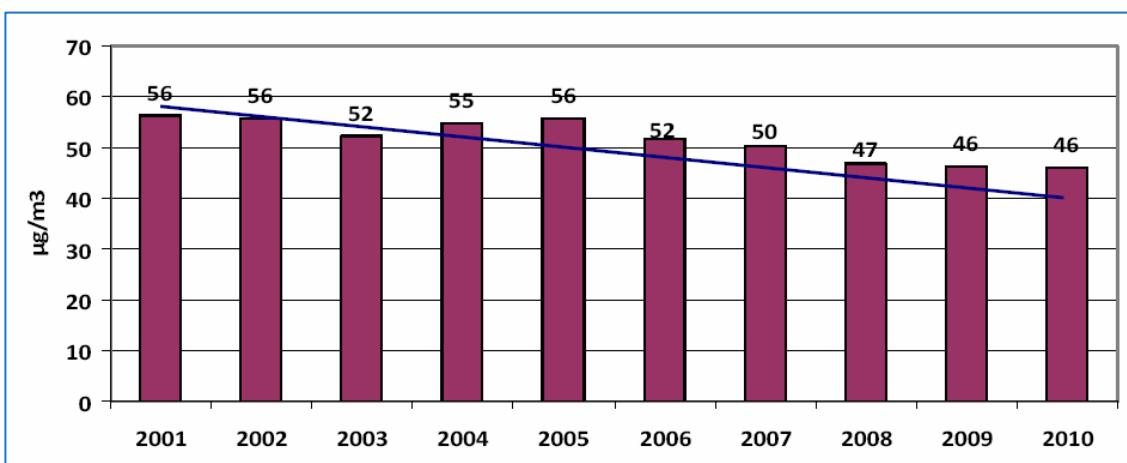


As shown, 6 of the 24 stations within the air quality network exceeded the hourly limit value more than 18 times during the year 2010.

Lastly, an indicator of the evolution over the last ten years is shown. As may be seen, there is a downward trend in the concentration of this pollutant within the atmosphere.

 Annual NO₂ evolution over the last 10 years 

(Stations that remain within the monitoring network throughout the period)



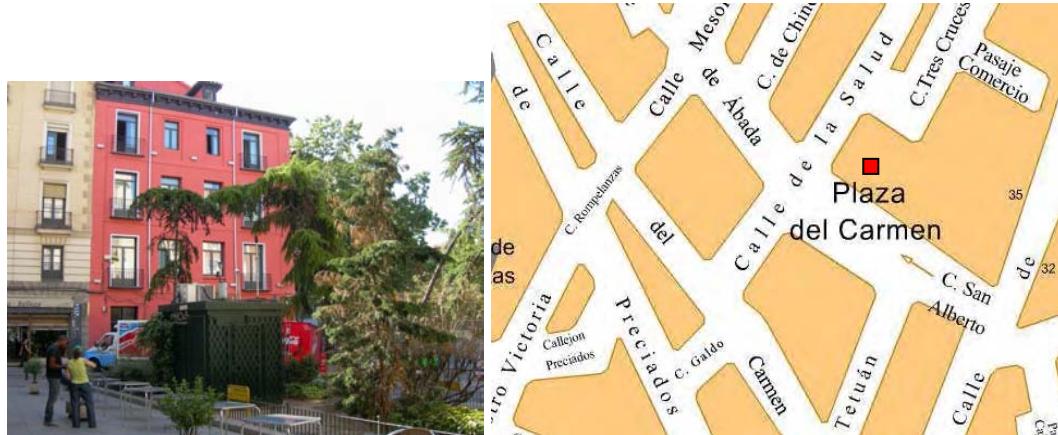
3.3. Network stations exceeding limit values in 2010

The following is a summary of the locations of the stations exceeding some of the nitrogen dioxide limit values (annual and hourly), as well as general information about the environments in which they are located.

PLAZA DEL CARMEN STATION

STATION		Plaza del Carmen		CODE		28079035																													
LOCATION		Plaza del Carmen corner Tres Cruces.		MUNICIPALITY		Madrid																													
LATITUDE		40°25' 9.40" N		DISTRICT		City centre																													
LONGITUDE		3°42' 11,51" O		ALTITUDE		657 m																													
STATION TYPE: Urban station of background pollution measurement																																			
PARAMETERS MEASURED																																			
SO ₂	PM ₁₀	PM _{2,5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL																	
X			X	X	X	X	X																												





AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

Roads with ADV greater than 100000 Vehicles/Day

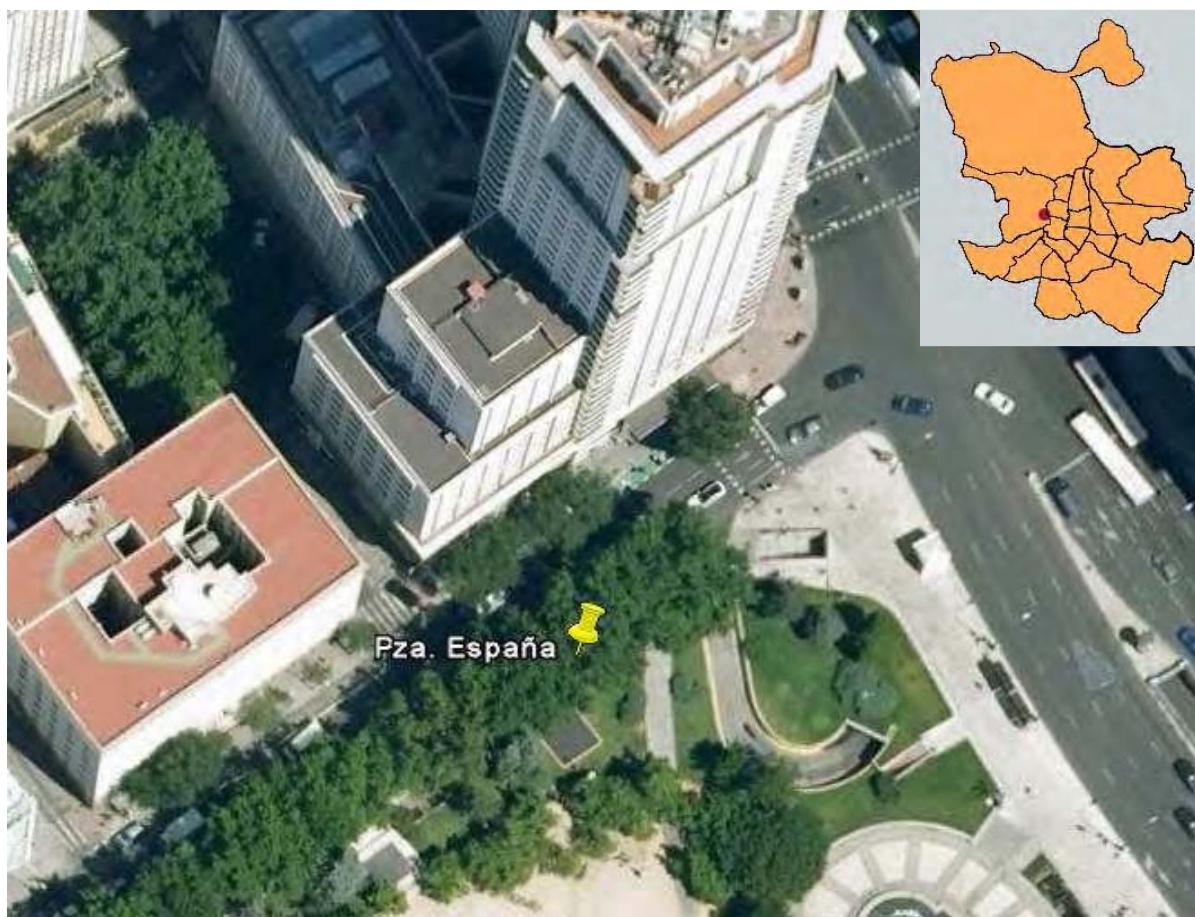


EVALUATION OF DATA FOR THE YEAR 2010

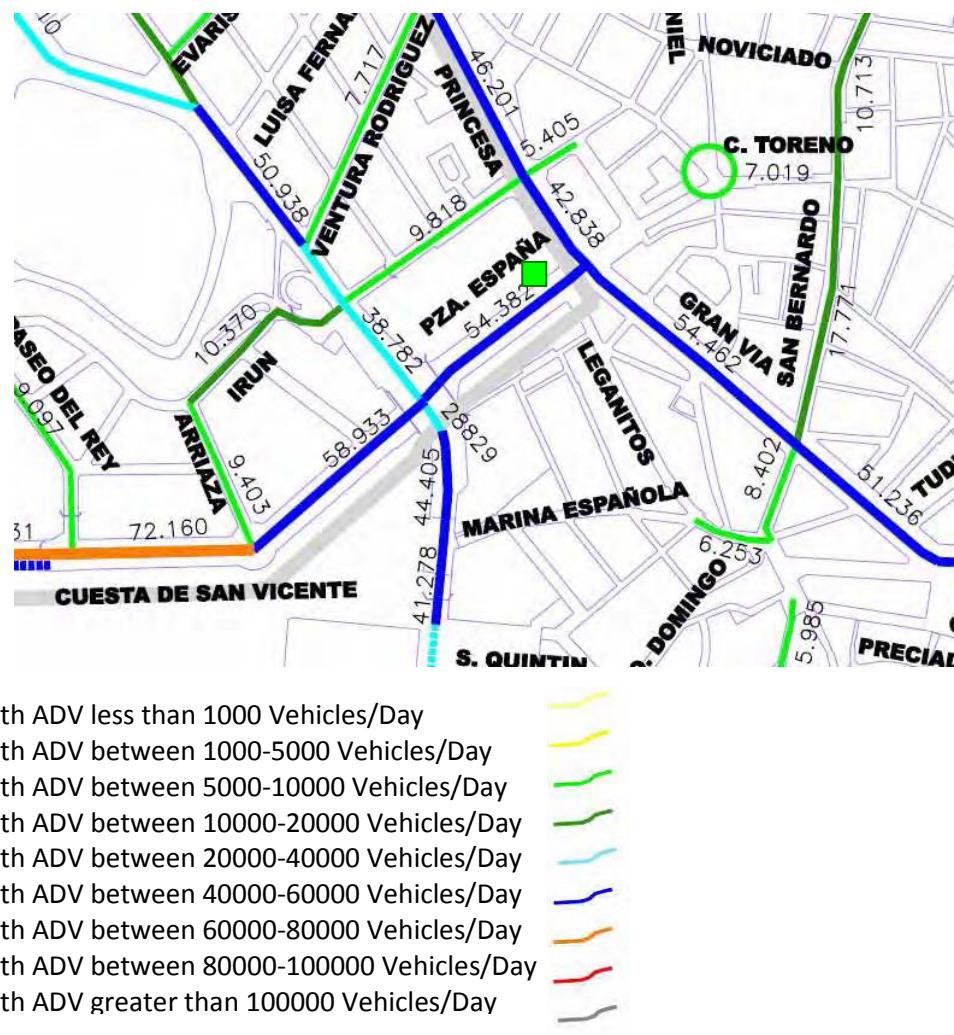
At this station an annual average value of $52 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

PLAZA ESPAÑA STATION

STATION		Plaza de España						CODE						28079004																			
LOCATION		C/ Princesa corner Plaza de España						MUNICIPALITY						Madrid																			
LATITUDE		40°25'26.94"N						DISTRICT						Moncloa																			
LONGITUDE		3°42'44.16" O						ALTITUDE						637 m																			
STATION TYPE: Urban station of traffic pollution measurement																																	
PARAMETERS MEASURED																																	
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL															
X			X	X	X	X						X	X	X	X		X																



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

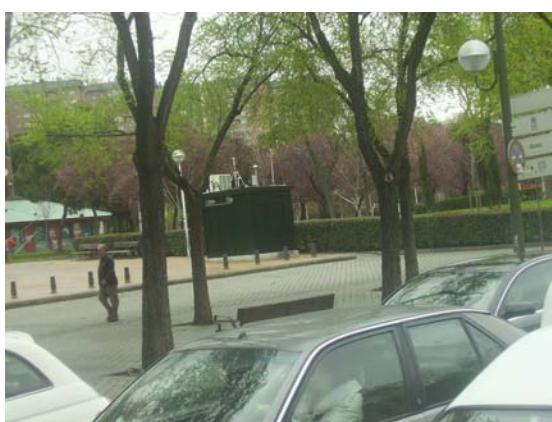
Roads with ADV greater than 100000 Vehicles/Day

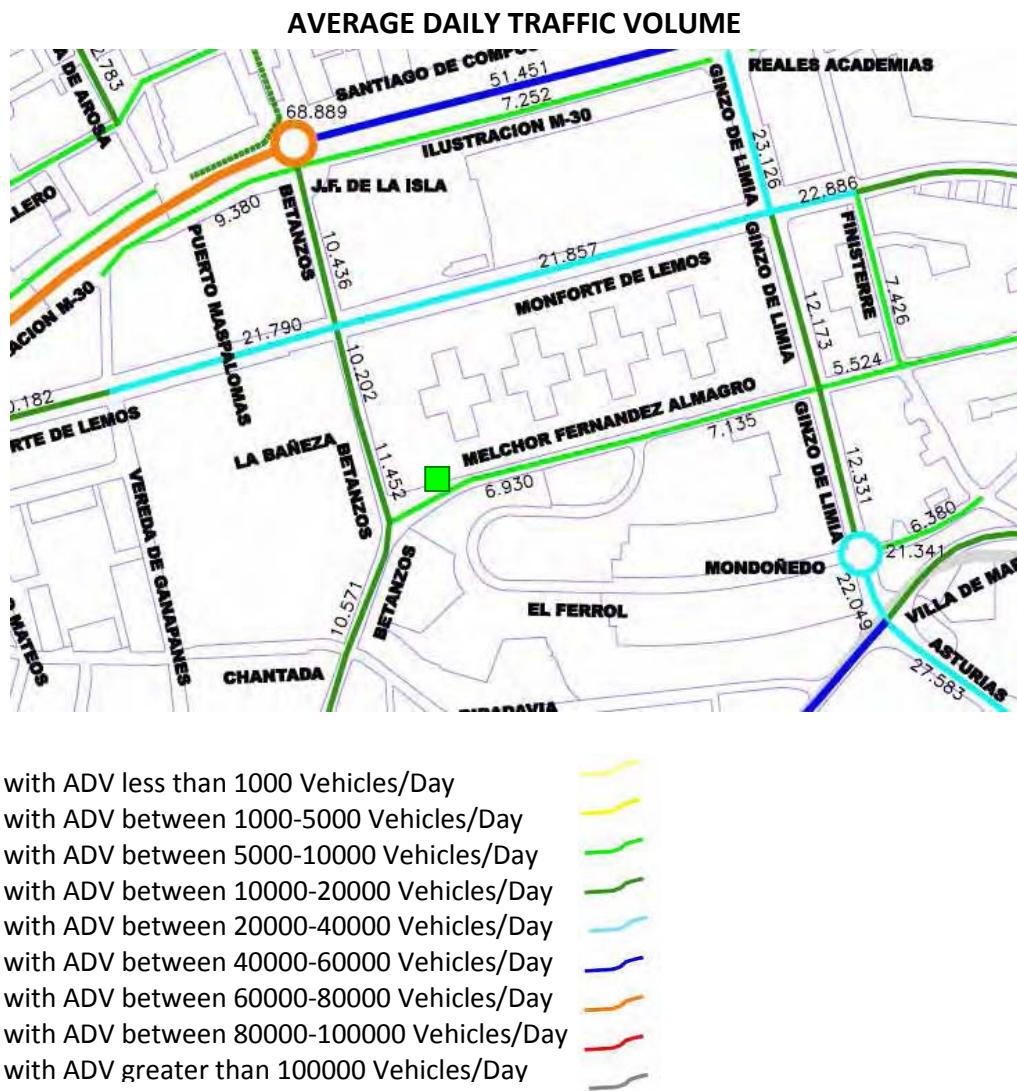
EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $49 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

BARRIO DEL PILAR STATION

STATION	Barrio del Pilar	CODE	28079039															
LOCATION	Avd. Betanzos corner C/ Monforte de Lemos	MUNICIPALITY	Madrid															
LATITUDE	40° 28' 41,70" N	DISTRICT	Fuencarral															
LONGITUDE	3° 42' 41,44" O	ALTITUDE	673 m															
STATION TYPE: Urban station of traffic pollution measurement																		
PARAMETERS MEASURED																		
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL
			X	X	X	X	X											X





EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $43 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value of $200 \mu\text{g}/\text{m}^3$ was exceeded a total of 32 times.

ESCUELAS AGUIRRE STATION

STATION		Escuelas Aguirre	CODE	28079008																													
LOCATION		Between C/ Alcalá y C/ O' Donnell	MUNICIPALITY	Madrid																													
LATITUDE		40° 25' 17,76" N	DISTRICT	Salamanca																													
LONGITUDE		3°40' 56,34" O	ALTITUDE	672 m																													
STATION TYPE: Urban station of traffic pollution measurement																																	
PARAMETERS MEASURED																																	
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL															
X	X	X	X	X	X	X	X	X	X	X																							



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day



Roads with ADV between 1000-5000 Vehicles/Day



Roads with ADV between 5000-10000 Vehicles/Day



Roads with ADV between 10000-20000 Vehicles/Day



Roads with ADV between 20000-40000 Vehicles/Day



Roads with ADV between 40000-60000 Vehicles/Day



Roads with ADV between 60000-80000 Vehicles/Day



Roads with ADV between 80000-100000 Vehicles/Day



Roads with ADV greater than 100000 Vehicles/Day

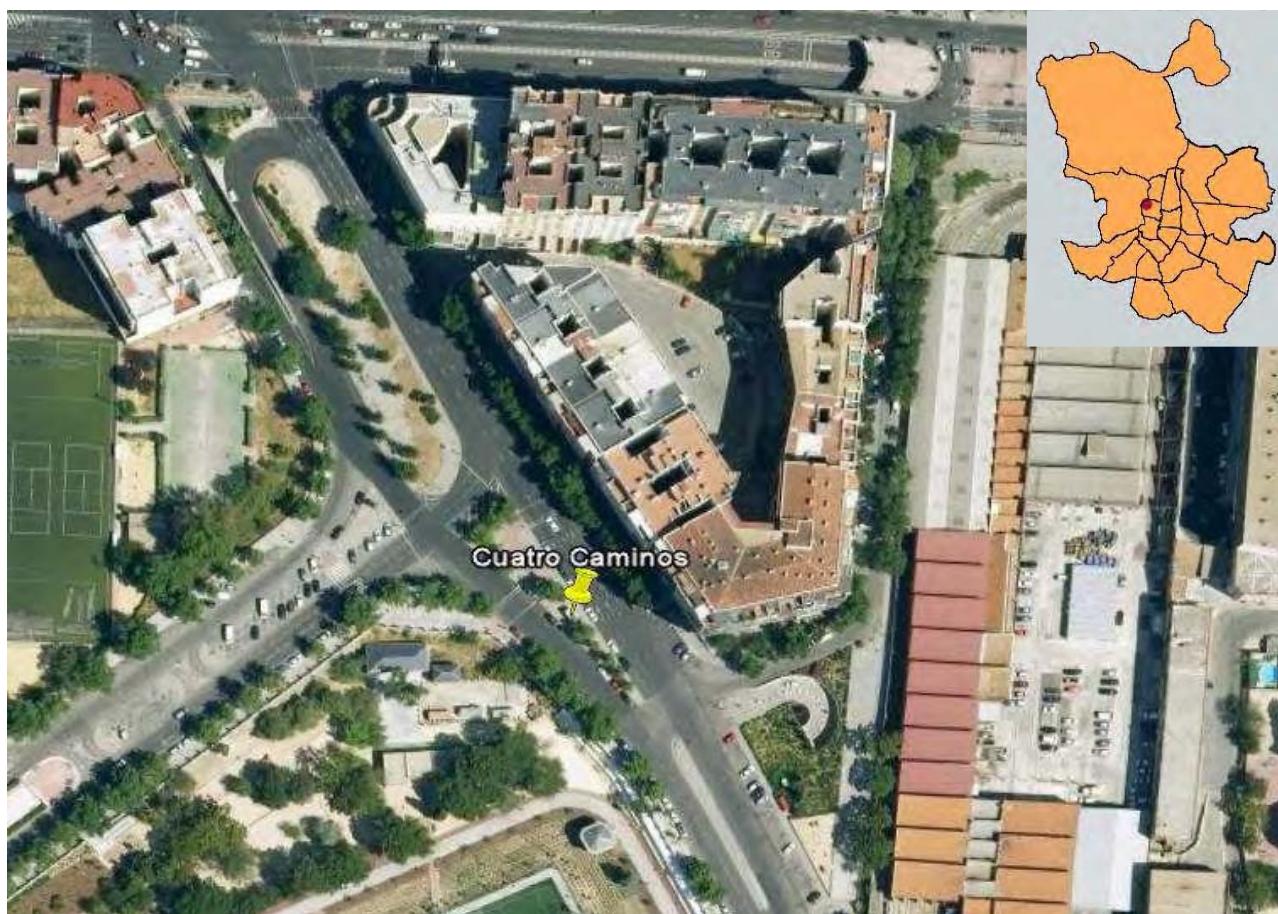


EVALUATION OF DATA FOR THE YEAR 2010

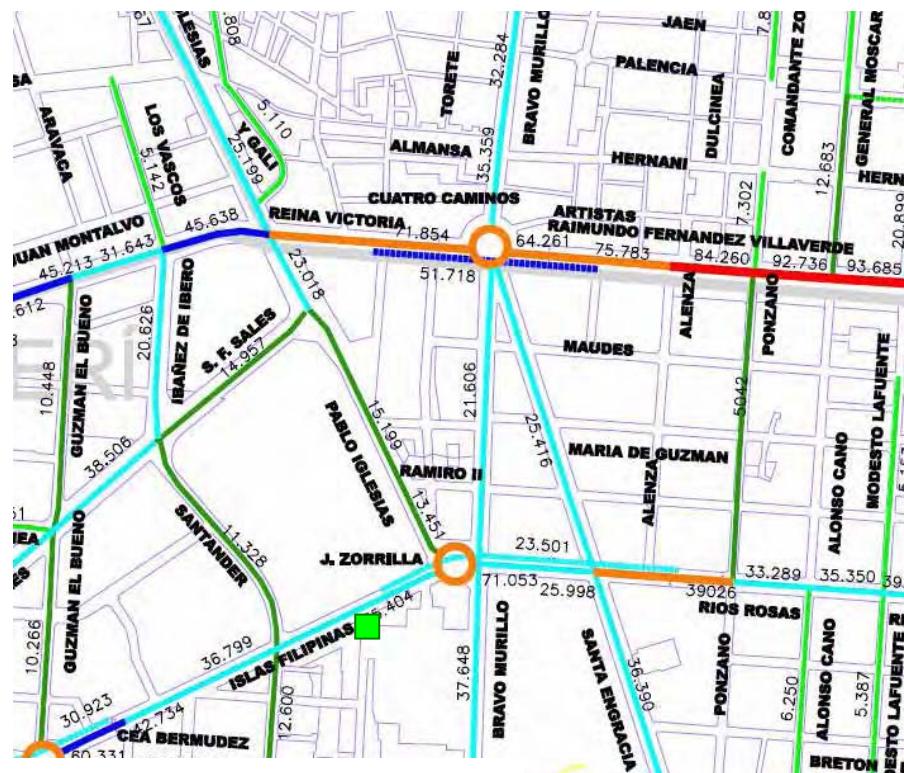
At this station an annual average value of $54 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value of $200 \mu\text{g}/\text{m}^3$ was exceeded a total of 33 times.

CUATRO CAMINOS STATION

STATION		Cuatro Caminos	CODE		28079038																														
LOCATION		Avda. Pablo Iglesias corner C/ Marqués de Lema		MUNICIPALITY		Madrid																													
LATITUDE		40° 26' 43,9" N		DISTRICT		Chamberí																													
LONGITUDE		3° 42' 25,6" O		ALTITUDE		699 m																													
STATION TYPE: Urban station of traffic pollution measurement																																			
PARAMETERS MEASURED																																			
SO ₂	PM ₁₀	PM _{2,5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL																	
X	X	X	X	X	X				X			X						X																	



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

Roads with ADV greater than 100000 Vehicles/Day

EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $54 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value of $200 \mu\text{g}/\text{m}^3$ was exceeded a total of 22 times.

RAMÓN Y CAJAL STATION

STATION	Ramón y Cajal	CODE	28079011															
LOCATION	Avda. Ramón y Cajal corner C/ Príncipe de Vergara	MUNICIPALITY	Madrid															
LATITUDE	40°27'5.57" N	DISTRICT	Chamartín															
LONGITUDE	3°40'38.17" O	ALTITUDE	708 m															
STATION TYPE: Urban station of traffic pollution measurement																		
PARAMETERS MEASURED																		
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL
			X	X	X				X									X



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day



Roads with ADV between 1000-5000 Vehicles/Day



Roads with ADV between 5000-10000 Vehicles/Day



Roads with ADV between 10000-20000 Vehicles/Day



Roads with ADV between 20000-40000 Vehicles/Day



Roads with ADV between 40000-60000 Vehicles/Day



Roads with ADV between 60000-80000 Vehicles/Day



Roads with ADV between 80000-100000 Vehicles/Day



Roads with ADV greater than 100000 Vehicles/Day



EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $55 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value of $200 \mu\text{g}/\text{m}^3$ was exceeded a total of 68 times.

VALLECAS STATION

STATION		Vallecas	CODE		28079040																											
LOCATION		C/ Arroyo del Olivar corner C/ Río Grande.	MUNICIPALITY		Madrid																											
LATITUDE		40°23'17,40"N	DISTRICT		Puente de Vallecas																											
LONGITUDE		3°39'5,42"O	ALTITUDE		677 m																											
STATION TYPE: Urban station of background pollution measurement																																
PARAMETERS MEASURED																																
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL														
X	X		X	X	X													X														



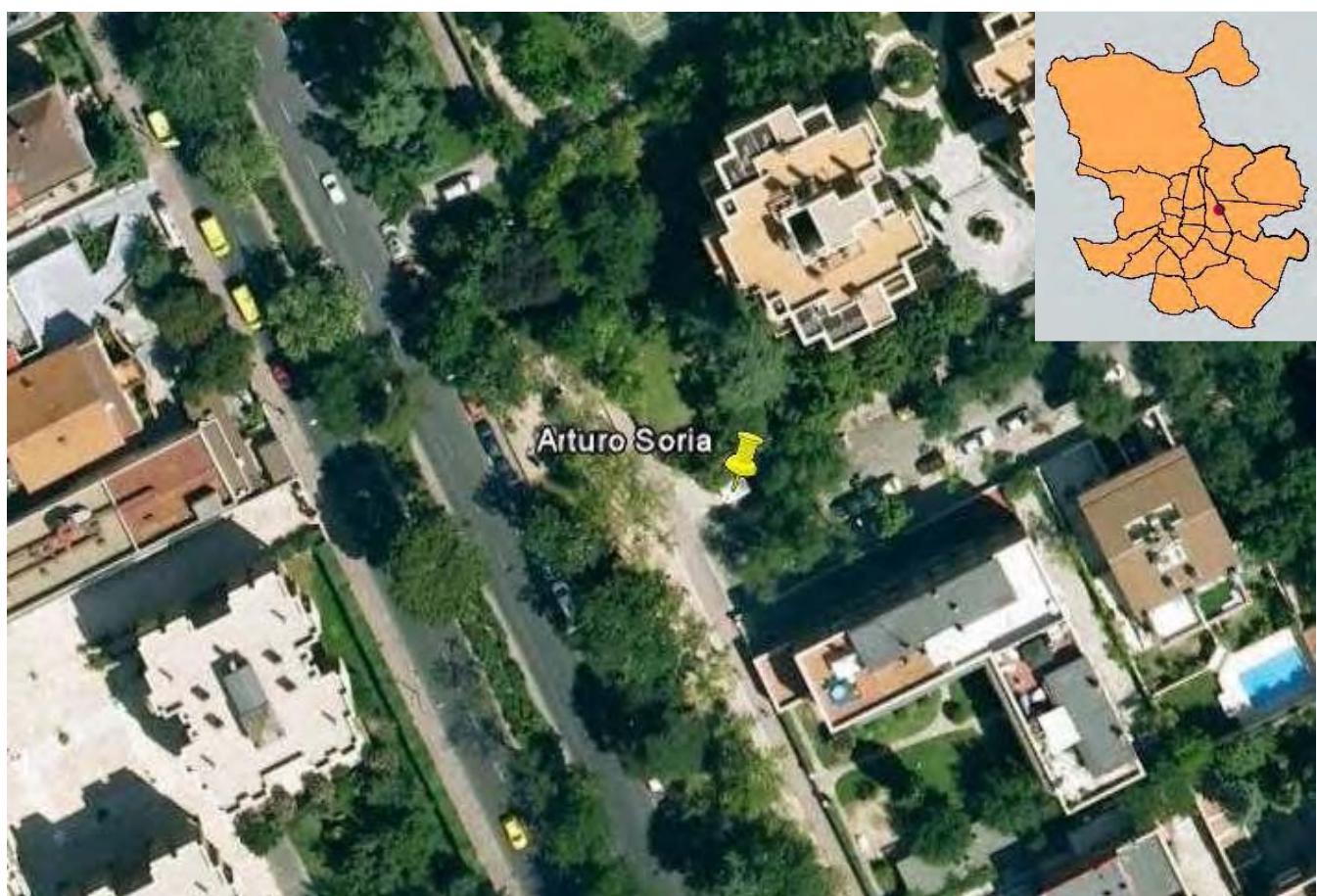


EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $42 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

ARTURO SORIA STATION

<i>STATION</i>		Arturo Soria		<i>CODE</i>		28079016																									
<i>LOCATION</i>		C/ Arturo Soria corner C/ Vizconde de los Asilos		<i>MUNICIPALITY</i>		Madrid																									
<i>LATITUDE</i>		40° 26' 24.20" N		<i>DISTRICT</i>		Ciudad Lineal																									
<i>LONGITUDE</i>		3° 38' 21.26" O		<i>ALTITUDE</i>		698 m																									
<i>STATION TYPE:</i> Urban station of background pollution measurement																															
<i>PARAMETERS MEASURED</i>																															
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _X	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL													
			X	X	X	X	X											X													





AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

Roads with ADV greater than 100000 Vehicles/Day



EVALUATION OF DATA FOR THE YEAR 2010

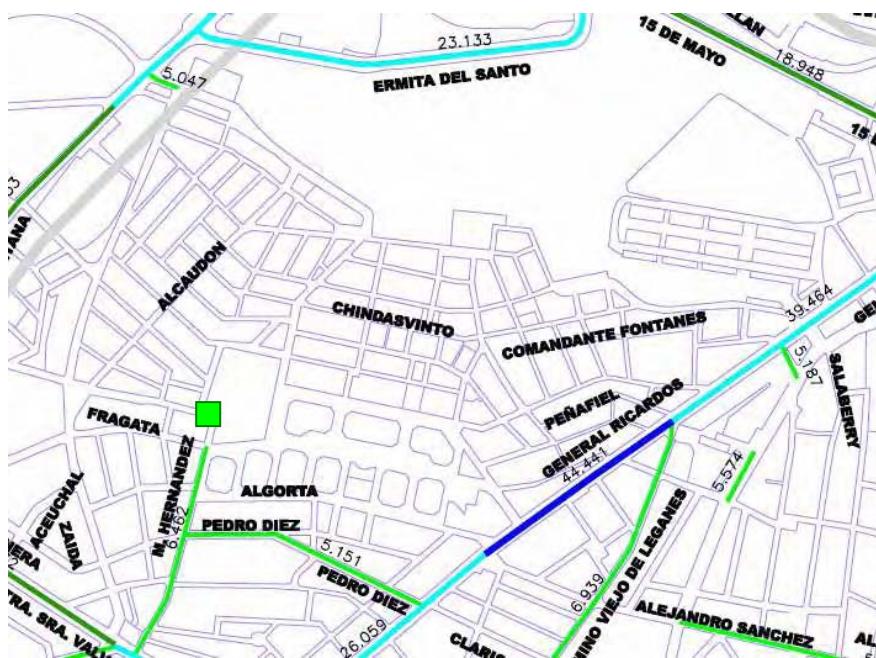
At this station an annual average value of $44 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

FAROLILLO STATION

STATION	Farolillo								CODE	28079018																							
LOCATION	C/ Farolillo - C/ Ervicio								MUNICIPALITY	Madrid																							
LATITUDE	40°23' 41,24" N								DISTRICT	Carabanchel																							
LONGITUDE	3°43' 54,7" O								ALTITUDE	625 m																							
STATION TYPE: Urban station of background pollution measurement																																	
PARAMETERS MEASURED																																	
SO ₂	PM ₁₀	PM _{2,5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL															
X	X	X	X	X	X	X	X	X		X		X						X															



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day



Roads with ADV between 1000-5000 Vehicles/Day



Roads with ADV between 5000-10000 Vehicles/Day



Roads with ADV between 10000-20000 Vehicles/Day



Roads with ADV between 20000-40000 Vehicles/Day



Roads with ADV between 40000-60000 Vehicles/Day



Roads with ADV between 60000-80000 Vehicles/Day



Roads with ADV between 80000-100000 Vehicles/Day



Roads with ADV greater than 100000 Vehicles/Day



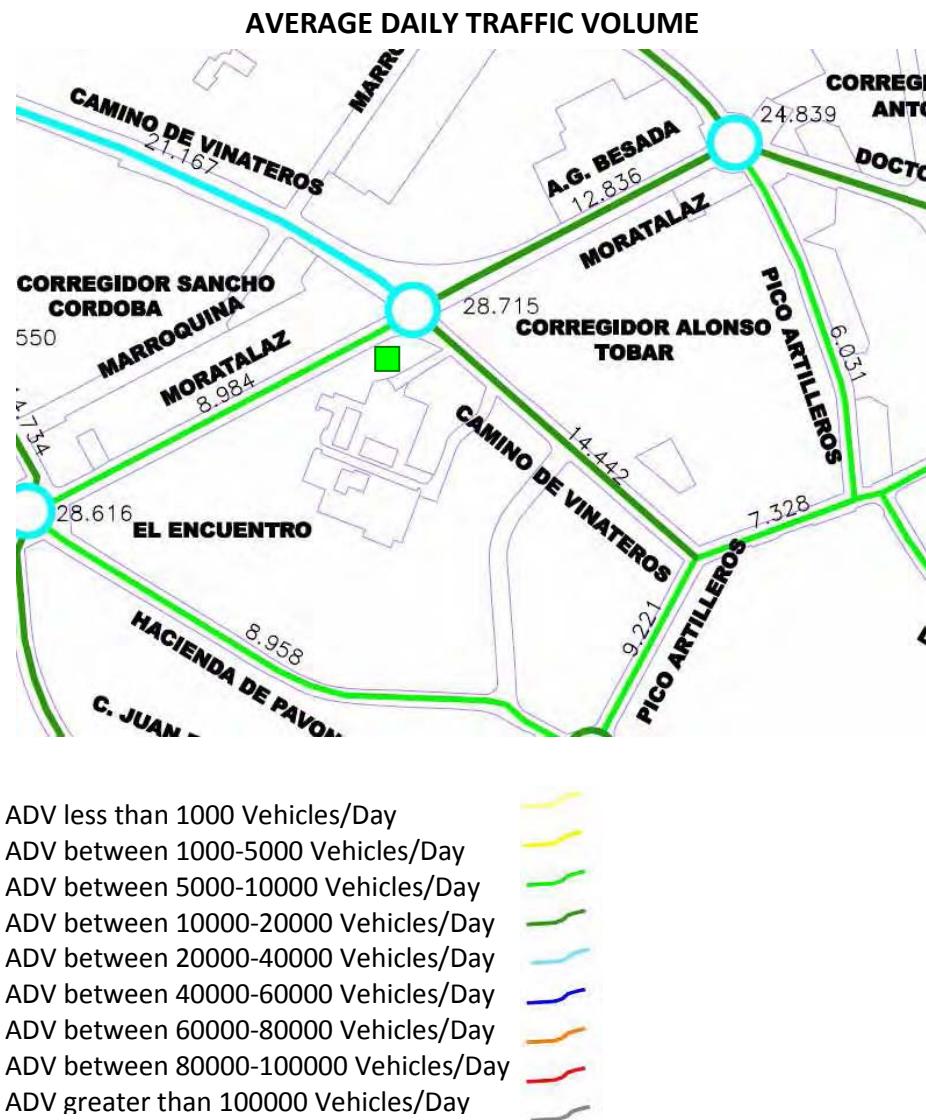
EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $42 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

MORATALAZ STATION

STATION		Moratalaz						CODE				28079036																					
LOCATION		Avd. Moratalaz corner Camino de los Vinateros						MUNICIPALITY				Madrid																					
LATITUDE		40° 24' 28,7" N						DISTRICT				Moratalaz																					
LONGITUDE		3° 38' 43,1" O						ALTITUDE				685 m																					
STATION TYPE: Urban station of traffic pollution measurement																																	
PARAMETERS MEASURED																																	
SO ₂	PM ₁₀	PM _{2,5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL															
X	X		X	X	X	X												X															





EVALUATION OF DATA FOR THE YEAR 2010

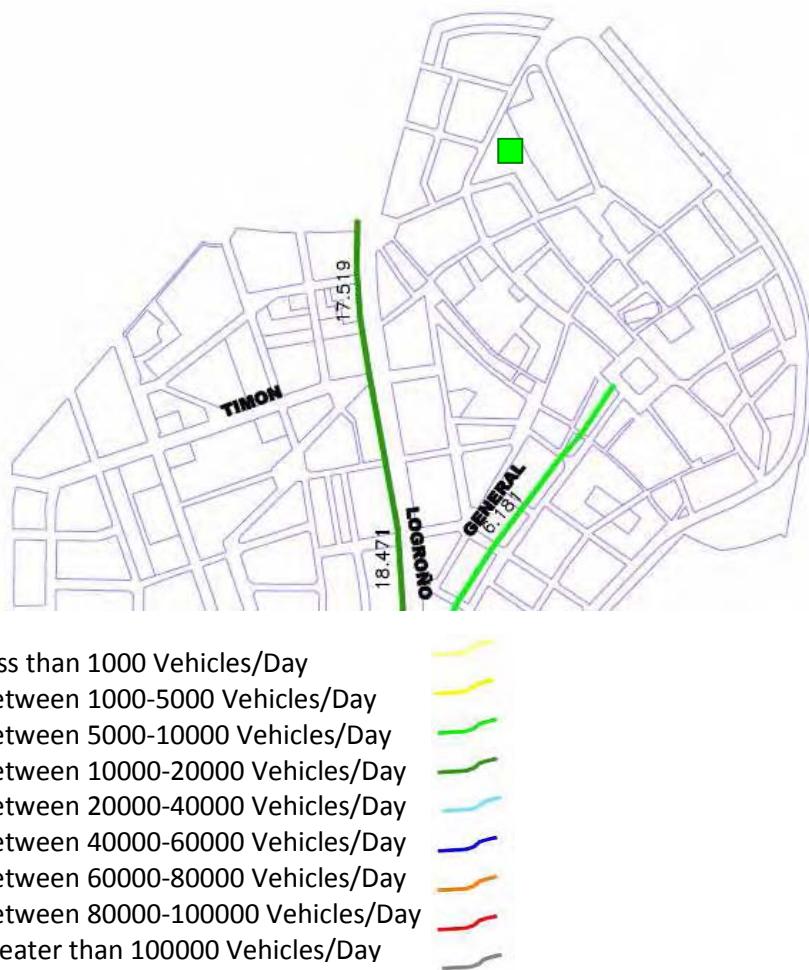
At this station an annual average value of $49 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

BARAJAS PUEBLO STATION

STATION	Barajas Pueblo						CODE	28079027																					
LOCATION	C/. Júpiter, 21 (Barajas)						MUNICIPALITY	Madrid																					
LATITUDE	40° 28' 36,9" N						DISTRICT	Barajas																					
LONGITUDE	3° 34' 48,1" O						ALTITUDE	620 m																					
STATION TYPE: Urban station of background pollution measurement																													
PARAMETERS MEASURED																													
SO ₂	PM ₁₀	PM _{2,5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL											
			X	X	X		X	X																					



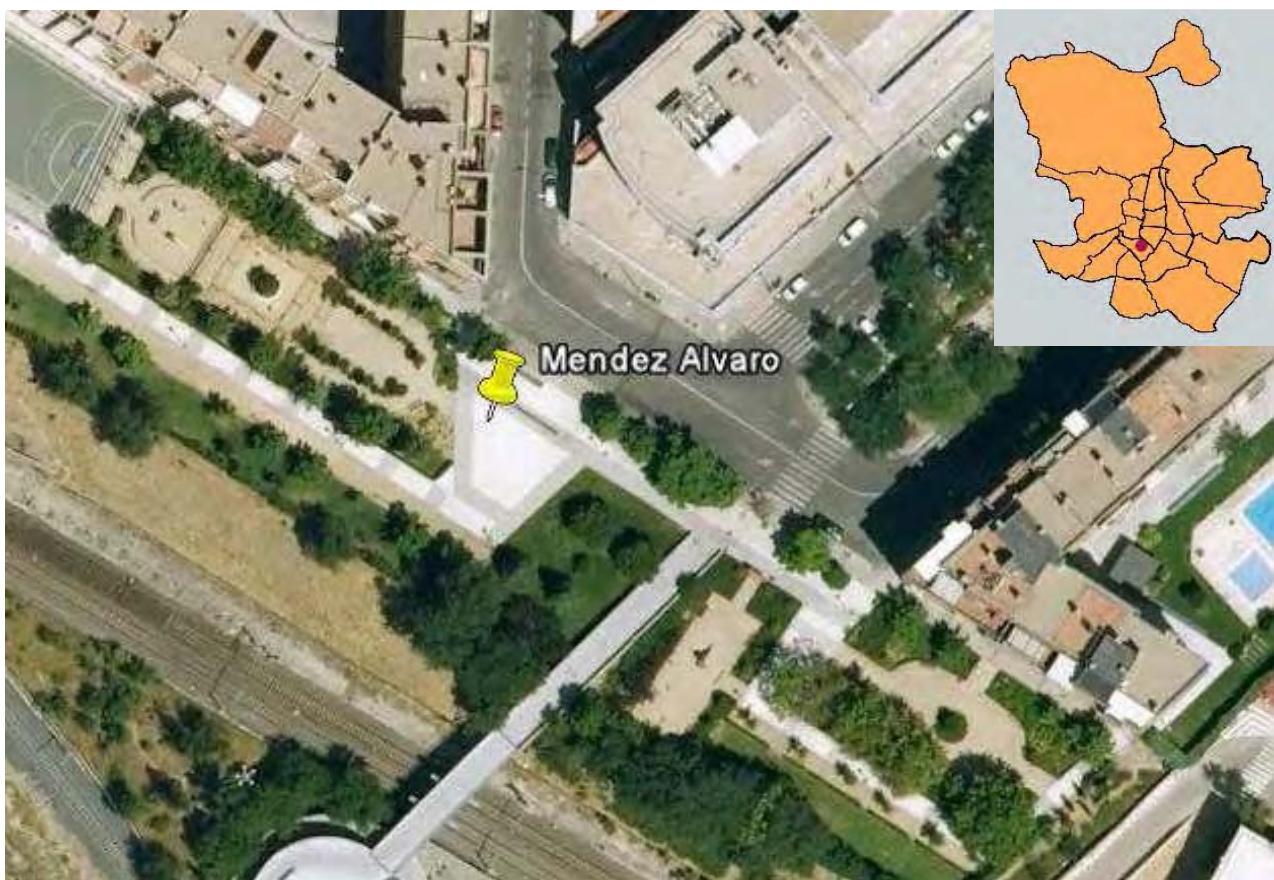
AVERAGE DAILY TRAFFIC VOLUME

**EVALUATION OF DATA FOR THE YEAR 2010**

At this station an annual average value of $47 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

MÉNDEZ ALVARO STATION

STATION		Méndez Álvaro	CODE		28079047																							
LOCATION		C/ Juan de Mariana / Pza. Amanecer Méndez Álvaro	MUNICIPALITY		Madrid																							
LATITUDE		40°23'53.21"N	DISTRICT		Arganzuela																							
LONGITUDE		3°41'12.57"W	ALTITUDE		609 m																							
STATION TYPE: Urban station of background pollution measurement																												
PARAMETERS MEASURED																												
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL										
	X	X	X	X	X																							



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

Roads with ADV greater than 100000 Vehicles/Day

EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $47 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$ and the hourly limit value was never exceeded.

CASTELLANA STATION

STATION		Castellana		CODE		28079048																									
LOCATION		C/ Jose Gutierrez Abascal		MUNICIPALITY		Madrid																									
LATITUDE		40°26'23.44"N		DISTRICT		Chamartin																									
LONGITUDE		3°41'25.28"O		ALTITUDE		685 m																									
STATION TYPE: Urban station of traffic pollution measurement																															
PARAMETERS MEASURED																															
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL													
X	X	X	X	X	X																										



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

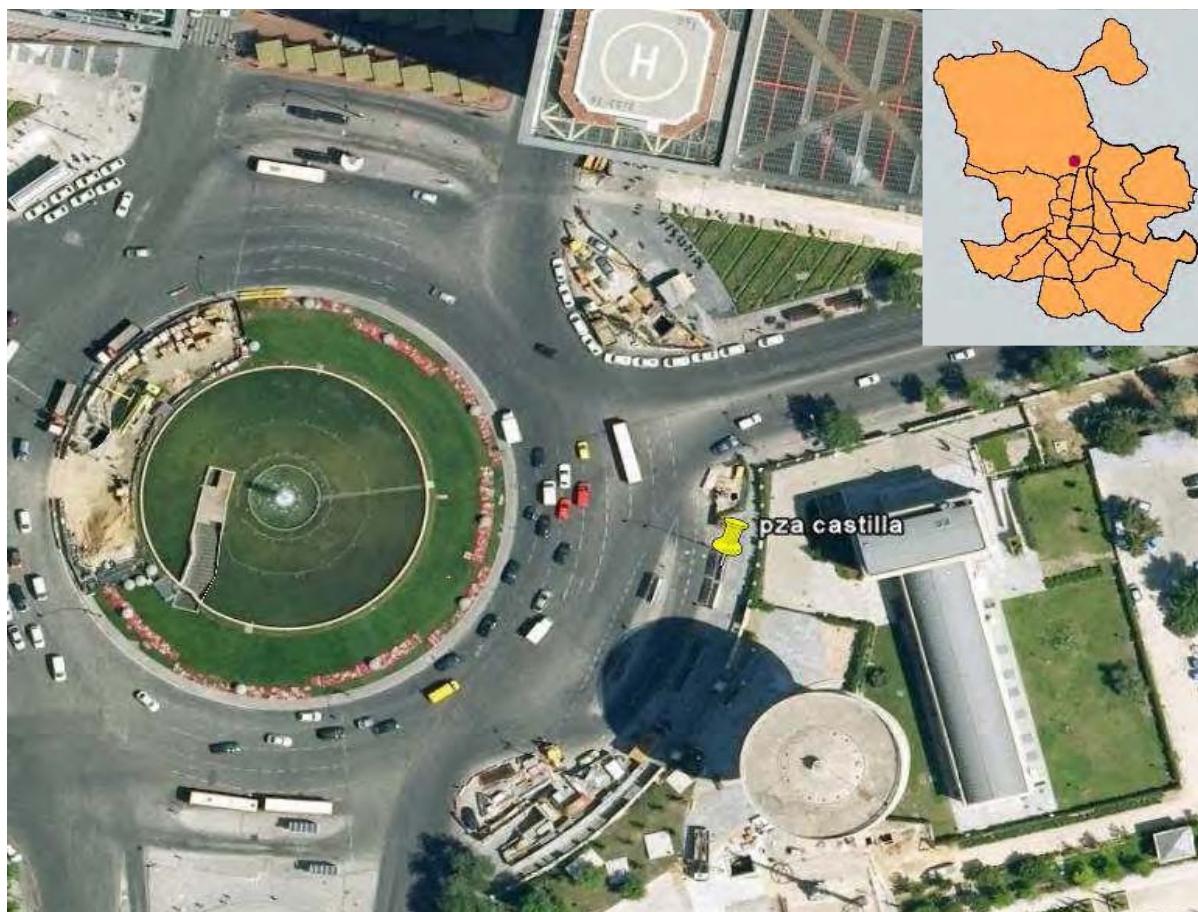
Roads with ADV greater than 100000 Vehicles/Day

EVALUATION OF DATA FOR THE YEAR 2010

This station began operating on June 1, 2010. Therefore, it cannot be taken into account in evaluating air quality in the City of Madrid this year because a minimum of 75% of the valid recorded data is required, but not available. Nevertheless, an annual average value of $49 \mu\text{g}/\text{m}^3$ was recorded at this station, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was exceeded no more than 18 times.

PLAZA CASTILLA STATION

STATION	PLAZA DE CASTILLA						CODE			28079050															
LOCATION	Plaza de Castilla						MUNICIPALITY			Madrid															
LATITUDE	40° 27'57.28"						DISTRICT			Chamartín															
LONGITUDE	3° 41' 18.42"						ALTITUDE			729 m															
STATION TYPE: Urban station of traffic pollution measurement																									
PARAMETERS MEASURED																									
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL							
	X	X	X	X	X							X													



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day



Roads with ADV between 1000-5000 Vehicles/Day



Roads with ADV between 5000-10000 Vehicles/Day



Roads with ADV between 10000-20000 Vehicles/Day



Roads with ADV between 20000-40000 Vehicles/Day



Roads with ADV between 40000-60000 Vehicles/Day



Roads with ADV between 60000-80000 Vehicles/Day



Roads with ADV between 80000-100000 Vehicles/Day



Roads with ADV greater than 100000 Vehicles/Day

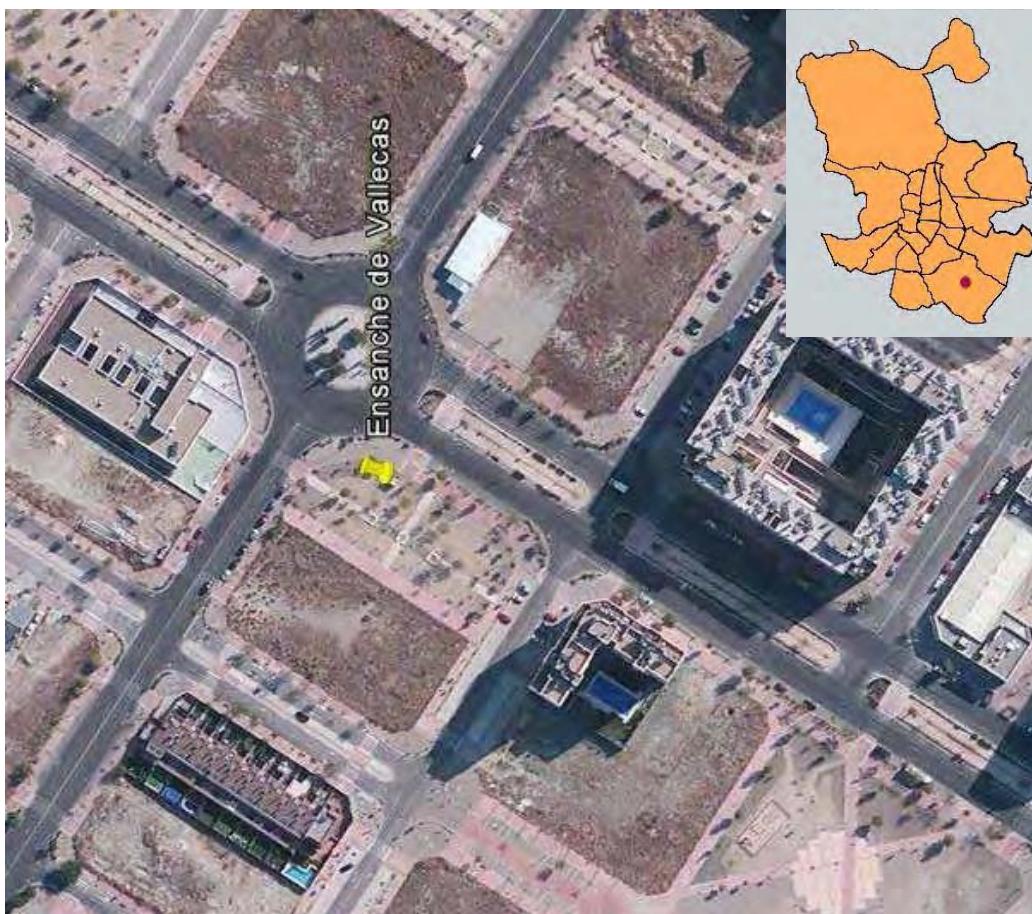


EVALUATION OF DATA FOR THE YEAR 2010

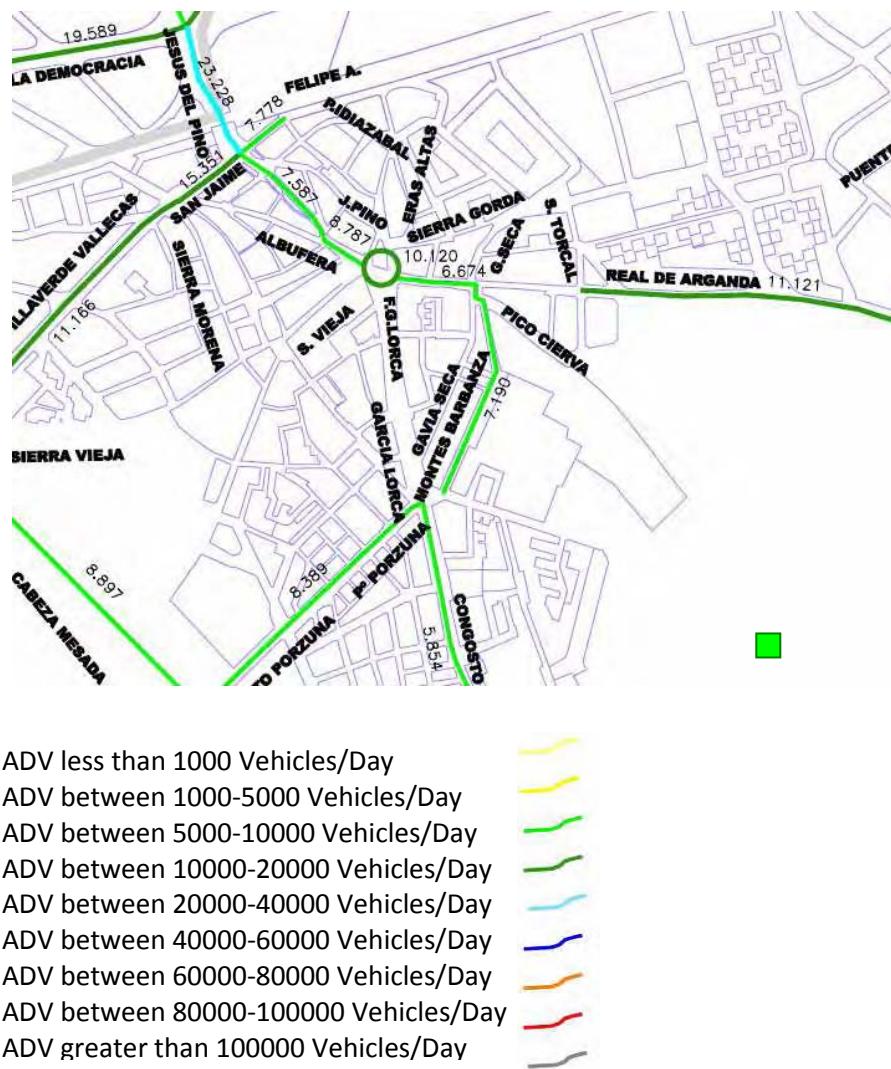
At this station an annual average value of $53 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

ENSANCHE DE VALLECAS STATION

STATION	Ensanche de Vallecas							CODE	28079054																						
LOCATION	Avda La Gavia/ Avda. Las Suertes							MUNICIPALITY	Madrid																						
LATITUDE	40°22'22,83"N							DISTRICT	Villa de Vallecas																						
LONGITUDE	3°36'43,75"O							ALTITUDE	630 m																						
STATION TYPE: Urban station of background pollution measurement																															
PARAMETERS MEASURED																															
SO ₂	PM ₁₀	PM _{2,5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL													
			X	X	X		X				X	X	X	X	X		X														



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day



Roads with ADV between 1000-5000 Vehicles/Day



Roads with ADV between 5000-10000 Vehicles/Day



Roads with ADV between 10000-20000 Vehicles/Day



Roads with ADV between 20000-40000 Vehicles/Day



Roads with ADV between 40000-60000 Vehicles/Day



Roads with ADV between 60000-80000 Vehicles/Day



Roads with ADV between 80000-100000 Vehicles/Day



Roads with ADV greater than 100000 Vehicles/Day

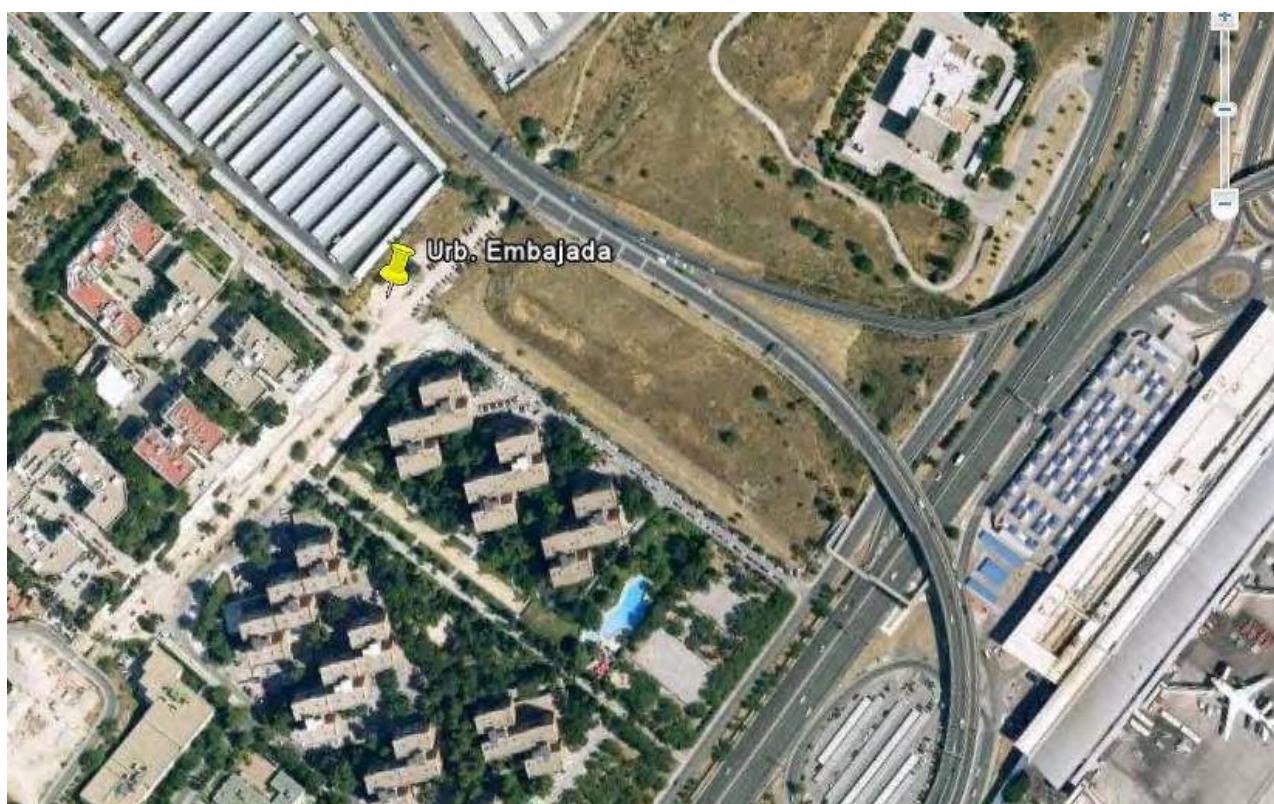


EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $41 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $\mu\text{g}/\text{m}^3$. The hourly limit value of $200 \mu\text{g}/\text{m}^3$ was exceeded a total of 25 times, which exceeds the maximum of 18.

EMBASSY BUILDING STATION

STATION	Embassy Building						CODE	28079055																									
LOCATION	C/ Riaño						MUNICIPALITY	Madrid																									
LATITUDE	40°27'45.10"N						DISTRICT	Barajas																									
LONGITUDE	3°34'50.34"O						ALTITUDE	618 m																									
STATION TYPE: Urban station of background pollution measurement																																	
PARAMETERS MEASURED																																	
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL															
	X		X	X	X			X	X																								



AVERAGE DAILY TRAFFIC VOLUME



Roads with ADV less than 1000 Vehicles/Day



Roads with ADV between 1000-5000 Vehicles/Day



Roads with ADV between 5000-10000 Vehicles/Day



Roads with ADV between 10000-20000 Vehicles/Day



Roads with ADV between 20000-40000 Vehicles/Day



Roads with ADV between 40000-60000 Vehicles/Day



Roads with ADV between 60000-80000 Vehicles/Day



Roads with ADV between 80000-100000 Vehicles/Day



Roads with ADV greater than 100000 Vehicles/Day



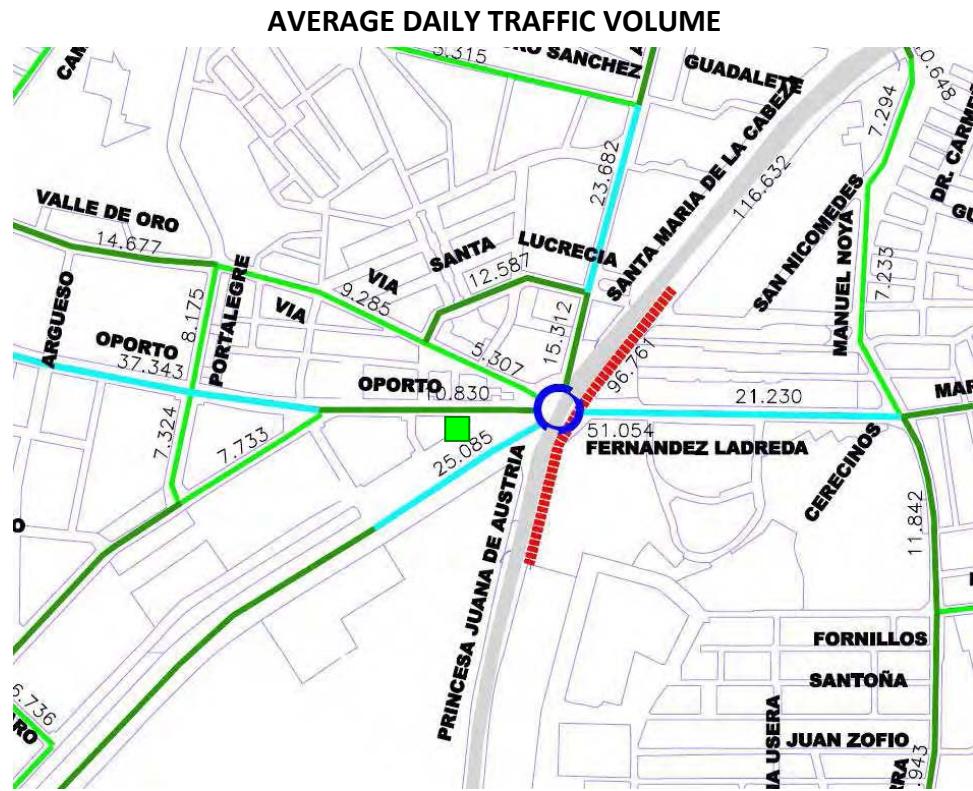
EVALUATION OF DATA FOR THE YEAR 2010

At this station an annual average value of $44 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$ and the hourly limit value was never exceeded.

FERNÁNDEZ LADREDA STATION

STATION		Pza. Fernández Ladreda	CODE		28079056																											
LOCATION		Avda. Oporto – Pº. Fernández Ladreda	MUNICIPALITY		Madrid																											
LATITUDE		40° 23' 05" N	DISTRICT		Carabanchel																											
LONGITUDE		3° 43' 7" O	ALTITUDE		605 m																											
STATION TYPE: Urban station of traffic pollution measurement																																
PARAMETERS MEASURED																																
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL														
			X	X	X	X	X					X	X	X	X	X	X															





Roads with ADV less than 1000 Vehicles/Day

Roads with ADV between 1000-5000 Vehicles/Day

Roads with ADV between 5000-10000 Vehicles/Day

Roads with ADV between 10000-20000 Vehicles/Day

Roads with ADV between 20000-40000 Vehicles/Day

Roads with ADV between 40000-60000 Vehicles/Day

Roads with ADV between 60000-80000 Vehicles/Day

Roads with ADV between 80000-100000 Vehicles/Day

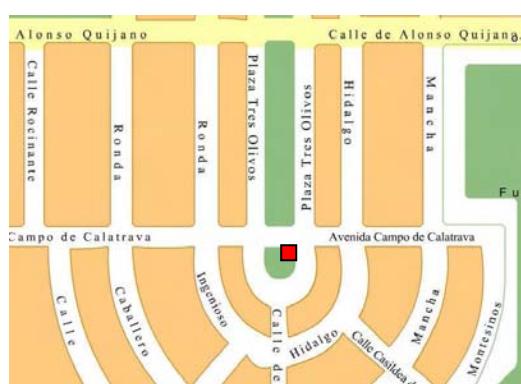
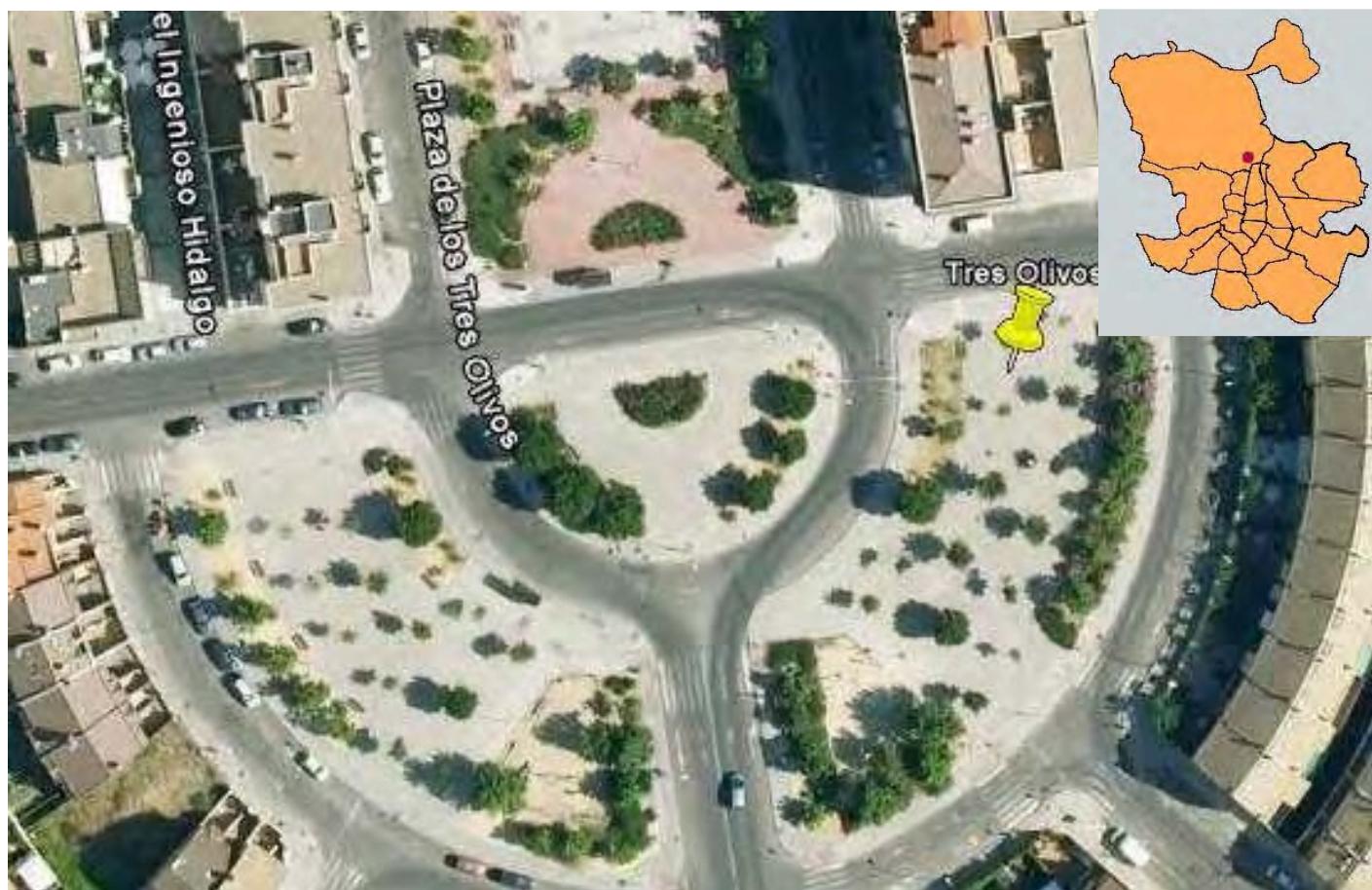
Roads with ADV greater than 100000 Vehicles/Day

EVALUATION OF DATA FOR THE YEAR 2010

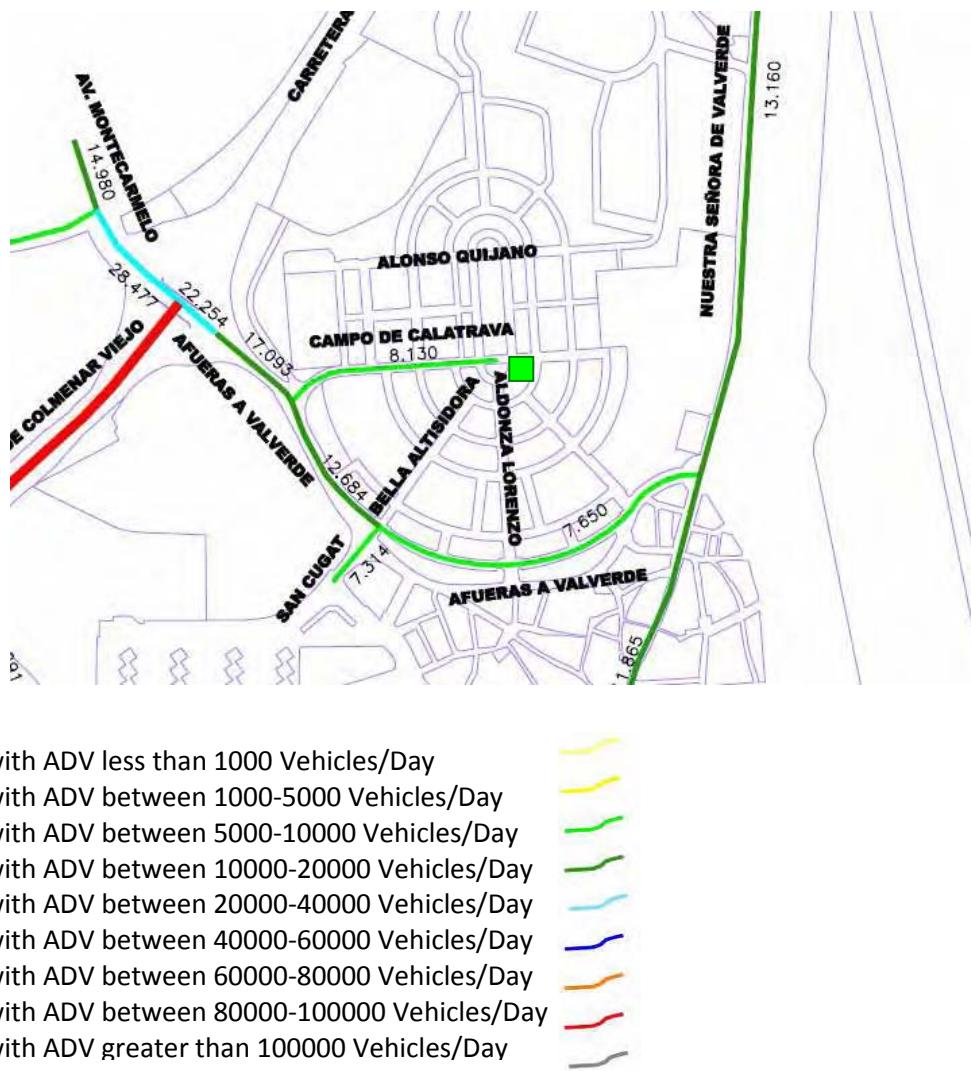
At this station an annual average value of $68 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value of $200 \mu\text{g}/\text{m}^3$ was exceeded a total of 76 times, above the maximum of 18 times per year in which this hourly limit value can be surpassed.

TRES OLIVOS STATION

STATION	Tres Olivos	CODE	28079060															
LOCATION	Plaza Tres Olivos, across from 163 of Ronda del Ingenioso Hidalgo	MUNICIPALITY	Madrid															
LATITUDE	40°30'2.05"N	DISTRICT	Fuencarral															
LONGITUDE	3°41'23.09"O	ALTITUDE	715 m															
STATION TYPE: Urban station of background pollution measurement																		
PARAMETERS MEASURED																		
SO ₂	PM ₁₀	PM _{2.5}	NO ₂	NO	NO _x	CO	O ₃	HC	BTX	CH ₄	UV	T	HR	DV	VV	P	BS	LL
	X		X	X	X		X											X



AVERAGE DAILY TRAFFIC VOLUME

**EVALUATION OF DATA FOR THE YEAR 2010**

At this station an annual average value of $41 \mu\text{g}/\text{m}^3$ was recorded, which exceeds the limit value of $40 \mu\text{g}/\text{m}^3$. The hourly limit value was never exceeded.

4. 2010 OBJECTIVES: MEASURES ADOPTED, ACHIEVEMENTS AND PENDING CHALLENGES

4.1 Measures adopted in order to meet 2010 objectives

Directive 96/62/EC of September 27, on ambient air quality management and evaluation, and its later regulatory implementation for the various pollutants, were the first limit values set in the EU with mandatory compliance dates, which established tolerance margins that would decrease progressively until those limits are reached. Putting these standards into effect implied the need to establish a new air quality control framework in Madrid. In order to meet the objectives provided for in the standard, in 2006 Madrid City Council approved the *Air Quality Strategy of the City of Madrid (2006-2010)*, the purpose of which was to create a comprehensive response to the demand for pollution reduction.

The 54 measures contained in the Strategy for that period are grouped into nine categories:

- Vehicular traffic
- Stationary sources
- Taxation measures
- Citizen awareness
- Studies and knowledge improvement
- Monitoring
- Urban waste
- Climate change
- Other measures

A total of 76% of the measures outlined in the Strategy were implemented during the period from 2006 to 2010. Very different actions were taken within the new scopes of action as is shown in the Strategy evaluation records included in **Annex I**. Another series of measures were adopted at the same time, the evaluation of which is detailed in **Annex II**. These additional measures, not planned for in the Strategy, covered various emission sources and focused on the vehicular traffic sector in particular. Such is the case, for example, of the underground works for the M30 motorway or the creation of 13 backup intermodal public transport areas.

4.2 Achievements and pending challenges

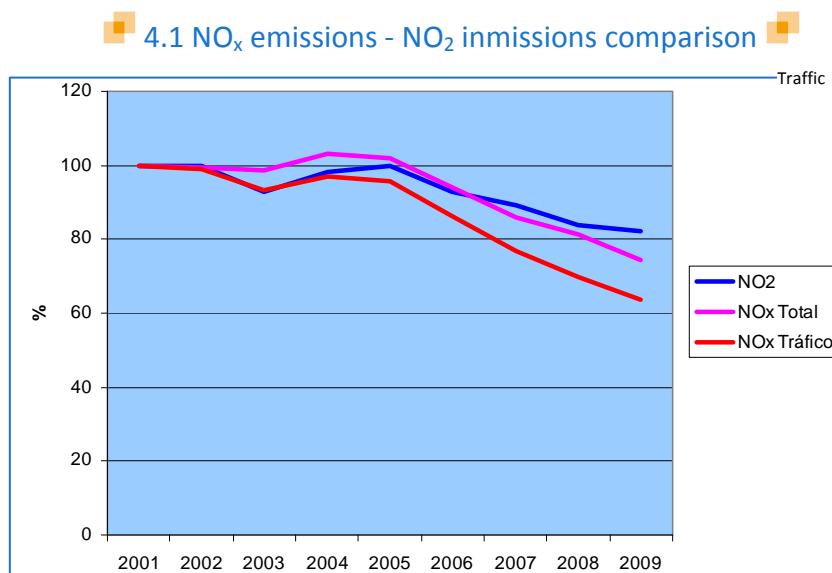
The application of all the aforementioned measures resulted in a significant reduction of polluting emissions, particularly from sources, such as traffic, which have a major impact on pollution, as shown in Chapter 2. The rates of reduction of emissions achieved at the source resulted in a significant improvement in the air quality of Madrid, as shown in Chapter 3. As a result, current levels of sulphur dioxide, carbon monoxide and lead are much lower than

those required by. There have also been significant reductions in ozone and suspended particulates. This has made possible the following:

- With respect to ozone, the alert threshold was never exceeded during the year 2010, although the advisory threshold was exceeded twice.
- PM_{2.5} particulates never exceeded the target value established for this pollutant at any of the network stations during the year 2010.
- PM₁₀ particulates never exceeded the limit value target of 50 µg/m³ per day at any air quality station in 2010, and the annual limit value stayed below the target set.

Regarding nitrogen dioxide, the effort prevented the alert threshold from being exceeded in 2010, but it was not enough to meet the new objectives for annual and hourly limit values. Nevertheless, they did result in lower concentrations during a period of strong economic expansion in the city. There is no doubt that, without the high rate of emission reductions achieved, it would not have been possible to break the link between economic growth and an increase in nitrogen dioxide pollution.

Aware of the challenge implied in meeting the demands of Directive 2008/50/EC, Madrid City Council proposed delving deeper into the causes of the problem, in light of the fact that the nitrogen oxide (NO_x) reduction rates achieved, particularly in the traffic section, did not result in a decrease in the concentrations of NO₂ in the air, as shown in Figure 4.1.



Source. NO_x: Emissions inventory - NO₂: Network Stations average concentration

The Council proposed acquiring as much knowledge as possible about factors determining primary NO_x and NO₂ emissions from traffic in order to improve actions taken regarding them. To this end, the Council, in cooperation with expert consultants on the subject, compiled the "*Report on reduction measures for NO_x from traffic*". The goal of this study, the first of its kind in Spain, was to profile vehicle types (trips and associated emissions) by taking samples with cameras at nine points within the city and thirty points with manual sampling, with which a sampling of more than two hundred thousand vehicles

was made within Calle-30. This work was done at various times during the years 2008 and 2009. The study has enabled NO_x and NO₂ emissions to be quantified and rendered the following results:

- 66% of total nitrogen oxide (NO_x) emissions within the City of Madrid come from vehicles. According to the study made of trips and emissions, NO₂ is distributed as follows: 56.1% from cars, 16.4% from buses, 14.8% from taxis and 12.7% from other categories (light vehicles, motorcycles, etc.).
- Of the private cars (excluding taxis) travelling through Madrid, those that run on diesel generate 98% of total NO₂ emissions from private cars. The reason for this is that 63.6% of private cars are diesel vehicles, and 96% of journeys undertaken with private cars take place in diesel vehicles that are less than 10 years old.

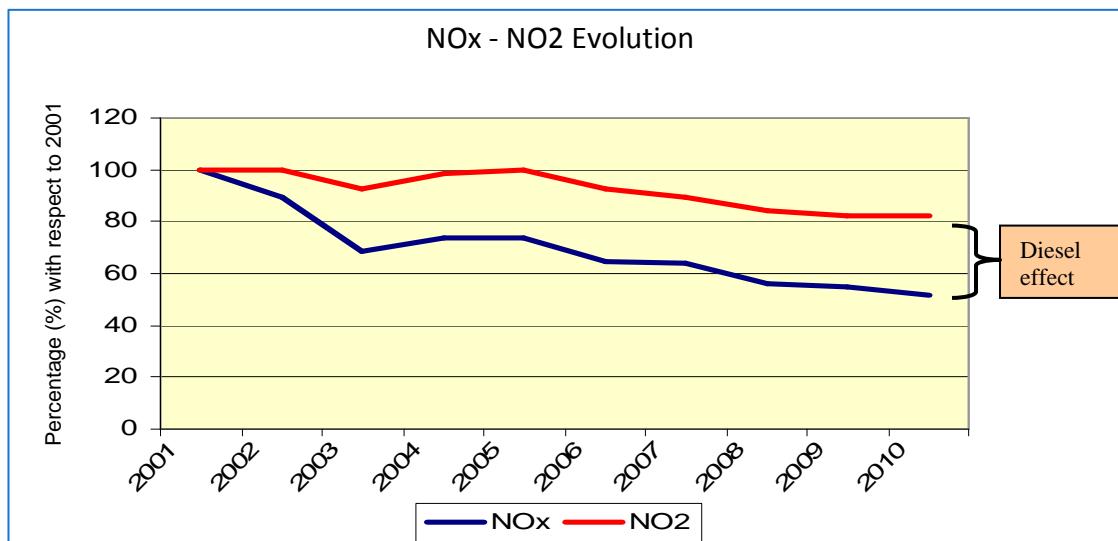
Along with the classification of vehicle traffic and corresponding emissions , the Council also considered the most recent studies conducted in various European countries, which show that, although new technologies introduced to diesel cars caused a decrease in their overall NO_x emissions, the portion of primary NO₂ emissions from the most modern technologies (EURO III and later) increased significantly.

These two facts (the increased percentage of diesel vehicle traffic in Madrid along with the renewals that have taken place in recent years resulting in vehicles with more modern technologies but producing higher primary NO₂ emissions) have brought about a structural problem called the "diesel effect." This effect explains the fact that, although NO_x emissions from road traffic have decreased significantly in recent years, NO₂ emissions have reduced to a lesser extent, as shown in Figure 4.2., which compares NO_x and NO₂ inmissions measured at urban stations of traffic pollution measurement and thus attributable almost completely to vehicles.

As a result, the challenge to be faced by the Council is to reduce traffic emissions even further. This will be critical to meet the objectives of Directive 2008/50/EC, given the fact that the weight of emissions from newer, diesel cars is very high. This fact conditions the measures to be taken significantly, because those based on restricting or penalizing the most polluting cars would affect the majority of vehicles in circulation, which would in turn have a disproportionate socioeconomic cost, particularly in the present socioeconomic circumstances.

Consequently, although it has discarded restriction and penalization measures for vehicles based on their age from this Plan, believing that the objectives of the Directive should be met, the Council has decided to meet the challenge by outlining a set of measures that will be explained in the following chapter.

 4.2. NO_x and NO₂ concentrations evolution at Urban stations
of traffic pollution measurement 



Source: Madrid Air quality monitoring network urban stations of traffic pollution measurement.

Furthermore, given the weight of NO₂ emissions from public transport (buses 16.4% and taxis 14.8%), a significant portion of the set of measures proposed is designed to promote technological renewal to cleaner fuels. Taking action on public transport will have very positive effects on improving air quality due to the volume of emissions it represents, as well as for the effect it has as an example.

5. NEW MEASURES FOR THE 2011-2015 PERIOD

Bearing in mind that many of the measures put into effect in prior years will continue in force, and thus will continue to generate positive effects on the air quality, in order to ensure continued reductions in polluting emissions, the Council is aware that the ability to take action must be reinforced. Therefore, this Plan includes a set of measures that either strengthen measures already in force, in particular those covered by the 2006-2010 Local Air Quality Strategy, or are entirely new measures.

In addition, given that the improvement in air quality in a city like Madrid requires a wide range of actions in many areas, it is evident that the fight against pollution must account for policies and measures promoted by the various jurisdictions, whether they be EU-wide, nationwide, regional or local in scope. In this respect, this Plan is framed within that context, thus the measures it includes form a part of the set of actions developed by the various jurisdictions cited.

From this perspective, by reason of competence, it is critical to point out that there are 70 measures forming the basis of this Plan, which are driven by Madrid City Council, and which we call "municipal measures". Along with them, due to their particular influence on the reduction of emissions from a sector as relevant as transport, the Plan also cites and describes 8 measures driven by other entities and administrations.

5.1. Focus and classification of measures

In order to ensure that Plan objectives will be met (see heading 1.2.2), and bearing in mind the conditions of the challenge described at heading 4.2, in writing the 70 measures driven by the Council, a comprehensive and inclusive approach was chosen. Specifically, the approach applied is comprehensive to the extent that actions regarding all main areas and activities that may be able to influence air quality are included within the 70 measures, with special emphasis being given to the most relevant pollution sources.

In this regard, it is worth noting that the Plan emphasizes the mobility sector. Given that traffic is the main cause of emissions, particularly nitrogen oxides (NO_x), 42 of the 70 measures (i.e., 60%) are meant to directly or indirectly reduce pollution from this sector. To this end, a set of measures centred only on reducing private traffic was not chosen. Instead, the choice was made to continue along the line that has had such good results to date, by encouraging a new model of more sustainable mobility. The intention is to make the demands of private mobility compatible with a city like Madrid, without restricting its ability to grow, by minimizing its environmental impact in terms of air pollution.

This planning is the reasoning behind the idea that measures covering the always complex challenge of mobility include technological solutions along with actions meant to cover items of a structural nature. Therefore, along with the 4 measures aimed at promoting cleaner technologies and cleaner fuels, there are 8 measures designed to deter and restrict use of private motor vehicles, 13 measures to promote a more efficient and sustainable public transport, 3 to improve other passenger transport, 6 measures to support alternative means of mobility, 3 to promote more sustainable commercial transport and another 3 to increase

research and investigation concerning sustainable transport and mobility. At the same time, the set of measures responds to an inclusive principal in that its measures are not limited to direct actions on emission sources, but also include actions to achieve and integrate considerations relative to air quality in other municipal policies ranging from taxation, city planning to education.

Continuing with this same inclusive perspective, the 70 measures not only include actions to be implemented by the Council itself, but also provide for initiatives that will be acted upon by private entities. In this regard, particular attention is paid to cooperation between the public and private sectors, with actions that include cooperation agreements between governmental entities and commercial associations, and even voluntary agreements with companies and those relative to private citizens.

The 70 measures are grouped into 9 classifications as follows:

NEW MEASURES FROM MADRID CITY COUNCIL 2011-2015	
SCOPE	NO. OF MEASURES
1. TRANSPORT AND MOBILITY SECTOR	42
1-1. DETERRENCE TO AND RESTRICTION OF THE USE OF PRIVATE MOTOR	
1-2. PROMOTION OF CLEANER TECHNOLOGIES AND CLEANER FUELS	
1-3. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC	
1-4. OTHER MEASURES FOR IMPROVING PASSENGER TRANSPORT	
1-5. PROMOTION OF ALTERNATIVE MEANS OF MOBILITY	
1-6. PROMOTION OF MORE SUSTAINABLE COMMERCIAL TRANSPORT	
1-7. PARKING LOTS	
1-8. ROAD MAINTENANCE ACTIONS	
1-9. RESEARCH AND INVESTIGATION ON THE SUBJECT OF SUSTAINABLE TRANSPORT AND MOBILITY	
2. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL SECTOR	4
3. CONSTRUCTION AND DEMOLITION WORK	2
4. CLEANING AND WASTE MANAGEMENT	4
5. URBAN PLANNING	4
6. NATURAL HERITAGE	2
7. STRENGTHENING INTEGRATION OF CONSIDERATIONS RELATIVE TO AIR QUALITY IN MUNICIPAL POLICIES	4
8. MONITORING, FORECASTING AND INFORMATION SYSTEMS	3
9. TRAINING, INFORMATION AND AWARENESS	5
TOTAL	70

Specifics regarding measures driven by other national and regional entities and administrations having a significant effect on the transport sector are detailed in Annex III.

MEASURES FROM OTHER NATIONAL AND REGIONAL ENTITIES AND ADMINISTRATIONS	
SCOPE	NO. OF MEASURES
- PROMOTION OF MORE EFFICIENT AND SUSTAINABLE INTERCITY, METROPOLITAN AND PUBLIC TRANSPORT	7
- BARAJAS AIRPORT PLAN	1
TOTAL	8

5.2 Cost of the measures driven by the Council

Total cost of Plan measures proposed by the Council for the 2011-2015 period is € 161,849,768 not including measures or actions financed privately.

The annual distribution, according to the time scope of the Plan (see heading 1.2.2) is as follows:

YEAR	2011	2012	2013	2014	PLAN TOTAL
TOTAL PER YEAR	42,178,270	43,829,073	30,681,614	41,800,212	161,849,768

Traffic is the main sector responsible for polluting emissions, as well as the one that it is essential to reduce, to a large extent, in order to achieve the air quality objectives for NO₂ concentration no later than January 1, 2015, 95% of the planned expenses (i.e., € 153,729,618) is designated for actions directly related to mobility and distributed as follows:

- DETERRENCE AND RESTRICTION OF THE USE OF PRIVATE MOTOR VEHICLES	10,728,415
- PROMOTION OF CLEANER TECHNOLOGIES AND CLEANER FUEL	166,772
- PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT	126,089,263
- MANAGEMENT MEASURES FOR IMPROVING PASSENGER TRANSPORT	150,000
- PROMOTION OF ALTERNATIVE MEANS OF MOBILITY	13,160,168
- IMPROVEMENTS TO ROAD MAINTENANCE TECHNIQUES	3,000,000
- RESEARCH AND INVESTIGATION ON THE SUBJECT OF SUSTAINABLE TRANSPORT AND MOBILITY	435,000
TOTAL TRANSPORT AND MOBILITY SECTOR	153,729,618

Regarding the other sources within the municipal scope that have a greater impact on NO_x emissions⁸, residential, commercial and institutional combustion and waste water treatment, an amount of € 6,474.503 has been earmarked to be distributed as follows:

RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL SECTOR	1,460,000
CLEANING AND WASTE MANAGEMENT	5,014,503
TOTAL	6,474,503

Lastly, an amount of € 1,645,647 is assigned to measures comprising actions to drive integration of items related to air quality within other policies, through ongoing improvement of the air quality monitoring, forecasting and information system, up to measures related to training, information and awareness.

As stated above, the total cost described does not include actions financed by other public entities and administrations that would exceed the competence framework of this Plan. Nevertheless, cost-related information is included in the description of the 8 measures that are not exclusively municipal⁹, for informational purposes and due to their relevance in improving air quality within the City of Madrid.

⁸ The third relevant source is aviation.

⁹ Madrid City Council is part of some of these entities, such as the Regional Transport Consortium.

Lastly, it is important to point out in this heading that, although investment from the private sector is not shown due to difficulty in estimating its amount, this by no means indicates the amount is smaller. On the contrary, among the things making it possible for Madrid to advance towards a more sustainable urban model, the extensive and growing commitment from this sector plays a large and critical role in improving environmental conditions and competitiveness. In this regard, and as far as polluting emissions are concerned, it is important to reiterate the significant effort and investment being made by self-employed taxi drivers and transport concessionaires, through energy companies and those marketing and distributing goods, as well as in other very diverse areas of activity, to make their mobility more efficient and less polluting.

6. DESCRIPTION OF THE MEASURES DRIVEN BY THE COUNCIL

2011-2015 MUNICIPAL MEASURES REPORT

1. TRANSPORT AND MOBILITY SECTOR

1.1. DETERRENCE AND RESTRICTION OF THE USE OF PRIVATE MOTOR VEHICLES

1. - Implementation of a low emission zone (LEZ)
2. - New areas of residential priority and restricted vehicle traffic areas within the LEZ
3. - New completely pedestrianized areas
4. - Reduction of road capacity on LEZ routes
5. - Implementation of a separate RPS rate within Low Emission Zones in 2012
6. - Expansion of the RPS schedule in 2012
7. - Implementation of an intelligent RPS in 2013
8. - Create a regulation prohibiting parked vehicles from keeping motors running

1.2. PROMOTION OF CLEANER TECHNOLOGIES AND CLEANER FUELS

9. - Develop an electric vehicle Strategic Implementation and Promotion Framework (2011-2016)
10. - Consolidate and expand the supply points for cleaner fuels
11. - Consolidate and expand government measures to promote the use of cleaner fuels and cleaner technologies
12. - Consolidation and strengthening the renewal of the municipal fleet of vehicles to cleaner technology

1.3. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT

1.3.1. Taxi

13. - New schedule regimen
14. - Drive to renew fleet to cleaner technology

1.3.2. City buses (EMT)

15. - Get 100% of the EMT City Bus Fleet serving within the Low Emission Zone to incorporate clean technology
16. - Expand the number of alternative supply points at EMT centres
17. - Promotion of best practices and use of new technology for more efficient use of EMT buses
18. - Reserved platform for buses
19. - Complete transversal line network
20. - Implement lines with special vehicles
21. - Suppress barriers, make access safe and optimize use of space within the bus stop infrastructure
22. - Increase conventional bus lanes with separator
23. - New payment systems (mobile, Internet, etc.)
24. - Improve information to passengers
25. - Integrated public transport interpretation centre

1.4. MANAGEMENT MEASURES FOR IMPROVING PASSENGER TRANSPORT

26. - Management tools for special use of conventional transport services and school transport services
27. - Parking and services management plan for Occasional Transport and tour buses

1.5. PROMOTION OF ALTERNATIVE MEANS OF MOBILITY

28. - Promotion of the use of carpooling and carsharing
29. - Promotion of the use of bicycles
30. - Promote walking
31. - Promotion of the use of motorcycles
32. - Promotion of alternative school mobility
33. - Promotion of use of public transport for mobility to work

1.6. PROMOTION OF MORE SUSTAINABLE COMMERCIAL TRANSPORT

34. - Promotion of voluntary agreements with the private sector to push renewal of commercial and delivery fleets to cleaner technology
35. - Offer mobility advantages to commercial and delivery vehicles with cleaner technology
36. - Research sustainable loading and unloading

1.7. PARKING LOTS
37. - Promotion of public/private cooperation for construction of resident and park-and-ride parking lots
1.8. ROAD MAINTENANCE TECHNICAL IMPROVEMENT ACTIONS
38. - Drive for sustainable road surfacing
39. - Use of less contaminating paint for markings
1.9. MEASURES FOR RESEARCH AND INVESTIGATION ON THE SUBJECT OF MOBILITY AND SUSTAINABLE PUBLIC TRANSPORT
40. - Mobility Roundtable
41. - Research and projects in progress
42. - Specific measures for environments in areas with records of high pollution
2. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL SECTOR
43. - Subsidize replacement of boilers that burn fuel oil
44. - Promotion of housing energy renovation
45. - Madrid City Council Energy Optimization Plan Drive
46. - Voluntary agreements with the private sector to increase energy efficiency and savings
3. CONSTRUCTION AND DEMOLITION WORK
47. - Promotion of best practices for reducing air pollution during the construction and demolition of buildings
48. - Promotion of best practices in mobility infrastructure projects
4. CLEANING AND WASTE MANAGEMENT
49. - Pneumatic waste collection
50. - Reduce pollution via street cleaning
51. - Renew street cleaning fleet to new technology
52. - Renew waste water purification equipment motors to new technology
5. URBAN PLANNING
53. - Integrate items concerning air quality into the new General Plan for Urban Zoning
54. - Roadway system review and development
55. - City centre revitalization measures
56. - Eco neighbourhoods: towards a more global idea of sustainability
6. NATURAL HERITAGE
57. - Consolidate the contribution to the fight against air pollution of the natural heritage of the city
58. - Reduce polluting emissions from maintenance tasks in green areas
7. STRENGTHENING INTEGRATION OF CONSIDERATIONS RELATIVE TO AIR QUALITY IN MUNICIPAL POLICIES
59. - Improve municipal governance
60. - Green public contracting drive
61. - Promotion of sustainable events
62. - Promotion of more sustainable sports activities and infrastructures
8. MONITORING, FORECASTING AND INFORMATION SYSTEMS
63. - Improve the air quality monitoring, forecasting and information system of Madrid
64. - Improve data control and analysis applications within air quality forecasting and information systems
65. - Develop air quality indicators within Madrid's Health Monitoring System of Environmental Factors
9. TRAINING, INFORMATION AND AWARENESS
66. - Train municipal service personnel on sustainability
67. - Offer training on air quality at schools
68. - Training to promote sustainable mobility
69. - New comprehensive municipal information model on sustainable mobility alternatives in the City of Madrid
70. - Promotion of citizen awareness of the Air Quality Plan

1. TRANSPORT AND MOBILITY SECTOR

1.1. DETERRENCE AND RESTRICTION MEASURES ON THE USE OF PRIVATE MOTOR VEHICLES

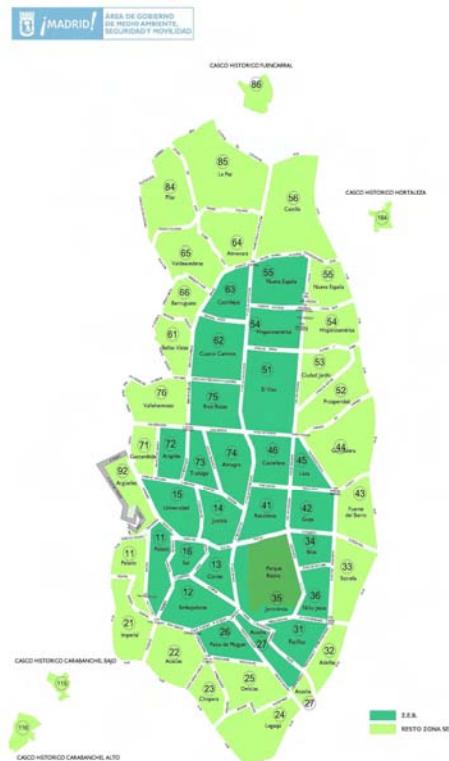
Nº 1. Implementation of a Low Emission Zone (LEZ)

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

The purpose of establishing a Low Emission Zone (LEZ) in Madrid is to demarcate a region within the city with the most traffic and highest levels of nitrogen dioxide (NO_2) in order to make it the focus of specific measures to reduce emissions from traffic.

The vehicle traffic trips and emissions classification study, conducted by Madrid City Council, advises against actions promoting general restrictions on the circulation of motor vehicles based on their age, due to the inefficiency of this method. Thus, this study, a first of its kind, has determined:

- That, of all cars circulating in Madrid, those that run on diesel generate 98.5% of all NO_2 emissions, because 68.7% of journeys correspond to diesel vehicles, and
- That 96% of diesel cars are less than 10 years old.



The study concludes that the types of vehicles circulating in Madrid condition the limits of measures to be adopted to reduce their emissions, and advises against those restricting traffic based solely on the age of the vehicle and emissions percentage, because it would affect almost 70% of private motor vehicle traffic in the city. Therefore, the study determined that traffic pollution reduction actions should be focused on general deterrence of automobile usage, with a stronger focus inside the LEZ on measures already in force as part of the municipal mobility policy (parking restrictions, areas of residential priority, pedestrianization, priority for cleaner methods, etc.).

The LEZ borders have been set by environment and mobility experts based on the ISO pollution study conducted by the University of Alcalá de Henares and the circulating vehicle classification study cited previously.

The Low Emission Zone includes all parts of every one of the following neighbourhoods. Embajadores (12), Cortes (13), Justicia (14), Universidad (15), Sol (16), Palos de Moguer (26), Pacífico (31), Ibiza (34), Jerónimos (35), Niño Jesús (36), Recoletos (41), Goya (42), Lista (45), Castellana (46), El Viso (51), Cuatro Caminos (62), Castillejos (63), Arapiles (72), Trafalgar (73), Almagro (74) and Ríos Rosas (75); and by portions of the Palacio (11), Atocha (27), Hispanoamérica (54) and Nueva España (55) neighbourhoods.

The cited Zone is in turn bordered by the following internal perimeter: Plaza de Castilla, Mateo Inurria, Platerías, Caídos de la División Azul, Avenida de Pío XII, Plaza del Perú, Príncipe de

Vergara, Plaza de la República Dominicana, Príncipe de Vergara, Plaza República del Ecuador, Príncipe de Vergara, María de Molina, Francisco Silvela, Plaza Manuel Becerra, Doctor Esquerdo, Plaza Conde de Casal, Doctor Esquerdo, Pedro Bosch, Méndez Álvaro, Bustamante, Ferrocarril, Glorieta Santa María de la Cabeza, Embajadores, Glorieta de Embajadores, Ronda de Toledo, Glorieta Puerta de Toledo, Gran Vía de San Francisco, Plaza de San Francisco, Bailén, Plaza de España, Princesa, Alberto Aguilera, Blasco de Garay, Cea Bermúdez, Bravo Murillo, Glorieta de Cuatro Caminos, and Bravo Murillo. Delimiting the LEZ has given Madrid a new planning tool for improving air quality within the city.

DUE DATE

Year 2012

ESTIMATED COST

- Signage estimated cost € 25,000

POSITIVE IMPACT GENERATED

- Deterrent for the use of private motor vehicles within the LEZ.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Actions implemented within the LEZ.

Nº 2. New Areas of Residential Priority and Restricted Vehicle Traffic Areas within the Low Emission Zone (LEZ)**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Since the year 2004, Madrid City Council has been defining areas within the city where only residents, public transport, emergency services, motor cycles and vehicles loading and unloading are permitted access (during specific hours of the day). Zones denominated Areas of residential priority (ARPs), are international benchmarks and have shown a high degree of efficiency in promoting more sustainable and pedestrian-friendly mobility. They decrease pollution, reduce noise and improve conditions, creating a more comfortable environment for residents, businesses and visitors. There are currently three ARPs. They are located in the neighbourhoods of Letras, Cortes and Embajadores, and cover 155 hectares, which is home to more than 60,000 residents.

Considering that the implementation of ARPs entails a significant investment in automated access control systems, as well as management and control costs, use of this type of tool will be increased in coming years based on funds available, with priority given to implementation within the Low Emission Zones (LEZ) cited in Measure 1. To that end, a study will be made of formulas that will enable the best cost efficiency, to be applied in the following neighbourhoods: Justicia, Universidad and Palacio.

DUE DATE

Year 2012-2015

ESTIMATED COST

- € 2,000,000

POSITIVE IMPACT GENERATED

- Deterrent for the use of private motor vehicles within the LEZ.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Restricted areas implemented.

Nº 3. New completely pedestrianized areas in the Low Emission Zones (LEZ)**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

In the transformation process carried out in the City of Madrid since 2003, a commitment has been made to the philosophy allowing incorporation of a new urban mobility culture, one focused on the pedestrian. Among other things, this model change was made possible by completely pedestrianizing specific streets and public spaces in our capital, despite difficulties entailed in implementing them within a highly-compact and consolidated city. Specifically, during the period from 2006 to 2010, the pedestrianized surface area in the city centre has been increased 32.7%, going from 10.31 to 14 hectares, to which the more than 155 hectares of the Areas of residential priority would be added.

Not to mention the recovery for pedestrian use made possible by the underground works associated with the west branch of the M30 motorway, examples of this pedestrianization strategy in the central hub of the city¹⁰, where certain arterial streets and plazas were entirely pedestrianized (Calle Arenal, Calle Fuencarral, Calle de Huertas, Plaza de Callao) or the expansion of pavements (Serrano, Puerta del Sol), which reached a total surface area of 12 hectares in 2009. One piece of information that illustrates the contribution of pedestrianization initiatives to sustainable mobility within the city is the decrease in the number of private motor vehicles accessing Calle Fuencarral from 10% to 4.5% after it was pedestrianized, and the 3% decrease in traffic on Calle Fuencarral and alternate routes.

For the purpose of using the advantages contributed by complete pedestrianization, particularly its effect on reducing traffic emissions, and in line with the goal sought in implementing Low Emission Zones (LEZ) on which the majority of the measures comprising part of the municipal mobility policy are intended to be focused, the goal of this measure is to continue the drive to new completely pedestrianized areas, so that pedestrians may continue to recover space formerly used by vehicles. To this end, after appropriate feasibility studies, in coming years pedestrianization projects will be carried out on streets that, due to their location and high amount of commercial and cultural traffic, could clearly be benefitted, as is the case for Carretas, Cava de San Miguel, Travesía del Arenal, Plaza de Celenque or the surroundings of Conde Duque, which total more than 7,000 square meters.

DUE DATE

2013-2015

ESTIMATED COST

- € 600,000

POSITIVE IMPACT GENERATED

- Reduction in the use of private motor vehicles.
- Reduction of polluting emissions from traffic.
- Recovery of the area for alternative means of mobility.
- Promote the use of public transport.
- Improvement of the environment and quality of life for residents.

TRACKING INDICATOR

- Projects drafted.
- Square meters pedestrianized.

¹⁰ Central hub of the city refers to the seven main districts in the centre of Madrid: Centro, Arganzuela, Retiro, Salamanca, Chamartín, Tetuán, and Chamberí.

Nº 4. Reduction in road capacity within Low Emission Zones)**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

For years Madrid City Council has been implementing many measures meant to recover public space for residents using actions that, in many cases, implied reduced road capacity and, as a result, diminished use of private motor vehicles in favour of other, more sustainable and cleaner methods of mobility, such as cycling or walking, with the consequent push for the use of public transport. An example of this is the actions implementing complete pedestrianization (see measure 3) or the expansion of pavements carried out at Calle Serrano, Puerta del Sol or Paseo de Recoletos and Plaza de Colón.

For the purpose of taking advantage of the opportunities offered by reducing road capacity as a formula for reducing air quality polluting emissions from traffic and, in line with the goal sought by the implementation of a Low Emission Zone (LEZ) on which the majority of the measures comprising part of the municipal mobility policy are intended to be focused, this measure consists of promoting reductions in road capacity within the LEZ. To this end, studies will be conducted in the years to come on calle Mayor, Carrera de San Jerónimo and calle Goya on the implementation of pavement expansion projects with a total surface area greater than 5,000 square meters. Along with the pavement expansion actions, the temporary pedestrianization of specific roads will be promoted by extending this measure, already in progress within the city, as an interim solution for traffic restriction.

DUE DATE

2011-2015

ESTIMATED COST

- € 1,400,000

POSITIVE IMPACT GENERATED

- Deterrent to use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.
- Recovery of space for alternative means of mobility (walking).
- Promote the use of public transport.
- Improvement of the environment and quality of life for residents.

TRACKING INDICATOR

- Projects designed.
- Square meters of pavements expanded.

Nº 5. Implementation of a separate Regulated Parking System (RPS) rate within Low Emission Zones (LEZ)**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

From its implementation in Madrid in 2002 up to its current setup in 2006, the Regulated Parking System (RPS) has established itself as an effective mobility management tool, and as a particular deterrent to the use of cars. It has contributed significantly to controlling parking, reducing traffic within the city and decreasing air quality polluting emissions. Mobility surveys show that citizens credit the RPS, along with increased and improved public transport, as the main reasons they do not use or have stopped using cars within the city, and now opt for public transport or other alternative forms of mobility instead.

In this context, the goal of this measure is to take advantage of the potential of RPS as a tool for deterring the use of cars and, consequently, as a facilitating element in pollution reduction.

To this end, in line with the goal sought to implement the Low Emissions Zone, on which the majority of the measures comprising part of the municipal mobility policy are intended to be focused, a new RPS rate will be implemented within the LEZ. The purpose of this is to send a clear message to citizens that measures designed to deter the use of cars within this zone are being strengthened as a basic condition for reducing pollution.

Setting a separate rate that is 10% higher within the physical boundaries of the LEZ and increasing the environmental function of the Service within this zone will contribute to improving the environment for residents and bettering their quality of life. The additional revenue that may be generated by this measure is estimated at between 3.5 and 4 million Euros per year, which would be used for sustainable mobility actions.

DUE DATE

2012

ESTIMATED COST

- Signage estimated cost € 25,000

POSITIVE IMPACT GENERATED

- Greater deterrence to the use of cars.
- Promotion of more sustainable means of mobility.
- Reduction of emissions from traffic.
- Improvement in the environment for residents.

TRACKING INDICATOR

- Implementation of a separate RPS rate within the LEZ.

Nº 6. Longer scheduled hours for the Regulated Parking System (RPS)

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Per the provisions of Measure 5, in order to best take advantage of the potential of the Regulated Parking System (RPS) as a tool in deterrence, and consequently as a facilitating element in pollution reduction, the goal of this measure is to strengthen use of this tool.

To that end, this measure consists of expanding the RPS schedule by one hour, starting in 2012, within all city zones where the service is implemented. By extending the scheduling potential of this traffic control tool, its capacity as a traffic deterrent will be strengthened and this will entail a consequent pollution reduction.

At the same time, residents will benefit from the measure in that the conditions of their environment will improve, as well as availability of space in their streets. Revenue that may be generated by this measure would be directed toward sustainable mobility actions.

DUE DATE

2012-2014

ESTIMATED COST

- € 6,678,415

POSITIVE IMPACT GENERATED

- Greater deterrence to the use of cars.
- Promotion of more sustainable means of mobility.
- Reduction of emissions from traffic.
- Improvement in the environment for residents.

TRACKING INDICATOR

- Expanded RPS schedule.
- Reduced traffic.
- Pollution reduction.

Nº 7. Implementation of Intelligent RPS**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Per the provisions of Measure 5 regarding the efficacy of the Regulated Parking System (RPS) as a tool to control and deter the use of cars, and based on the experience acquired over the years it has been used, Madrid City Council wishes to take full advantage of the potential of this service to promote more sustainable and cleaner mobility.

To this end, the goal of this measure is to gradually introduce the most modern information and communication technologies into the RPS, in order to be able to improve the quality of service for users while making it more able to adapt to the requirements of vehicle control. This flexibility will enable better control of the service in that rates may be altered according to criteria like traffic volume, vehicle technology, pollution level, etc. Along these lines the RPS will also be able to act as a parking control and regulation tool according to the pollution requirements in various areas within the city, in which case it will be an essential tool for traffic control as well as air quality policy.

The Intelligent RPS will be gradually implemented as existing contracts within the city expire and will grow progressively within the city, both in the territorial area which the service covers today, as well as to possible extensions that may be recommended after appropriate studies are conducted.

DUE DATE

Year 2013-2015

ESTIMATED COST

- There should not be an increase with respect to the current cost of the service.

POSITIVE IMPACT GENERATED

- Deterrent to use of private motor vehicles.
- Promotion of cleaner vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Areas with Intelligent RPS.

Nº 8. Prohibition on keeping motors running in parked vehicles**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

As traffic is the main source of air quality pollution within the city, it is essential to continue to implement measures within this sphere of activity that tend to improve compatibility between socioeconomic mobility needs and emissions reduction.

In this sense, a comprehensive approach on sustainable mobility requires a wide range of actions on the matter, because it is a proven fact that positive results in the fight against pollution are the fruit of many and varied policies and measures, from the structural and technological to those promoting best practices. Thus, the measure being proposed, to prohibit keeping the motor of a vehicle running when it is parked, is intended to respond to a

bad practice which, although not a widespread problem within the City of Madrid, has a direct effect on pollution and is not an essential activity. Therefore, it is advisable to eliminate it. To this end, a law shall be passed making it a requirement to turn off the motor of a car that is parked for more than two minutes, even if the driver remains inside. Likewise, rules shall be established for vehicles that are exempt. The measure shall be written as a municipal ordinance.

DUE DATE

2012

ESTIMATED COST

- None.

POSITIVE IMPACT GENERATED

- Reduction of emissions from traffic.
- Noise pollution reduction.
- Improvement in the environment for residents.

TRACKING INDICATOR

- Regulation of the prohibition.

1. TRANSPORT AND MOBILITY SECTOR

1.2. PROMOTION OF CLEANER TECHNOLOGIES AND CLEANER FUELS

Nº 9. Promotion of electric mobility

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In recent years, and particularly since Madrid was selected as one of three cities in Spain for the implementation of the Electric Mobility Project (MOVELE) promoted by the Ministry of Industry, Tourism and Commerce, a significant push for electric mobility has been started. A great example of this is that in July of 2011 Madrid already had a network of 246 electric charging points, both publicly and privately owned. 40 stations have already been installed on public roads to favour so-called on-demand charging. At the same time, measures such as the exemption from the Regulated Parking System or Road Tax credit have been implemented to promote the purchase of rechargeable electric and hybrid vehicles. Public subsidies from the State to purchase rechargeable electric and hybrid vehicles must be added to all this.

In order to keep up the momentum in this drive for electric mobility, Madrid City Council will develop a Strategic Implementation and Promotion Framework within the city (2011-2016), in cooperation with key sectors that will create the local action plan on the matter, which will allow validation of future actions to be taken by the City of Madrid to promote and generalize electric mobility:

- Research a process of municipal “joint procurement” for purchasing vehicles jointly with businesses, which would allow unification of the demand for electric vehicles within the City of Madrid, enabling demand to be increased to critical mass and pushing manufacturers to give the City of Madrid priority as a customer.
- Maintain and extend tax incentives for mobility up to the limits set by current national law.
- Promotion of exemplary projects within the urban merchandise distribution sector and in public surface transport (taxis and buses).
- Promotion of charging point infrastructure via the MOVELE Project (promoted by IDAE, and in the case of the City of Madrid, until December of 2012): 280 charging points via the

- MADEV-MADrid Electric Vehicle project (from the ELENA programme promoted by the European Investment Bank, for the purpose of encouraging the implementation of electric mobility, until November 2013).
- Participate in projects to exchange knowledge, experience and best practices on the subject of electric mobility in Europe and internationally. For example: project EVUE as part of the URBACT II programme (until December of 2012).
 - Municipal electric mobility drive via consolidation of environmental criteria in public contracting and completion of the installation of 61 electric charging points in car parks managed by Madrid Movilidad to favour the use of electric vehicles in the City of Madrid.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 166,772

POSITIVE IMPACT GENERATED

- Promotion of sustainable mobility.
- Reduction of air polluting emissions.

TRACKING INDICATOR

- No. of charging points installed in the city.
- No. of electric vehicles licensed in the city.

Nº 10. Consolidation and expansion of the supply points for cleaner fuels**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The use of fossil fuels by motor vehicles is one of the main sources of both particulate and NO_x emissions. The promotion of vehicles driven by cleaner technologies and cleaner fuels, which Madrid City Council has implemented in recent years, comes accompanied by a strategy aimed at creating an appropriately wide and accessible network of supply points. As a result of this policy, Madrid now has 36 stations providing alternative fuels (LPG, biofuels, CNG) and more than 240 electric vehicle charging points.

The objectives for this measure are:

- To reduce pollution from vehicular traffic via promotion of cleaner vehicles.
- To enable citizens and businesses to use cleaner vehicles by creating an appropriate refuelling network.

The lines of action are as follows:

- To push for agreements with companies supplying clean fuels and contracting formulas, such as granting the use of public space for installation of supply points.
- To expand the electric charging point network (see Measure 9).
- To promote installation of supply points by private enterprises in order to supply their fleets.
- To increase the number of alternative fuel supply points at municipal facilities and to study the feasibility of their use by the public.
- To formulate appropriate urban zoning conditions for incorporating these new supply points into the city.
- To create awareness campaigns concerning the alternative fuel supply point infrastructure and electric vehicle charging points within the City of Madrid.

DUE DATE
2011-2015
ESTIMATED COST
- Private financing.
POSITIVE IMPACT GENERATED
- Promotion of vehicles using cleaner technologies and cleaner fuels. - Pollution reduction.
TRACKING INDICATOR
- Number of alternative fuel supply facilities. - Number of electric vehicle charging points.

Nº 11. Consolidation and expansion of government measures to promote the use of cleaner technologies and cleaner fuels

DESCRIPCIÓN DE OBJETIVOS, MEDIOS Y ACCIONES

The goal of this measure is to use tax incentives to consolidate and expand the line of action that has been implemented by Madrid City Council during recent years, in order to favour the development and use of cleaner technology and cleaner fuels, within the limits established by the legal framework of national law. This is the case, for example with exemptions and credits provided for in the Motor Vehicle Tax (IVTM) and the Regulated Parking System Tax Ordinance.

To this end, the Council will proceed to study and review the tax provisions to which benefits for promoting cleaner technologies and cleaner fuels may be added or increased. Meanwhile, the Council will continue proposing reforms to the State legal framework, in order to improve tax benefits for the technologies and fuels most suitable for reducing air quality pollution.

DUE DATE

Year 2011-2015

ESTIMATED COST

- No additional cost.

POSITIVE IMPACT GENERATED

- Deterrent to use vehicles that cause more pollution.
- Promotion of cleaner technologies and cleaner fuels.
- Reduction of traffic pollution.

TRACKING INDICATOR

- Vehicles benefited by tax measures.

Nº 12. Consolidation and strengthening renewal of the municipal fleet of vehicles to cleaner technology

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

As of July 2011, Madrid City Council fleets of vehicles has more than 1,700 vehicles that meet the requirements for being considered green vehicles, due to using alternative fuels like CNG, LNG, electricity and bioethanol, or which have obtained qualification "A" in the IDAE (Energy Savings and Diversification Institute) energy labelling system. It is important to point out that there are 904 vehicles belonging to the municipality that run on Compressed Natural Gas, that there are 201 hybrid vehicles, and that Madrid City Council already has a fleet of 112 electric vehicles. At the same time, during recent years a process of fleet rationing has been used, which further optimized the number of vehicles and the service requirements.

This measure proposes to consolidate this optimization and technological renovation process of the municipal fleet, using a new drive that would allow the presence of cleaner vehicles to continue to increase. Priority use of vehicles having lower air quality polluting emissions will be promoted from the various municipal services. Special emphasis will be put on nitrogen oxides (NO_x) and particulates, which would favour electric vehicles, hybrids and those using Liquid Natural Gas (LNG), Compressed Natural Gas (CNG) and bioethanol.

This measure will be implemented as follows:

- Public contracts, improvements to fuel and technology selection criteria and the introduction of new vehicle use optimization criteria.
- Development of a study that would enable the fleet of vehicles to be optimized, by attempting to better adjust the number of vehicles to the actual requirements of the various municipal services, including measures concerning fleet management (logistics, scheduling) that could optimize fleet operations.
- Better coordination for shared use of the municipal fuel supply infrastructure.
- Specific technological renovation actions for large fleets (Municipal Transport Company - EMT), Municipal Cleaning Service (see specific Measures). The same for fleets that, although smaller, are used intensively. This is the case, for example, with municipal cranes, which already have units using alternative technology like CNG. For the purpose of ending renting in 2013, vehicles that meet the EURO V standard at least, and which use alternative fuels, according to technology existing at the time of renewal, will be added, with priority given to CNG and hybrids.

DUE DATE

2011-2015

ESTIMATED COST

- Internalization of contracting costs.
- See the specific file for each fleet (for example, EMT).

POSITIVE IMPACT GENERATED

- Improvement in the sustainability of the municipal fleet.
- Reduction of polluting emissions (NO_x , Particulates and CO_2).

TRACKING INDICATOR

- Progress in the number of vehicles considered Green Vehicles and percentage with respect to all fleet vehicles.

1. TRANSPORT AND MOBILITY SECTOR

1.3. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT

1.3.1. TAXI SECTOR

Nº 13. New taxi schedule regimen

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Although implementation of a new schedule regimen for rendering Taxi Service responds to an economic streamlining needed in the sector, its effects in terms of pollution reduction also contribute to making this measure clearly justifiable. In effect, taking into account the contribution of emissions from the taxi sector to total air quality polluting emissions within the city (13.6% of NO_x from traffic), the fact of achieving a reduction in the number of hours that taxi vehicles are active translates to fewer miles travelled by all vehicles in general and, consequently, a reduction of emissions for this sector.

Therefore, the goal of this measure is to limit the maximum amount of time taxis offer service, from Monday through Friday, without diminishing the quality of service offered as a whole, via modification of the ordinance regulating the Service. Control of the schedule limits will be managed with the taxi meter.

DUE DATE

2011

ESTIMATED COST

- The cost of modifying taxi meters is the responsibility of the license owners.

POSITIVE IMPACT GENERATED

- Reduction of emissions from the taxi sector.

TRACKING INDICATOR

- Regulation of the schedule limit.

Nº 14. 14 Drive to renew taxi fleet to cleaner technology and cleaner fuels
DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Madrid City Council is conscious of the fact that the taxi sector is an essential public service within the framework of sustainable mobility, and for years now, in cooperation with the sector and private entities related thereto, it has been promoting various initiatives tending to facilitate technological renewal, seeking to minimize the impact of its status as the source of 13.6% of NO₂ originating from traffic. No doubt this emissions rate is due to the fact that most of the vehicles now in service are, on average, less than 6 years old, which would make diesel the most highly-used fuel. Due to the promotion of new technology and expansion of the alternative fuel supply network within the city, the sector now has services available for alternative fuel supplies (CNG and LPG) and electric charging points, as well as for taxi vehicle models, extensive enough to enable acceleration of the renewal process. This has enabled the alternative technology renewal rate to rise, in just two years, from 100 to 46% in 2011.

Based on this initial situation, the goal of this measure is to accelerate this rate of renewal to cleaner technology to further reduce both NO_x and particulate emissions. To this end, the following actions are proposed:

- Create a new line of municipal subsidies to promote cleaner technology.
- Incorporate CO₂ and NO_x emissions limits into official taxi vehicle approval.
- Establish an operating permit expiration date for taxis that exceed certain NO_x and CO₂ emissions limits.
- Grant mobility advantages to taxis with cleaner technology.
- Promote electric taxi example projects.

DUE DATE

2011-2015

ESTIMATED COST

- € 1,732,000

POSITIVE IMPACT GENERATED

- Reduction in the number of diesel-powered taxis and a corresponding decrease in NO_x and particulate emissions.
- Increased market niche for new technology and fuels.

TRACKING INDICATOR

- Percentage of renewed taxis with cleaner technology and cleaner fuels (electric, hybrid, CNG, LNG, etc.).

1. TRANSPORT AND MOBILITY SECTOR**1.3. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT****1.3.2. EMT CITY BUS**

Nº 15. Get 100% of the EMT City Bus Fleet serving within the Low Emission Zone to incorporate clean technology

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In recent years the Municipal Transport Company (EMT) has made an intense effort towards technological renewal of its fleet, with special emphasis on the reduction of polluting emissions. As a result of this effort, there are no longer any fleet vehicles powered by conventional fuel: 574 are powered by CNG, 5 by bioethanol, 20 are electric and 1,666 run on biodiesel.

Based on this initial situation, the goal is to continue to take advantage of technological renewal in order to further improve emissions reductions and, per the objective sought in implementing Low Emission Zones (LEZ), wherein a more intense focus is placed upon pollution reduction measures. The goal of this measure is to get all 1,338 buses servicing the LEZ renewed to clean emissions technology that qualify them to be designated as Enhanced Environmentally-friendly Vehicle (EEV) at minimum.

Currently, 51% of these vehicles fit those criterion. This measure would mean bringing that figure to 100%. All buses servicing that zone would be electric, or CNG, or meet the standards required to be designated Euro V, EEV or be fitted with particulate filters or catalytic converters. In other words, buses currently at Euro IV standards or lower would not be allowed to run in the zone without a particulate filter or catalytic converter installed.

To that end, the following actions will be taken:

- - Replace 307 buses (265 Euro II and 32 Euro III biodiesel, as well as 10 EEV) with 307 Compressed Natural Gas (CNG) buses, 32 of which would be articulated.
- - Install urea injection catalytic particle filters to reduce particle and NO_x emissions in 485 Euro III biodiesel buses.

DUE DATE

Year 2011-2014

ESTIMATED COST

- CNG buses: € 94,742,663
- Filtration systems: € 6,059,600
- Total € 100,802,263

POSITIVE IMPACT GENERATED

- Reduction of polluting emissions, with special emphasis on the LEZ, and that all 83 bus lines be considered clean.
- Improved public transport service.
- Reduced use of private motor vehicles and reduction of traffic pollution.

TRACKING INDICATOR

- Number of cleaner vehicles added to the lines running within the LEZ.

Nº 16. Expand the number of alternative supply points at EMT centres**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Although the Madrid Municipal Transport Company (EMT) CNG refuelling stations are able to service the fleet planned for years to come, the goal of this measure, within the company's ongoing technological renewal framework line of action, is to plan for possible expansion of supply points of fuel and alternative technologies. Specifically, the following studies will be undertaken:

- Determine the need to expand refuelling facilities built at Entrevías and Carabanchel.
- Extend the CNG refuelling station model to other operations centres, so that external vehicles can use the pump capacity installed for refuelling buses.

With respect to electric mobility, 40 charging points will be implemented between the main offices of the EMT and the operations centres.

DUE DATE

Year 2011-2015

ESTIMATED COST

- Electric charging points € 120,000
- The cost of new CNG supply points will depend on the results of the study on needs.

POSITIVE IMPACT GENERATED

- Promote the use of cleaner technologies and cleaner fuels.
- Reduction of polluting emissions (NO_x, Particulates and CO₂).

TRACKING INDICATOR

- Number of new supply points of fuel and alternative technologies.

Nº 17. Promotion of best practices and use of new technology for more efficient use of EMT buses**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The goal of this measure is to expand the actions already being taken by the Municipal Transport Company (EMT) to improve best practices in vehicle use by increasing their efficiency. Specifically, the measure considers three types of actions:

- Eco-driving courses: 3,518 drivers were trained during the 2007-2010 period. In addition, eco-driving is one of the subjects taught that is being included in CAP [Professional Aptitude Certification] retraining courses and for new hires. The goal of the measure is to get all drivers trained in these courses.
- Implementation of the eco-driving help system and optimum management of energy consumption in buses: the measure implies tests for integrating on-board systems that obtain information from CAN-BUS into the existing on-board equipment in buses. This will form an Eco-Driving Help System for optimum, real-time monitoring and management of consumption by equipment on board (air conditioning, lights, monitors, etc.).
- Implementation of the obligation to turn off the engine while waiting at the end of the line: the goal of this measure is to avoid polluting gas emissions while the bus is waiting to leave the station. Instructions for carrying out this measure have already been included in the manual, in new-hire orientations, retraining courses and model update courses. Drivers who fail to comply with this measure may be fined.

DUE DATE

Year 2011-2015

ESTIMATED COST

- Eco-driving courses: € 710,000
- Implementation of the driving help system in the entire fleet: € 1,200,000

POSITIVE IMPACT GENERATED

- Reduced fuel consumption.
- Reduction of polluting emissions (NO_x, Particulates and CO₂) and noise. A 10% overall reduction in consumption is estimated after implementation of this system, with a corresponding reduction of emissions.

TRACKING INDICATOR

- No. of drivers taking the courses.
- No. of vehicles and % of the fleet with system installed.
- Annual no. of fines for not turning off engine when waiting at the end of the line.

Nº 18. Reserved platforms for buses**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Among the measures meant to promote use of public transport (specifically buses), the Council has been paying particular attention to those that improve the quality of service.

Along these lines, the actions proposed within the framework of this measure seek to establish effective preferred lanes for inter-district connecting buses outside of Calle 30. This would increase the share of public transport in cross mobility between districts outside Calle 30, which is currently below the use of private transport.

To this end, in the years to come, research needed to plan and execute the following actions will be undertaken: Reserved platform for buses at the Avenida de los Poblados hub (this hub will facilitate the bus relationship between the Latina, Carabanchel and Usera districts and between nodes relevant to the public transport system, such as Colonia Jardin, Aluche or 12 de Octubre, by connecting together Metro lines 3, 5 and 10 and Suburban Line C5).

DUE DATE

Year 2012-2015

ESTIMATED COST

- € 7,000,000

POSITIVE IMPACT GENERATED

- Improved public transport service.
- Reduced use of private motor vehicles and reduction of traffic pollution.

TRACKING INDICATOR

- Length of platforms reserved for buses.

Nº 19. Complete the EMT transversal line network**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The goal of this measure is to drive development of the transversal line network in districts outside Calle 30, which was started during the 2007-2011 period. This set of lines will be developed in two large urban areas: the eastern and southern sectors of the ring outside Calle 30. It will affect the districts of Hortaleza, Barajas, Ciudad Lineal, San Blas, Moratalaz, Vicalvaro, Puente de Vallecas and Villa de Vallecas, on the one hand, and Usera, Villaverde, Carabanchel and Latina, on the other.

The increased service from these new transversal lines must be a tool for increasing the share of public transport in transversal mobility between districts outside Calle 30, which is currently below the use of private transport.

DUE DATE

Year 2012-2015

ESTIMATED COST

- The cost of the action is effectively the annual cost of running 7 lines with 45 buses. The total is estimated at € 10.000.000.

POSITIVE IMPACT GENERATED

- Improved public transport service.
- Reduction in the use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Length of transversal lines as a percentage of the total length of the daily network.

Nº 20. Expand the network with special vehicles

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

The goal of this measure is to continue driving development of EMT lines with mini/midi-buses, in order to improve accessibility in metropolitan areas that do not have an adequate road capacity suitable for circulation of conventional buses. Clean fuel vehicles (CNG, electric and/or hybrid) will be used for this. Until hybrid technology matures in standard buses, preference will be given to natural gas midi-buses for these lines with special vehicles.

Implementation studies will be prioritized within this programme beginning with a first action for the Tetuan District, which connects the municipal neighbourhoods of Almenara and Valdeacederas, which will improve service to the La Ventilla area by connecting them with the Plaza de Castilla interchange.

DUE DATE

Year 2012-2015

ESTIMATED COST

The cost of the action is effectively the annual cost of running the line. The total is estimated at € 100,000.

POSITIVE IMPACT GENERATED

- Improved public transport service with cleaner vehicles.
- Reduction in the use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Length of lines having special vehicles as a percentage of total length of the daily EMT line.

Nº 21. Suppress barriers, make access safe and optimize use of space within the bus stop infrastructure of Madrid

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

During the 2011-2015 action period Madrid City Council will continue implementing the Barrier Suppression and Safe Access to Public Transport Plan. Besides the most sensitive areas, research will be conducted on the different users of these stops (EMT, tour buses, school buses, etc.) and on optimizing parking spaces without diminishing use of the service.

Bus stop improvement projects will continue in accordance with the Barrier Suppression and Safe Access to Public Transport Plan. Pavements will be expanded so that no vehicle will be able to drive between the bus and the curb, in order to facilitate direct access by all people in general, and by those with reduced mobility in particular. This will reduce the time it takes for the bus to make a complete run of its route as well as reduce emissions. Access to bus stops will also be improved with podotactile paving to warn and orient disabled persons.

Prefabricated platforms will be used to achieve similar objectives when other actions are not possible.

DUE DATE

Year 2011-2013

ESTIMATED COST

- € 600,000

POSITIVE IMPACT GENERATED

- Promote the use of public transport.
- Reduction in the use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Number of remodelled bus stops.

Nº 22. Increase of conventional bus lanes with separator

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In order to improve the quality of the bus service in terms of regularity and frequency, the goal of this measure is to continue increasing the bus lanes within the City of Madrid, both the conventional version as well as those with dividers, which currently total more than 60 kilometres.

25 kilometres of new conventional bus lanes are planned to be built. Furthermore, the total protected bus lanes (with separator) will be extended another 20 km over and above the current 42 km.

Given that implementation action usually must involve more than just signage (i.e., implying the elimination of parking areas near the curbs) and also considering that, for lanes with a separator, it also depends whether the width of the platform will allow it, in order to identify the specific hubs, prior study must be done to consider the best options in terms of mobility.

DUE DATE

Year 2012-2015

ESTIMATED COST

Cost not yet determined: The cost of the action cannot be estimated until the hub selection process takes place and after completion of corresponding projects. For these reasons, it has now been put on the Air Quality Plan budget.

POSITIVE IMPACT GENERATED

- Improved public transport service quality.
- Reduction in the use of private motor vehicles.
- Reduction of polluting emissions from traffic.

TRACKING INDICATOR

- Increased length of bus lanes.

Nº 23. Improved payment systems**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Experience has shown that facilitating the use of public transport via incorporation of new technology focused on user comfort leads to greater use and benefits a shift from the use of private motor vehicles to use of the bus. For that reason, the Madrid Municipal Transport Company (EMT) has been placing special emphasis on this aspect of mobility for years, with great success. In this context, the goal of this measure is to improve the payment systems by making them more flexible and adding functions that bring greater value to customers, as well as to create new fare systems and to increase use of the bus network. To that end, a push will be made to implement new systems after researching the various technological alternatives, such as enabling fare payment by mobile phone (NFC), by Internet or by credit card on certain lines, etc.

DUE DATE

Year 2012-2015

ESTIMATED COST

The estimated cost of this initiative is € 750.000 (this amount may vary greatly based on the solution chosen).

POSITIVE IMPACT GENERATED

- Improved public transport service quality.
- Reduction in the use of private motor vehicles.
- Reduction of polluting emissions from traffic.

TRACKING INDICATOR

- Percentage of users that can pay fares using alternative means.

Nº 24. Improved information to passengers**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

This measure is framed within the set of actions being implemented by the Madrid Municipal Transport Company (EMT) to give users better access to information. Being able to get instant, real-time information on the status and characteristics of public transport enables citizens to manage and plan their commutes, promoting use of public transport and redounding directly on improved mobility. In this context, one of the main strategic objectives of the Madrid Municipal Transport Company is to provide overall information on its service in multiple formats and platforms, enabling customers to use the service more efficiently and adapt it to their own needs. The measure will be implemented via the following actions:

- Expansion of information panels at bus stops: the goal is to provide information on wait times and other items of interest for EMT customers at the bus stop itself. The expansion will be done at high-demand stops in order to reach the highest number of possible users.
- Expansion of multi-media monitors inside buses: the goal is to provide information on the route line aboard the vehicles. Information will also be provided on nearby points of interest, cultural events, weather, wait times at intersections to catch other buses and other information of interest.
- Installation of Wi-Fi at bus stops: the goal is to enable access to the Internet from bus stops in the same way it is now possible from the buses themselves. In this sense, customers would have sustained and stable connectivity to the Internet during all parts of their bus ride through the city.
- Development of a mobile navigation system to increase use of the bus by implementing a navigation system through the City of Madrid for mobile devices with GPS, which would

- enable any user to get to any destination via public transport by using the EMT service in particular. This will put the company service within reach of customers without them needing to know the entire EMT network. It will enable the use of any line to reach any destination via a complete, permanent and continuous guidance system (including Augmented Reality). Furthermore, real-time information associated with the service, or supplemental to it, will be available at all times, which would include, for example, estimated arrival times for buses, announcements, accidents, detours and other information of interest. Voice guidance will also be enabled, in order to make it accessible to and facilitate use by all types of persons.
- Expansion of the audio information system to the entire fleet for the visually impaired: the goal is to install an information system that is audible from outside the bus to indicate the route line and destination for each bus. This will facilitate use of buses by the visually impaired.

DUE DATE

Year 2012-2015

ESTIMATED COST

The cost of the panels and monitors will vary based on the number installed:

- Implementation of the navigation system: 250,000 Euros.
- Expansion of the audio information system: 575,000 Euros.

POSITIVE IMPACT GENERATED

- Promote use of public transport.
- Commuters shift from using private motor vehicles to using public transport.
- Reduction of traffic congestion and private motor vehicle traffic pollution.

TRACKING INDICATOR

- No. of information panels installed.
- No. of multi-media monitors installed.
- Percentage of all bus stops having Wi-Fi.
- Percentage of implementation of the application.
- Percentage of all buses with exterior audio information systems.

Nº 25. Integrated public transport interpretation centre**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The goal of this action is to create a space for informing citizens and interpreting public transport in the City of Madrid with the following uses:

- EMT customer information point: a customer service point staffed with EMT personnel will be set up, which would be similar to those currently found at some transport interchanges.
- Information point on alternative means of mobility in the City of Madrid.
- Multi-media information and exhibition area where audiovisual documents can be exhibited or temporary exhibitions can be provided.
- Transport fare sales machines: transport ticket dispensing machines.
- Inquiry point with computers/Wi-Fi: the underground route will have kiosk-type computers with Internet access and applications related to EMT and public transport in general.
- Equipment for use by EMT employees.

DUE DATE

Year 2012-2015

ESTIMATED COST

- € 1,250,000

POSITIVE IMPACT GENERATED

- Awareness about the use of public transport and it benefits to the environment as well as improved urban mobility.

TRACKING INDICATOR

- Percentage implementation of the project.

1. TRANSPORT AND MOBILITY SECTOR**1.4. OTHER MEASURES FOR IMPROVING PASSENGER TRANSPORT****Nº 26. Management tools for special use of conventional transport services and school transport services****DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Both conventional and school special-use transport offer city and intercity mobility networks that perform an important service for citizens. Nevertheless, they also contribute to more traffic, particularly during specific hours of the day and in certain locations. Consequently, anything seeking to improve efficiency in these forms of mobility will improve service as well as reduce its negative effects on pollution and traffic congestion.

In this context, the goal of this measure is to implement a study that would enable routes, stops and reserved parking to be optimized, as well as the characteristics of the special use (disabled and workers in general) School Transport and Regular Transport fleets.

A graphic data management tool will be developed, which would enable routes, stops and reserved parking to be displayed, as well as characteristics of the bus fleets, for the purpose of defining them and proposing more efficient alternatives.

DUE DATE

Year 2012-2014

ESTIMATED COST

- € 120,000

POSITIVE IMPACT GENERATED

- Improved service.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Implementation of the management tool.

Nº 27. Parking and services management plan for occasional transport and tour buses**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Occasional and tourist transport for travellers is a complex sector offering an important service to the city by facilitating tour trips, congresses and other things with the various hotels and accommodation in the capital. The activity is concentrated in the city centre along the main strip, which will make any initiative influencing the sector very effective. The goal of this measure is to optimize routes, stops and reserved parking, which would allow occasional and tour buses to offer a more efficient transport service in terms of traffic control, reduced congestion and pollution.

Specifically, the current Madrid tour bus parking Mobility Plan will be revised and evaluated for operational criteria. Measures authorizing preferential treatment for vehicles with cleaner

technology will be added, in order to push technological renewal of fleets to cleaner vehicles. Specific Action Plans and General Action Protocols will be defined in order to manage a massive influx of buses to the capital during large events.

To this end, a specific computer application will be created and the databases will be configured on a geographic information system.

DUE DATE

Year 2012-2013

ESTIMATED COST

- € 30,000

POSITIVE IMPACT GENERATED

- Improved service.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Implementation of the management tool.
- Implementation of action protocols.

1. TRANSPORT AND MOBILITY SECTOR

1.5. PROMOTION OF ALTERNATIVE MEANS OF MOBILITY

Nº 28. Promotion of the use of carpooling and carsharing

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

The goal of this measure is to drive a new culture of private motor vehicle use, by promoting the habit of sharing, whether it be a person's own vehicle or that of another, by optimizing use of this means of transport, reducing the number of vehicles on the road, saving energy and diminishing negative effects such as traffic congestion or pollution. The measure comprises two actions:

- Promotion of the carpooling culture at businesses, by increasing the average number of passengers per motor vehicle, urging and facilitating a change in the habits of users. The action comprises the launch of an A to B pilot programme with a wider focus than the current use programmes, bearing in mind the details of managing the change. The Carpool to Work Pilot Programme for the City of Madrid was designed in cooperation with the Madrid Regional Transport Consortium (CRTM) and is managed by the Madrid Municipal Transport Company (EMT).

This project has set the strategic objective of mandatory mobility (for reasons of employment or study). It adopts a focus based on cooperation with private institutions and businesses in specific policies of Corporate Responsibility, which would enable implementation of a set of programme actions. To that end, necessary and strategic tools have been created, such as: the communication campaign design and logo; the municipal WEB Portal, focused on sensitivity, awareness and technical support in managing the internal change; cooperation in the design of incentives, etc.

- Promotion of the carsharing service with cleaner vehicles: the action consists of cooperation with businesses already established in Madrid for development of specific "Madrid Carsharing" signage, which identifies and promotes locations where this carsharing service is available. Study of possible mobility benefits for carsharing vehicles. Recent estimates

done in various European countries and in North America show, on average, a carsharing vehicle can replace 8.3 private vehicles.
DUE DATE
Year 2012-2014
ESTIMATED COST
- € 70,000
POSITIVE IMPACT GENERATED
- Mobility culture change. - Reduction in the number of private motor vehicles. - Reduction of traffic congestion and traffic pollution.
TRACKING INDICATOR
- No. of A to B carshare programme users. - No. of businesses with carsharing set up. - No. of carsharing vehicles in service. - No. of customers using the service.

Nº 29. Promotion of the use of bicycles**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Since 2008 when Madrid City Council created an ambitious Cyclist Mobility Master Plan both the size of the cycling infrastructure and cyclist demand have grown steadily. Thus, demand had increased by 20% in 2010, although bicycle use is still low and mostly tied to leisure activities. At the same time, bicycle paths have grown to 263 km., which includes the Anillo Verde Ciclista (Green Bicycle Ring), a 64 kilometre route through green areas, districts and neighbourhoods.

On that basis, the goal of this measure is to promote bicycle use, in order to increase its share among the various means of transport, above where it currently sits at 0.14% of all vehicles circulating within the central hub of the city. Beyond the portion of mobility it covers, the significance of cycling lies in its role as an aid to changing the mobility culture within the city, by moving away from private motor vehicle use, helping to reduce traffic, and contributing to a more balanced distribution of current road capacity, which favours cleaner transport, and ultimately reduces pollution and improves the environment.

The following actions are designed to implement this promotion of cycling as alternative transport:

- Increase the cyclist mobility infrastructure, particularly in Low Emission Zones (LEZ) within the city, by developing a network of bicycle streets and bicycle lanes, as well as by implementing bicycle lanes on the main strip —Alcalá and the so-called bicycle M10, a route comprising the streets: Génova-Sagasta-Carranza-Alberto Aguilera-Marqués de Urquijo – Ferraz /Pintor Rosales-Bailén-Gran Vía de San Francisco-Ronda de Toledo-Ronda de Valencia-Ronda de Atocha-paseo del Prado-paseo de Recoletos
- Bicycle parking network drive
- Implementation of a public bicycle rental service (1,500 bicycles and 3,000 bicycle racks).
- Creation of a voluntary bicycle registry.
- Improvements to existing information on bicycle mobility.

DUE DATE

2011-2014

ESTIMATED COST

- Infrastructure: - € 3,938,000
- Promotion: - € 67,168
- Revenue from the Public Bicycle Rental Service: € 4,500,000 per year.

POSITIVE IMPACT GENERATED

- Increase in the use of bicycles as alternative transport.
- Contribution to changing the private motor vehicle culture of the city.
- Pacification of traffic and deterrence to the use of private motor vehicles.
- Contribution to reduction of polluting emissions from traffic.
- Noise pollution reduction and improvement to the environment.

TRACKING INDICATOR

- Growth of the cyclist infrastructure.
- Increase in use of bicycles.

Nº 30. Promote walking**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Madrid has undergone a huge transformation since 2003, due to an integral project that has resulted in an improved and more accessible urban space, in which public areas for pedestrians have gained ground. Because of this project, pedestrians, visitors and residents are once again beginning to have preference on the use of urban space.

Implementation of Areas of residential priority, completely pedestrianized areas and expanded pavements has now made it possible for 32% of commuting done by residents within the city to be on foot; 25% is done in private motor vehicles and 63% is done via public transport. The goal of this measure is to continue to drive acceptance of an urban mobility culture centred on pedestrians. Therefore, it is linked widely to other measures for granting more public space to pedestrians (see Measures 2, 3 and 4).

In this context, the specific goal of this measure is to develop a Strategy for Creating a Network of Pedestrian Priority Routes within the central hub of Madrid: the proposal is to generate a continuous network of routes that facilitate walking in all its aspects (connectivity, health, sports, tourism, culture, relationships, etc.) by overall intervention within areas established for that purpose, while upgrading public space and accessibility, expanding the scope of action beyond the hubs that have been set up in recent years. The relationship of proposed actions to public transport will also be analyzed, along with the improvement it may make in pedestrian mobility as a means to supplement it.

DUE DATE

2011-2015

ESTIMATED COST

- Implementation of the Strategy € 35,000

POSITIVE IMPACT GENERATED

- Promote walking and public transport associated with it.
- Deterrent to use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Percentage of pedestrian mobility inside the city.
- Creation of the Strategy.

Nº 31. Promote the use of motorcycles**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

In recent years, Madrid City Council has pushed many initiatives to promote the use of motorcycles as a means of transport. These actions have included measures such as the creation of motorcycle parking spaces, allowing motorcycles to go to the head of the line at stop lights, exemption from the Regulated Parking System (RPS), authorization to use the lanes reserved for buses, taxis and the last section of the HOV-Bus Lane, replacement of conventional pedestrian crosswalks with dashed lines and less non-slip paint and permission to access Areas of residential priority.

All these measures have contributed to the 15% increase in motorcycle usage in mobility in Madrid since 2006, making it a "real" alternative to private motor vehicles as a means of transport, which is flexible, demands less space and is cleaner. Thus, the goal of this measure is to further consolidate and encourage the use of motorcycles via measures such as:

- New motorcycles parking areas.
- More bus-taxi-motorcycles lanes.
- Providing more information on this subject to Traffic Agent Authorities and Safety and Emergency Organizations of Madrid City Council.
- Expansion of priority on motorcycles at stop lights and suppression of zebra stripes in pedestrian crosswalks.
- Specific electrical charging points for motorcycles.
- Improved information on motorcycle mobility in Madrid.
- New training course for various groups at the permanent motorcycle safety training school in Vicálvaro.
- Tracking of the 2009-2013 Strategic Motorcycle Road Safety Plan of the City of Madrid.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 100,000

POSITIVE IMPACT GENERATED

- Shift from private motor vehicles to motorcycle usage.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Percentage increase in the use of motorcycles.

Nº 32. Promotion of alternative school mobility**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The goal of this measure is to promote commuting by students and their families to schools on foot, by bicycle and via public transport, and to bring the new mobility culture to schools and into their lifestyles. To this end, the resources of the Madrid City Council "Educate Today for a More Sustainable Madrid" programme will be made available for the following actions:

- Evaluations of the school environment for commuting on foot.
- Inclusion of the new mobility culture in the curriculum with the support of academic learning materials.
- Commitments and actions from the learning community in order to arrange school trips in public transport, organize pedibus and bicycle trips and create plans of action.

- Improve road safety by installing traffic meters and increasing pedestrian crossing times at stop lights.
- Student assistance on EMT buses by qualified personnel from Mobil Help Service (SAM). A city centre bus will be made available exclusively for this or an existing line will be shared, depending on need.
- Commitments and actions designed to inform parents and Parent Associations (AMPAS) in order to get their cooperation in changing attitudes concerning student mobility.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 200,000 planned over two years.

POSITIVE IMPACT GENERATED

- Improved involvement from childhood in sustainable mobility and acquisition of academic values that become part of the new mobility culture.
- More physical activity and less childhood obesity.
- Changes in the mobility habits of students and their families.
- Deterrent to use of private motor vehicles for school transport.

TRACKING INDICATOR

- Percentage of new students commuting on foot or using bicycles.
- No. of students participating in the project.
- No. of schools participating in the project.
- No. of schools requesting SAM service from EMT.
- No. of students using the SAM service from EMT.

Nº 33. Promotion of the use of public transport for mobility to work**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

In the 2006-2010 period the Madrid Municipal Transport Company (EMT) began an initiative to expand its services by directing actions to certain demand segments with specific characteristics. This is the case for accessibility to Industrial Parks, Business Parks and, in general, Workplaces that have certain specific characteristics, frequently in their own sites and located outside metropolitan areas, and have their own profiles with respect to associated mobility patterns, which are significantly different from urban demand in general. In the previous period, a sub-network of Work Centre Transport (WCT) lines were proposed, and six lines were started. The original programme action will continue in the 2011-2015 period, and the opportunity for action will be evaluated in each case.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost of action to be valued is the annual cost to run the available lines, which is estimated at €3,500,000 and includes making 4 new lines available, which will require the use of 13 buses.

POSITIVE IMPACT GENERATED

- Shift commuters away from using private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- No. of lines implemented.
- No. of programme users.

1. TRANSPORT AND MOBILITY SECTOR**1.6. PROMOTION OF MORE SUSTAINABLE COMMERCIAL TRANSPORT****Nº 34. Promotion of voluntary agreements with the private sector to encourage renewal of commercial and delivery fleets to cleaner technology****DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Within the framework of the Madrid Pro-Climate Forum, Madrid City Council has pushed for the addition of cleaner vehicles to commercial fleets, via voluntary compliance with a commitment to renewal, which sets a minimum 6% distribution for these types of vehicles prior to 2012. As a result of this action, 29 companies have signed the commitment. Likewise, company initiatives to promote the use of clean vehicles, such as renting electric motorcycles or using electric vehicles for delivery are being pushed.

The goal of this measure is to continue driving these types of actions for the purpose of:

- Increasing the number of businesses that commit to the voluntary agreement.
- Promote the use of alternative fuels in the commercial sector.
- Promote the use of electric vehicles in the commercial and industrial sector.

To that end:

- Voluntary agreements will be renewed and updated in order to increase the number of commitments and agents participating in them.
- Formulas for granting mobility benefits to renewed fleets will be studied.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost of renewal will be borne by the companies participating in the agreements.

POSITIVE IMPACT GENERATED

- Reduction of emissions from the goods delivery and transport sector.

TRACKING INDICATOR

- Businesses that have signed voluntary fleet renewal agreements.
- Number of cleaner vehicles added at the companies conducting activities within the city of Madrid.

Nº 35. Offer mobility advantages to commercial and delivery vehicles with cleaner technology**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Although commercial and delivery vehicles perform an essential function within a city, they are also a source of polluting gas emissions. During high-traffic periods, urban goods distribution and delivery accounts for between 20 to 25% of all vehicles in the central hub and the main commercial areas of Madrid. These vehicles represent approximately 7% of the nitrogen oxides (NO_x) and 9% of the nitrogen dioxide (NO_2) emissions. Consequently, it is essential to adopt measures that will allow the indispensable service offered by these vehicles to be compatible with a no less necessary reduction in pollution.

The City of Madrid has been a pioneer in Spain by allowing operators in various professions to park their commercial vehicles in blue parking spaces within Regulated Parking for 5 hours by displaying a specific permit (orange card). In order to promote use of cleaner vehicles, an

amendment to the Ordinance regulating this fee was approved, so that non-electric, full hybrid vehicles and those running on cleaner fuels (LNG, CNG) can take advantage of a reduced annual rate for the Separate "Industrial and Commercial Vehicles" Area. Furthermore, modification of the decree extends the opportunity to obtain this orange card permit, which limits conventional vehicles to 3,500 kilograms, to these types of cleaner vans, mini-vans and trucks weighing up to 5,000 kilograms.

In this context, the goal of this measure is to continue to make the activities of commercial goods distribution and delivery vehicles ever more compatible with the fight against pollution, by promoting those having less impact in terms of emissions. To this end, during the 2011-2015 period, the Council, along with the sectors involved, will proceed to research new actions regarding accessibility concerning loading and unloading, meant to give more added value to vehicles with cleaner technology. Special attention will be given to the Low Emission Zone (LEZ) in particular, and to Areas of residential priority (ARP), where mobility conditions will be different for vehicles causing more pollution and favour those with cleaner technology. Likewise, other competitive advantages for commercial delivery and distribution vehicles using cleaner fuels and cleaner technology will be studied, such as special conditions on the use of parking for entities doing a great deal of commercial activities who have a share in municipal markets like IFEMA or Mercamadrid.

DUE DATE

2012 – 2015

ESTIMATED COST

- The cost of fleet renewal will be borne by commercial businesses.

POSITIVE IMPACT GENERATED

- Promotion of cleaner commercial and delivery vehicles.
- Reduction of air quality polluting emissions like greenhouse gases.

TRACKING INDICATOR

- New incentive measures adopted.
- Percentage of cleaner vehicles within the fleet of registered industrial and commercial vehicles (orange card).

Nº 36. Study of more sustainable loading and unloading

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

During the 2006-2010 implementation period of the Air Quality Plan, a work group on loading and unloading was created as part of the Mobility Roundtable, which reached many conclusions and proposed various measures. Some of these measures have already been initiated. For example, the number of loading and unloading spaces has been increased from 2,115 (2006) to 2,403 (2010), and the Mobility Ordinance allowing different loading and unloading hours to be set for different types of vehicles to be changed, based on the amount of pollution they emit.

Implementation of these measures will be deepened during the 2011-2015 period, by expanding awareness of the influence of this activity on urban traffic and its corresponding effect on polluting emissions, as well as its socioeconomic implications. In order to achieve these objectives, a study will be conducted to define sensitive environmental areas and measures that favour loading and unloading activities with cleaner industrial and commercial vehicles (access restriction, schedule limitations, signage, etc.).

The current regulations will be revised based on an analysis of the results, and in the specific case of the ordinance, for the purpose of optimizing the model to favour more rational use of space and promote application of competitive advantages for cleaner vehicles, especially in Low Emission Zones, while at the same time strengthening restrictions for vehicles that pollute more.

DUE DATE

2011-2015

ESTIMATED COST

- The study will be conducted with the Council's own resources.

POSITIVE IMPACT GENERATED

- More awareness of loading and unloading activities will redound on appropriate planning and control that improves items such as: traffic flow, reduced loading and unloading times, the relationship between agents implied in this activity for promoting addition of cleaner vehicles to distribution fleets.

TRACKING INDICATOR

- Actions taken for the study and promotion of awareness:

- Workshops and conferences with work groups.
- Studies and projects on loading and unloading in the City of Madrid.
- Follow-up actions.

1. TRANSPORT AND MOBILITY SECTOR

1.7. PARKING LOTS AND TRANSPORT INTERCHANGES

Nº 37. Promotion of municipal action concerning regulated parking and parking for residents

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Underground parking lot policies are a key element in managing mobility and contribute significantly to facilitating implementation of actions concerning air quality, by freeing urban space from the physical, environmental and aesthetic pressures exerted by traffic. On the one hand, it contributes a substantial improvement to urban mobility by favouring traffic flow and surface parking rotation. In addition, it minimizes the negative effects of traffic on the urban environment (pollution, noise), thus improving the quality of the air we breathe and reducing noise pollution.

For these reasons, Madrid City Council has, for years, been implementing a tough policy of pushing preferential underground parking for residents within many districts of the capital. Thus, between 2006 and 2010 the number of parking spaces for residents within municipal parking lots has increased from 86,769 to 94,995 (2010) and the number of rotating parking spaces from 16,869 to 18,354.

Given the great importance of this type of infrastructure for mobility within the city and, consequently, for the fight against air quality pollution, the goal of this measure is to continue to push for municipal action regarding underground parking, in order to increase the number of available parking spaces, paying particular attention to the search for more efficient management formulas, which may enable advances to be made in this area, in an unfavourable economic environment such as we have now. To this end, in order to carry out this measure, the following courses of action will be implemented:

- Public-private cooperation in the construction and exploitation of park and ride and resident parking lots: possible alternatives that may promote public-private cooperation in the construction of park and ride and resident parking lots will be studied.
- The parking fee regimen applicable to mixed and metered public parking lots will be reviewed. A study will be conducted on rates in sections that offer the possibility of medium to long-term parking, with lower rates for sections having shorter parking times. Underground parking lot rates will be coordinated with other parking alternatives now available within the city and with mobility and environmental policies, as for example an incentive on the use of clean vehicles by offering a discount on the fees applicable to all other vehicles.

DUE DATE

2011-2015

ESTIMATED COST

- Inclusion of this measure in the Plan entails no additional cost.

POSITIVE IMPACT GENERATED

- Reduction of the pressure exerted by vehicles within the urban environment.
- Facilitation of a reduction of polluting emissions from traffic.
- Noise pollution reduction.
- Improvement in the environment for residents.

TRACKING INDICATOR

- Parking spaces.
- Management efficiency improvement measures.

1. TRANSPORT AND MOBILITY SECTOR**1.8. ROAD MAINTENANCE TECHNIQUE IMPROVEMENT ACTIONS****Nº 38. Drive for sustainable road surfacing****DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Madrid municipality covers approximately 70,000 hectares and has approximately 4,500 kilometres of streets and roads, which makes for a paved surface area within the city of close 5,000 hectares, about 60% of which is road and 40% pavements. The goal would be to add these sustainable paving techniques to municipal road surfacing work gradually, as well as others that may arise over time, provided that the techniques are economically viable. Officially approved techniques must be included in the corresponding standards and price schedules in order to promote more general usage. Newer techniques must first be subjected to testing and the corresponding technical tracking before being officially approved, in order to evaluate their conditions of use and performance in service.

For some time now, Madrid City Council has been studying and tracking the progress of these types of materials in the various techniques developed for their use in paving both streets and pavements. Specifically, various experiments with these types of products have been done, and all are being periodically tracked. In the summer of 2008, through operation Madrid Paves Madrid, an experiment was done on a 1,000 square meter section of road on calle Martin de los Heros. In 2010, two projects using non-polluting paving materials for pavements were completed: at the intermodal area of Canillejas and on calle de Flor Alta. A comparison of samples taken at 10 cm. above ground, both before and after paving, show a 60% reduction in NO_x within the environment for the specific conditions of the study.

In both cases, the preliminary tracking results for these projects are very positive as far as their capacity to clean the air. Nevertheless, there are still some questions to resolve, both concerning their actual effect on reducing air pollution under various environmental conditions as well as other possible collateral effects there may be from their use. Likewise, based on studies done, testing standards and regulations must be defined for these materials and applications.

Studies of these new techniques and materials must continue in the years to come, via specific, large-scale testing on sections or through opportunities linked to works to be started or to maintenance operations, such as Madrid Paves Madrid, which will allow the questions at hand to be answered. In this sense, Madrid City Council, along with a consortium of businesses, hosted the LIFE+ 2011 conference of the European Union, a research and investigation project to be implemented between 2012 and 2015, in order to study a new asphalt road surface treatment system for eliminating nitrogen oxides within urban environments.

In addition, the Council is studying the possibility of taking part in new research projects based on this photocatalytic product technology, not only within the scope of paving, but also for other types of applications (tunnel coatings, painting, etc.). The Council is working on these projects together with consortiums made up of various organizations. Nevertheless, it would be helpful to have the ability to take measurements and make technical reports evaluating the objective results, above and beyond reports from the manufacturers, perhaps via some contract or agreement that would enable the equipment required for these operations to be acquired. Research will be done on this in order to determine how to contract for these specific services, so that the companies will have the equipment required. This would also allow some specific large-scale studies to be done concerning development of technical standards and specifications for the purpose of establishing the conditions for use of these techniques and materials on municipal roads.

DUE DATE

2011-2015

ESTIMATED COST

- Specific studies, technical reports and development of technical standards and specifications: € 500,000.
- Execution of full-scale test sections: execution and tracking of specific test sections: € 2,500,000.

POSITIVE IMPACT GENERATED

- Reduced NO_x concentrations in the air in contact with the road surface in treated areas. Reduction levels will depend upon the specific environmental conditions of the area and the effectiveness of the treatment.

TRACKING INDICATOR

- Number of test sections executed and analyzed.
- Number of tracking reports done.
- Participation in research programmes.
- Square meters treated with decontaminating road surface.

Nº 39. Use of less contaminating paint for markings**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Traditionally, a significant source of Volatile Organic Compound (VOC) emissions, which are in turn ozone precursors, has been the solvents contained in paints used for road markings that, due to the size of the painted surfaces (some 500,000 square meters per year), contribute a large amount.

Aware of this problem, Madrid City Council has been implementing a series of actions tending to reduce the impact of maintenance and renewal of road markings on the environment, which run from the addition of new, less contaminating materials and suspension of the use of alkyd paint, to replacement of conventional crosswalks with dashed lines that require the use of less paint, as well as research on replacing current anti-icing methods with cleaner ones.

In this regard, the goal of this measure is to continue to drive actions tending to reduce polluting emissions derived from this activity, by undertaking a cost/benefit analysis that would enable optimum use of paints in markings, as well as growing use of new, less contaminating materials. To this end, particular attention will be paid to strengthening demand for this material in municipal contract specifications.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost will vary based on the type and amount of paint used.
- Inclusion of this measure in the Plan entails no additional cost.

POSITIVE IMPACT GENERATED

- Reduction of emissions from volatile organic compounds.

TRACKING INDICATOR

- Actions started to reduce emissions from the use of paint in road markings.

1. TRANSPORT AND MOBILITY SECTOR**1.9. MEASURES FOR RESEARCH AND INVESTIGATION ON THE SUBJECT OF MOBILITY AND TRANSPORT****Nº 40. Mobility Roundtable****DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The Mobility Roundtable is an indispensable tool for implementation of Sustainable Mobility Policy created by Madrid City Council, which is an essential forum for the exchange of knowledge in which all parties involved in the drive for strategic mobility in the City of Madrid are represented. Because it is a critical element for deepening knowledge and studying problems linked to mobility and more sustainable solutions in detail, it is set up as an essential tool for the contribution of Sustainable Mobility to better air quality in the city.

Consequently, the goal of this measure is to strengthen the function of the Roundtable with the following objectives:

1. Collaborate in determining mobility alternatives for a City of Madrid Mobility Plan that is technically rigorous and in line with Air Quality Plan objectives.
 - Support the creation of a knowledge base on which to place the Plan: diagnosis.

- Systematize the technical proposals and action proposals that will constitute the basis of the work of consideration, debate and decision-making: proposal of objectives, plan of action.
2. Increase cooperation between institutions and commitment between agents able to act on executing it and influence it effectively (municipal areas, but also with other administrations, levels of government and public and private institutions).

Highlights:

1. Outside technical assistance: a team of professionals specializing in mobility planning and relational management, which would serve a dual function:
 - Technical preparation of the content that will be the basis of decision-making:
 - Annual report on the Status of Air Quality and Mobility.
 - Technical analysis, strategies and proposals on key projects and measures. Tracking and support in the implementation of strategic projects.
 - Organization and streamlining of project and consultation framework required to advance the process of analysis and decision-making.
 - Plenary Session
 - Strategy Workshops

2. Sector meetings.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 165,000

POSITIVE IMPACT GENERATED

- Improvement in the quality of decisions and increased efficiency in all planned actions: these are the result of a rigorous process of technical analysis, but also of deliberation by many co-agents who contribute a wide range of perspectives and knowledge.
- Facilitates the implementation of measures and projects (where they are technically based and also have the support of all agents with the ability to influence their implementation).
- Generates more awareness of the challenges to be met and the way of meeting them, and helps to explain actions to citizens on controversial matters (helps to gain social support in the environment for measures to be adopted).

TRACKING INDICATOR

- Annual Tracking Reports (qualitative and quantitative on the status of mobility within the city) and the impact on Air Quality. Includes 64 mobility tracking indicators.
- Number of sector Strategies defined and validated by the Roundtable.
- Reports on the development of approved Strategies and their impact on mobility and Air Quality.

Nº 41. Projects and Studies Drive**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

One of the routes to action that has enabled Madrid City Council to advance with the implementation of a sustainable mobility model has been the push for and involvement in local, national and international projects and studies tied to mobility and its impact on cities. From the use of new fuels (fuel cells or bioethanol) and technologies like the electric vehicle, through new management tools, up to new paving materials, the monitoring and evaluation of air quality relating to traffic and its characterization, there have been a wide range of fields related to mobility and air quality in which the Council and its dependent entities have taken part in cooperation with various public organizations, research centres and private companies.

Based on the belief that innovation and development of new technologies are an essential part of sustainable mobility, the goal of this measure is for the work that has been done within this field in preceding years be continued and pushed through the 2011-2015 period, via participation of the Council in projects and studies such as those cited below:

- Asphalt road surface treatment for eliminating nitrogen oxides in urban environments (European Project FENIX, Life Plus Programme).
- Project MADEV (MADrid Electric Vehicle): project considered to be in Phase 1 of implementing electric mobility within the city (Phase Zero would be project MOVELE, currently in progress).
- Pilot Programme for promotion of Carpooling to Work in Madrid: project initiated in cooperation with the Regional Transport Consortium to promote carpooling to work.
- Participation in Project ELECTROBUS, subsidized by the IDAE.
- Studies on improving management of specific means of transport.
- Studies on continued improvement of the representativeness of air quality monitoring stations in the City of Madrid.
- Air pollution episode classification studies.
- Studies on the emissions at Calle 30 and implementation of a variable speed limit system there, based on the traffic volume and pollution levels.
- Besides these studies, two specific projects were undertaken to improve decision-making in the sustainable organization and distribution of traffic.
- Study on prevailing winds and air circulation at main hubs within the city. Analysis of micro-climatic conditions at main traffic centres within the city will provide key elements for decision-making on traffic control and for adopting specific mobility planning measures.
- Study on traffic volume at main hubs.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 150,000

POSITIVE IMPACT GENERATED

- Increase in knowledge that, when used for specific actions, enables improved mobility management and a consequent reduction of its negative impact.

TRACKING INDICATOR

- Number of R&D studies and projects started involving Madrid City Council and its subdivisions.

Nº 42. Specific measures for environments in areas with records of high pollution**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Within the framework of the tasks done by the Council, which involve tracking air quality within the city, certain areas have been identified as having a history of exceeding the limits, especially of nitrogen dioxide, and their unique characteristics require specific analyses and actions.

The records point towards causes from a wide variety of circumstances that are not well understood, and in order to correctly understand the reasons these limits are being exceeded, specific studies of the environment are being conducted, which range from weather data and comparative analysis of traffic type, volume and time when limits are exceeded, through measurements at various points and study of the terrain to search for possible stationary sources or anomalous causes that explain the events recorded. Along those lines, this measure considers two types of actions:

- To complete the diagnosis by identifying the specific reasons for the excesses:

- Study the influence of transport interchanges, the number of bus stops on the road and parking lots.
- Spatial distribution of pollution and anomalous effects of dispersion caused by unique weather conditions and topography.
- Localized effects due to the influence of ozone from the oxidation of NO.
- Traffic management pilot programmes having preferential schedules, traffic flow direction and traffic signal control.
- Influence of phenomena related to ventilation of underground passageways.
- Studies correlating the type of road traffic with recorded inmissions.

- To initiate actions required to reduce pollution in the environment of the areas subject to the actions.

- Special priority for implementation of the "Clean Lines" programme for less contaminating public transport buses.
- Traffic regulations meant to minimize stop-and-go cycles.
- Restrictions on heavy vehicle traffic.
- Installation of filter systems on ventilation grates and other corrective measures at establishments identified as polluters.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 120,000

POSITIVE IMPACT GENERATED

- Pollution reduction.
- Improved knowledge on the behaviour and spread of pollution.

TRACKING INDICATOR

- Studies and actions initiated.
- Pollution reduction in the areas.

2. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL SECTOR

Nº 43. Line of municipal subsidies for renewal of centralized diesel boilers

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

The good results obtained in reducing sulphur dioxide levels, through the line of subsidies provided to replace coal-burning boilers offered in previous years, suggests implementation of a new line of subsidies for diesel boilers. The goal of this measure is to provide an incentive for owners of buildings having inefficient, diesel boilers, which exhaust high volumes of nitrogen dioxide and other polluting emissions into the atmosphere, to replace them with others using cleaner fuels and cleaner technology. According to data from the last census, the total number of diesel boilers within the City of Madrid is approximately 4,100. Bearing in mind the economic context, and in order to create a measure having the best cost/benefit ratio, the criteria applicable to the subsidy would focus on boilers with an output of greater than 100 kilowatts that are more than 10 years old and located within the Low Emission Zone (LEZ). In any case, it would require the installation of new boilers fuelled by diesel or natural gas to meet the highest NO_x emissions standards, per the provisions of the corresponding UNE standard. This measure supplements those from the Community of Madrid meant to promote energy savings and efficiency in structures: the so-called Renewal Plan for gas-fuelled home appliances to condensation boilers, along with subsidies to promote installation of renewable energy, as well as renovation actions by the Housing and City Planning Division designed to improve energy efficiency and sustainability in structures.

DUE DATE

2013-2014

ESTIMATED COST

- € 1,200,000

POSITIVE IMPACT GENERATED

- Emissions from Class-5 boilers are 0,07 grams of NO_x per kilowatt hour versus 0.20 grams of NO_x per kilowatt hour generated from diesel, and 0.15 grams of NO_x per kilowatt hours from natural gas in conventional boilers.

TRACKING INDICATOR

- Number of boilers replaced by fuel type.
- Nitrogen oxide emissions generated.

Nº 44. Promotion of housing energy renovation

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In recent years, Madrid City Council has pushed for the renovation of existing structures according to sustainability criteria, placing special emphasis on energy efficiency and its resulting reduction of emissions that pollute the air. The tools used to promote housing energy renovation have been subsidies offered through Renovation Division programmes, projects derived from Technical Inspection of Structures, and Structural Energy Efficiency and Sustainability Improvements. Likewise, specific programmes have been implemented for the replacement of coal-burning boilers and rebates on the Projects, Facilities and Building Tax (ICIO).

The intention is to deepen the concept of sustainability in building during the next period, by consolidating existing lines of work and implementing new initiatives directed towards

improvement of air quality and reductions in CO₂ emissions into the atmosphere, among other things.

- Municipal public assistance in renovation: grant funds will continue to be offered from exclusively municipal resources, in order to favour technical inspection of buildings (TEB), in light of 7,000 rehabilitation actions among local residences, and through a new TEB ordinance, which includes energy performance items exceeding conventional criteria. It is proposed that assistance of up to 10,000 Euros per residence and location be offered, based on funds available, until the maximum specified in the ordinance is reached.
- Provide incentives for sustainable construction: in keeping with the policy of tax incentives to stimulate sustainability in construction, the possibility of expanding current environmental rebates on the Projects, Facilities and Building Tax (ICIO) will be studied. These would be meant for new construction or renovation done according to the highest standards of energy consumption reductions and per the state legal framework.
- Eco-neighbourhoods: towards a more global idea of neighbourhood. This will be done by expanding the scale of current action. Creation of neighbourhoods with renewable energy, such as solar, geothermal, biomass and biogas will be stimulated. Alternatives to traditional means of mobility will also be promoted with things such as electrical charging points and bicycle lanes, with the clear objective in mind of influencing the main sources of polluting gases within the residential environment.
- New "urban revitalization" areas: to influence energy efficiency and sustainability aspects of conservation, recovery and restoration projects of public and private structures.
- Creation of Renovation Agencies: as an action to favour the items mentioned above, renovation will be supported in areas and neighbourhoods of the city by Agencies able to offer fast, professional service in providing information, managing and processing any neighbourhood initiative with the various administrations.
- Residential innovation: possibilities for adding funds to the new promotions favouring new energy usage that is more respectful of the environment will be studied (bicycle-storage rooms, electric charging points in parking lots, Heating District, etc.).

DUE DATE

2011-2015

ESTIMATED COST

- Variable, based on the type of intervention made.
- Inclusion of this measure in the Plan entails no additional cost.

POSITIVE IMPACT GENERATED

- The measures proposed directly or indirectly influence the type and volume of air polluting gas emissions. Replacement of fuels for DHW and heating in buildings directly affects the levels of suspended particulates, NO_x, SO₂ and CO.
- Improvement in the energy efficiency of structures redounds on a lower consumption of energy from lighting or air conditioning and heating systems.
- Other collateral measures adopted in neighbourhoods and buildings contribute to the development of behaviour models that are more respectful of the environment (favouring use of bicycles as supplemental transport, development of common areas, etc.).

TRACKING INDICATOR

- No. of subsidized actions with sustainable renovation criteria.
- No. of actions added to the ICIO rebate.
- Comprehensive interventions on a neighbourhood scale (eco-neighbourhoods).

Nº 45. Drive Energy Optimization Plan of Facilities and Buildings owned by Madrid City Council
DESCRIPTION OF THE MEASURE

Within the framework of actions taken by Madrid City Council to promote energy savings and efficiency, the Governing Board approved the Municipal Facilities and Buildings Energy Optimization Plan in June of 2010. This Plan comprises a set of actions, which include the position of Energy Managers responsible for tracking the Plan at each building and facility, integrating higher standards for energy efficiency into municipal contracting or creating energy studies by category of building and facility, in order to implement specific efficiency and savings measures. All these actions have already been put into effect. The goal of this measure is to continue to push for the implementation of this plan in two specific areas:

- Development of a computer program that would enable the consumption and savings generated at all municipal buildings and facilities to be tracked, in order to provide the Energy Managers with an appropriate tool for their work.
- Implementation of specific savings measures at municipal buildings and facilities. Specifically, compliance is sought with the programme resulting from the energy study done at schools managed by Madrid City Council, which has led the way in changing the management model, by using Energy Savings Enterprise (ESE) methods within the framework of the ESE Plan 2001 from the National Government. Madrid City Council has taken up this Plan beginning with implementation of this management model at 42 public schools that have already been identified as having low energy efficiency. These 42 schools have been grouped into 5 Energy Consumption Centres (ECC), the tenders for which were begun in 2011, and which are planned to continue through corresponding bids. This management method enables installation of the best savings and efficiency technology available at the 42 ECC schools. An example of this is the replacement of heating systems, mainly focusing on replacing diesel boilers with low-temperature natural gas boilers and replacing old and obsolete equipment with cleaner more efficient technology.

DUE DATE

2011-2015

ESTIMATED COST

- € 260,000

POSITIVE IMPACT GENERATED

- Air pollution reduction as a result of the use of new heating systems at the 42 schools. The following savings are estimated:

- 11.6% savings on an average total energy consumption of 189,000 kilowatt hours per year for heating, due to the change in boiler technology.
- 7.09% savings on an average total energy consumption of 140,579 kilowatt hours per year for heating, due to more efficient heating.

The power of the proposed boilers varies between 68 kW and 800 kW. An average of 10.37% savings on consumption is estimated from replacement of energy sources and boilers and 6.15% from changing to more efficient equipment.

TRACKING INDICATOR

- Implementation of the computer program.
- No. of Energy Savings Enterprise contracts and schools affected.
- Percentage of energy savings on heating.

Nº 46. Voluntary agreements with the private sector to increase energy efficiency and savings

DESCRIPTION OF THE MEASURE

Madrid City Council believes it is not enough for administrations to adopt energy efficiency and savings measures in order to reduce our high dependence on fossil fuels, but rather it is necessary to have active cooperation from the private sector. Promotion of these practices within the private sector strengthens competition between companies by reducing energy consumption, influencing sustainable development by the companies themselves and within the environment, and by reinforcing their corporate images to the public.

Work is planned in three clearly differentiated sectors:

- Large enterprises, via the Madrid Pro-Climate forum, a Platform created in 2008, made up of large companies that voluntarily commit to adopting measures for improving air quality within the city and fighting against climate change. Among the initiatives put into effect is the agreement to renew 6% of their fleets to cleaner technology, and now a voluntary Energy Efficiency Agreement is planned, which will include an Energy Study on buildings and facilities to be selected and a Savings Plan to be created and submitted in 2012.
- Small and mid-sized enterprises, via the Cooperation Agreement for Sustainability with businesses in Madrid, signed in 2008 between the Council, the Chamber of Commerce and the CEIM. A set of low-cost, energy efficiency measures will be designed within this framework, to be offered to traders and small businesses.
- Communities of property owners advocating an agreement with the Official Association of Property Managers. In this case, cooperation with the private sector within the scope of energy efficiency and savings will be sought, in order to achieve savings in energy usage and contribute to improving the environment within the city.

DUE DATE

2011- 2015

ESTIMATED COST

- The cost of the measures will be borne by the companies benefiting from them.

POSITIVE IMPACT GENERATED

The savings generated, particularly with reference to heating energy, implies a savings in terms of the emissions of pollutants into the atmosphere.

TRACKING INDICATOR

- Entities subscribing to voluntary agreements.

3. CONSTRUCTION AND DEMOLITION WORK

Nº 47. Promotion of best practices for reducing air pollution during the construction and demolition of buildings

DESCRIPTION OF THE MEASURE

The process of building and demolishing structures is a source of air pollution, both from the machinery used, as well as from the process of excavating dry soils, etc., which contributes significantly to pollution from suspended particulates.

Aware of this fact, and that best practices applied to this sector substantially reduce the aforementioned negative impacts, Madrid City Council, in cooperation with businesses from the sector, will create and draft a "Guide to Best Environmental Practices in the Design, Construction, Use, Maintenance and Demolition of Buildings and Facilities." The main goal of this Guide is to promote adoption of sustainability criteria throughout the life cycle of buildings and facilities, in order to put into practice environmental impact reduction measures associated with buildings, thereby reducing pollution, and thus emissions, within our environment.

In order to create this document, the experience and knowledge of professionals from the sector will be used to find constructive solutions and action measures that will enable work to be done in a more sustainable way.

DUE DATE

2011- 2015

ESTIMATED COST

- € 7,000

POSITIVE IMPACT GENERATED

- Promotion of sustainability measures for all construction professionals.
- Reduction of environmental impact during construction, remodelling and demolition of buildings.

TRACKING INDICATOR

- Creation of the Guide.

Nº 48. Promotion of best practices in mobility infrastructure projects

DESCRIPTION OF THE MEASURE

The process of building and demolishing mobility structures is a source of air pollution, both from the machinery used, as well as from the process of excavating dry soils, etc., which contributes significantly to pollution from suspended particulates. Aware of this fact, and that best practices applied to this sector substantially reduce the aforementioned negative impacts, Madrid City Council, in cooperation with businesses from the sector, will create and draft a "Guide to Best Environmental Practices in the Construction, Maintenance and Demolition of Mobility Structures."

The main goal of this Guide is to promote adoption of sustainability criteria through all phases of these public works, in order to put into practice environmental impact reduction measures associated with them, thereby reducing pollution, and thus emissions, within our environment.

A Work Group will be set up to create the document. The group will be made up of the most relevant businesses within the sector in order have the experience and knowledge of professionals from companies participating in the Forum. Constructive solutions and action measures will be identified, which will enable work to be done in a more sustainable way.

DUE DATE

2011- 2015

ESTIMATED COST

- € 7,000

POSITIVE IMPACT GENERATED

- Awareness of sustainability methods among public road work professionals.
- Reduced environmental impact during mobility infrastructure projects.
- Pollution reduction, especially suspended particulates in work environments.

TRACKING INDICATOR

- Creation of the Guide.

4. CLEANING AND WASTE MANAGEMENT

Nº 49. Installation of central waste collection systems in new construction areas within the city.

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Waste collection in cities like Madrid implies intensive use of a large fleet of light and heavy vehicles which, although an essential service, it is also an endless source of air quality polluting emissions. Aware of this fact, Madrid City Council has been implementing management and technology measures for years in order to reduce these emissions. Noteworthy among these is the complete fleet renewal, which is now fuelled by compressed natural gas (CNG), the effect of which on air quality is significantly less than that of traditional fuels like diesel.

Along these lines, the goal of this measure is to continue to reduce the negative impact on air quality made by waste collection services, by reducing the size of daily city waste collection routes made by large trucks via installation of centralized waste collection at new housing development. To this end, feasibility studies will be done and appropriate management actions taken to ensure the ongoing, progressive implementation of centralized collection systems.

DUE DATE

Year 2011-2015

ESTIMATED COST

- This will vary based on the technology chosen and the extent to which it is applied.

POSITIVE IMPACT GENERATED

- Reduction in the number of heavy vehicle operations and the consequent positive impact in reducing traffic congestion and pollution.

TRACKING INDICATOR

- Percentage reduction in atmospheric emissions.

- Percentage increase in new housing developments having centralized waste collection systems.

Nº 50. Reduce pollution via street cleaning

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

City street cleaning done by the Municipal Cleaning Service plays an important role in reducing the problem of contamination on paved surfaces being disturbed and raised into the air as dust, as well as keeping public roads in a clean, sanitary condition and eliminating foul odours.

The goal of this measure is to strengthen the actions already being taken by Madrid City Council in this area by adding the following actions:

- Modification of the frequency of scheduled street cleaning for each district during periods of high atmospheric stability and prolonged absence of precipitation. The specific cleaning service that will be put into effect will cover the paved surfaces within the city (pavements, roads, boulevards, parks, etc.) having higher levels of suspended particulates. Preference will be given to performing this service in mixed form (tank truck and operator with pressure washer) and manual (street cleaning crew with hose carts) in order to be able to have better access to all paved surfaces. In this way, access will be increased to paved areas

- with less traffic, which are a large source of surface contamination. Non-potable water will be used for street cleaning.
- Special cleaning will be done within environments with high levels of contamination. This would be done manually, on foot, using recycled water from hydrants fed by an underground recycled water network, which would reduce the use of street-cleaning machinery and, as a result, the emissions of pollutants into the atmosphere.
 - Gradual implementation of a dedicated system for manual street cleaning on foot, by taking water from hydrants fed by an underground recycled water network within the Low Emission Zone, which would also reduce the use of street cleaning equipment and, as a result, the emission of pollutants into the atmosphere. Use of the existing network of municipal water galleries is proposed for extending the recycled water network from both the O'Donnell and the Parque del Oeste tanks.

DUE DATE

The dedicated street cleaning actions would be put into effect to the extent required, between 2011 and 2015. In the mean time, scheduled street cleaning services will also be used. Where they are not already present, special manual street cleaning actions would be put into effect to the extent that the corresponding recycled water supply network is available in the specific area.

ESTIMATED COST

- Variable based on the type and amount of cleaning.
- Investment for special street cleaning infrastructure: € 500,000

POSITIVE IMPACT GENERATED

- Reduced incidents of paved surface contamination being disturbed and becoming airborne dust, with the resulting reduction in pollution from suspended particulates.
- Maintenance of paved surfaces in an appropriately clean and sanitary condition.
- In the case of manual street cleaning, reduction of emissions from mechanical street cleaning.

TRACKING INDICATOR

- Number of manual street cleaning services.

Nº 51. Technological renewal of the Municipal Waste Collection and City Cleaning Services fleet of vehicles and machinery

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Currently, 85% of the 529 vehicles making up the city waste collection fleet use alternative fuels. 418 of the vehicles in this collection fleet (trucks of various sizes) are fuelled by natural gas, and the remainder, except for a small portion, are bioethanol or hybrid vehicles. Approximately 18% of the vehicles and machinery used in cleaning city districts (not including those belonging to SELUR, Special Services or Garbage Trucks) are biodiesel, electric, hybrid or natural gas.

The intention of the proposed measure is to advance the green renewal of the vehicle and machinery fleet designated for city waste collection and cleaning services, by making this technology available for the types of vehicles and machinery used. This renewal will be done gradually, by adding the requirements necessary to contracts as they expire between 2011 and 2015.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost of the measure will depend on the type and number of vehicles renewed as well as the technology used.

POSITIVE IMPACT GENERATED

- Reduction of air quality polluting emissions and greenhouse gases.

TRACKING INDICATOR

- Percentage of the fleet renewed with respect to 2010.

Nº 52. Renew waste water purification equipment motors to new technology**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

As is known, the process of electrical energy co-generation via burning of biogas from waste water purification processes as fuel produces NO_x compounds derived from the nitrogen present in sludge. In the specific case of Madrid, given the volume of water purified, sludge treatment contributes 6.7% of the NO_x emissions within the city.

For this reason, application of this measure is intended to reduce emissions of polluting gases into the atmosphere by increasing the energy efficiency of the equipment. It would consist of renewing a portion of the existing equipment by replacing it with cleaner, more energy-efficient equipment, because it is not possible to adapt the existing equipment to comply with current law.

This measure would require replacement of 8 generators (of the 25 in totals) manufactured prior to the year 2003 with new ones that comply with the stricter standards of exhaust emission.

DUE DATE

2012-2015

ESTIMATED COST

- The estimated cost of the 8 generators to be replaced is € 4,514,503

POSITIVE IMPACT GENERATED

- A reduction of approximately 15% from the current level of atmospheric emissions is estimated.

TRACKING INDICATOR

- Number of generators replaced.

5. URBAN PLANNING

Nº 53. Integrate items concerning air quality into the new General Plan for Urban Zoning

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In the last decade, urban policies implemented within the City of Madrid have presumed an inflection point at which it would be shown that socioeconomic development is not only compatible with protection of our natural environment, but also that caring for the environment is an inescapable requirement for achieving an urban model that is sustainable and lasting over time. In recent years, large urban renewal operations have been undertaken. Madrid Río is the most paradigmatic example, along with many others of a smaller scale at numerous squares and streets within the city, without any change in the General Plan. Now, in order to keep advancing into the future, changing the General Plan along these lines is essential.

Structural policies are what ensure an urban environment low in polluting emissions over the long term. In many cases the reasons underlying pollution are found within the city structure itself and in its growth model. For this reason, one of the key priorities within the scope of the Council's new General Plan for Urban Zoning is inclusion of an environmental element in all phases of creating the Plan and in all its core themes. The Madrid model will be shaped by environmental sensitivity and responsibility, and will result in a compact city, which promotes renewal, renovation and recycling within the city as it is today, by incorporating sustainability as a fundamental element and by including sustainable mobility planning as a requirement in the formulation of proposals for change and new urban growth.

Along these lines, particular attention will be paid to responsible energy efficiency performance on residential, equipment and infrastructure, by implementing cleaner and more renewable formulas, such as mobility based on public transport, conceived for the pedestrian, ensuring accessibility and configured for the use of alternatives other than cars, such as bicycles.

DUE DATE

Year 2011-2015

ESTIMATED COST

- No additional cost.

POSITIVE IMPACT GENERATED

- Definition of a General Plan for Urban Zoning in which the environmental aspect is duly integrated and, over the long term, will support structures and forms of urban development that pollute less and entail a smaller carbon footprint.

TRACKING INDICATOR

- Phases in the definition and creation of the Plan.

Nº 54. Roadway system review and development**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

In order to meet the demand for transport in any large city, while ensuring harmonious and sustainable growth that enables rational use of territorial resources (the roadways within a general integrated mobility system), there are certain undeniable implications to promote territorial cohesion. Likewise, improvement in roadway communication between neighbourhoods and districts ensures safer and more fluid mobility, as well as providing better public transport platforms, relieving congestion and reducing pollution from traffic.

In this context, the goal of this measure is:

- Development of the general roadway systems provided for in urban planning documents, in order to promote articulation of the interconnected network of roadways, by shaping the hubs that structure the commuter flow between different points of the city (north-south, east-west). This will also favour territorial equilibrium and support and ensure better sustainability.
- Review and improvement of the interconnectivity between neighbourhoods and districts. This will enable better communication between neighbourhoods and districts, facilitating their integration, as well as better controlling traffic, by qualifying access conditions to roads and motorways that cross or communicate with them, as well as connections with other high-capacity roadways (intersections, roundabouts, junctions, bypasses, etc.).

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost will vary based on roadway developments implemented. Inclusion of this measure in the Plan entails no additional cost.

POSITIVE IMPACT GENERATED

- Improvement of roadway communications has a direct effect on improving mobility, relieving congestion and reducing pollution associated with traffic.

TRACKING INDICATOR

- Roadway system review and development phases.

Nº 55. City centre revitalization measures**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Problems associated with the large metropolitan areas of the world are magnified within their central areas. Problems related to air quality occur here as well. For this reason, all policies meant to improve the quality of life in city centre areas, which are not designed exclusively as commercial areas, but rather place emphasis on the daily life of residents by humanizing the environment, minimizing traffic, adding green areas and trees, reducing noise and favouring pedestrians, have a direct effect on improving air quality.

In recent years, the Council has paid special attention to the city centre area of the city, a space covering almost 51 square kilometres bordered by Calle-30, wherein a third of the population of Madrid resides, and within which more than half the gross production of the city is generated. A great example of this are the more than 1,000 actions implemented, which have rendered new infrastructure and equipment or improved that already in existence, within two preferred scopes of action, which are closely tied to reduction of pollution and improvement in the quality of life.

- Residential renovation actions, from the most visible of the integrated renovation areas, to thousands of more widely spread actions promoted by municipal subsidies, agencies and regulations, which affect many buildings and residences.
- Sustainable mobility actions, which range from new transport networks, reserved bus platforms and new lines, through transport interchanges, intermodal areas and residential parking, up to support for pedestrians, in the form of widening pavements, building new pedestrian areas and designating areas of residential priority.

The Council will continue pushing City centre revitalization measures with an eye towards the future, in order to create an area that is more populous, more habitable, more socially integrated and more sustainable, with a special emphasis on improving air quality. To this end, the following lines of work with positive effects in terms of reducing pollution are proposed:

- Focus of the City centre Madrid Project drive: The City centre Madrid Project, which has already been announced publicly, offers an integrated vision of urban policies, involving a wide range of public policy areas and various departments within the Administration. It constitutes a large idea bank, some of which are more abstract and others more specific. Some require more detailed development before being rolled out and others are ready to be applied directly.
- Project to convert Plaza de España into a large city park. This plaza will become a new green lung, supplementing the Sabatini, the Templo de Debod and the new Madrid Río park. The action will also imply reorganization of the current metered parking. The project will be carried out in two phases: The first, which will be rolled out in the 2011-2014 period, will include an international competition of ideas for transforming this space, and the actions required to properly implement them in terms of urban planning will be put into place.
- Urban revitalization: this initiative will be implemented for the purpose of strengthening the Gran Vía hub, by expanding the network of town squares that run alongside it. Likewise, urban revitalization actions will be taken within the Madrid Río and Atocha environments. Recycling will enable old urban waste containers within the city to be re-purposed, giving way to new residential models, economic activities and public spaces within the city, with specific emphasis on sustainable mobility and energy efficiency.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost will vary based on actions implemented.
- Inclusion of this measure in the Plan entails no additional cost.

POSITIVE IMPACT GENERATED

Revitalization measures have a direct effect on improving mobility, deterring the use of private motor vehicles, providing more space for pedestrians, favouring the use of new, cleaner fuels and cleaner technology, relieving traffic congestion and reducing the pollution it causes.

TRACKING INDICATOR

- Implementation phases of the revitalization projects.

Nº 56. ECO-NEIGHBOURHOODS: TOWARDS A MORE GLOBAL IDEA OF SUSTAINABILITY**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

These include creation of new ecological neighbourhoods with renewable energy, promoting the use of alternatives to private motor vehicles with things such as electrical charging points and bicycle racks, as well as actions meant to favour lower energy consumption in buildings and more efficient waste management, among other things. Eco-neighbourhoods include actions such as:

- Internal organization and orientation of buildings in order to take advantage of natural light, prevailing winds, insulation and cross ventilation.
- Parking garages will include electric charging points and bicycle areas.
- Vehicle and pedestrian access.
- Areas with indigenous species planted.
- Installation of sustainable systems (district heating, etc.) for domestic hot water, heating and electrical energy.
- Sustainable water management for recycling waste water and rain water.

The areas in which these actions will be implemented are as follows: La Rosilla (Villa de Vallecas), Plata y Castañar (Villaverde) or the area of la Colonia de Nuestra Señora de los Ángeles (Puente de Vallecas). More than 2,500 protected homes are planned for the three eco-neighbourhoods, all of which are sponsored by the municipality.

DUE DATE

2011-2015

ESTIMATED COST

- Inclusion of this measure in the Plan entails no additional cost.

POSITIVE IMPACT GENERATED

- This project will increase personal mobility by adapting living spaces in a society that is ever more complex and dynamic.
- Improved residential living environment and conditions of use.
- Reduction of emissions from mobility.
- Reduced energy consumption, particularly domestic hot water (DHW), which means a reduction of polluting emissions.
- An increase in green areas.

TRACKING INDICATOR

- Implementation phases of the eco-neighbourhoods.

6. PARKS, GREEN AREAS AND TREES

Nº 57. Consolidate the contribution to the fight against air pollution of the city's natural heritage

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Madrid has one of the largest amounts of public green areas, in terms of surface area, and the greatest number of trees lining its streets of any city in the world. Protecting this valuable natural heritage and ensuring its proper care is a key policy of Madrid City Council in order to ensure the sustainability of the city. It is a policy that has received priority attention in recent years, as demonstrated by the fact that, since 2003, more than 1,200 hectares of new green areas and a million new trees have been added.

Among the benefits that trees and green areas bring to the urban ecosystem are those relating to its contribution to improving the atmosphere. Thus, besides helping to reduce the temperature, by mitigating the heat island effect and minimizing polluting processes such as the generation of ozone, which are catalyzed by high temperatures, trees play an active role in cleaning the air by helping to absorb pollution and acting as CO₂ sinks.

For all these reasons, the Council will continue promoting consolidation of the natural heritage within the City of Madrid in the years to come, by contributing to the fight against pollution, both in terms of air quality as well as climate change, with the following focus:

- New green areas will meet environmental sustainability criteria, in that forest-type areas will be created by planting indigenous species that are well-adapted to the climactic conditions of our City.
- Conservation tasks will be compatible with sustainability criteria, both in the use of vehicles and machinery (see Measure 65) as well as in waste management or via extension of the Recycled Water Network of Madrid for watering.

DUE DATE

Year 2011-2015

ESTIMATED COST

- There is no specific additional cost implied in the conservation of green areas.

POSITIVE IMPACT GENERATED

- Reduction in air quality pollutants.
- Increased CO₂ sink capacity.

TRACKING INDICATOR

- Surface area of green areas.
- Number of trees.

Nº 58. Reduce polluting emissions from maintenance tasks in green areas**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

In order to care for and maintain the natural heritage of the City of Madrid, which covers more than 6,000 hectares of green areas and includes more than 300,000 trees along roadways, a wide variety of fleet vehicles and machinery must be used. In recent years, the framework of actions taken to drive sustainable management of the natural heritage of the city has generated a significant renewal within the vehicle and machinery fleet, such that today, of the 346 vehicles, 143 use cleaner technology and cleaner fuels; 87 are electric vehicles; 20 are hybrids and 36 use CNG.

In this context, the goal of this measure is to continue to promote renewal of fleet vehicles and machinery used to conserve and maintain the natural heritage of the city to cleaner technology. To achieve this renewal, contract specification requirements will be raised for vehicles used in park conservation work, and priority will be given to those with no direct emissions, hybrids and natural gas-powered vehicles (CNG or LNG), in that order.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The cost will be borne by the contractors.

POSITIVE IMPACT GENERATED

- Reduction in air quality pollutants.
- Increased CO₂ sink capacity.

TRACKING INDICATOR

- Percentage of cleaner vehicles and machinery to total park vehicles and machinery.

7. STRENGTHENING INTEGRATION OF CONSIDERATIONS RELATIVE TO AIR QUALITY IN MUNICIPAL POLICIES

Nº 59. Improving city governance

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Given that one of the main elements in sustainable development is integration of environmental considerations into sector policies, these days, all specialized organizations agree on indicating that one of the areas where this integration is most efficient is municipal governance. Thus, Madrid City Council has considered for years that sustainability is the basis of its development model. The goal of this measure is to further reinforce this focus in coming years, particularly in the fight against pollution, via the following routes:

- Integration of municipal atmospheric protection (air quality and climate change), mobility and energy policies into a single Government Division, in order to reduce problems and increase synergy, by making better use of resources and optimizing human resources and materials. The intention of this reorganization of government structure is to strengthen the comprehensive and inclusive approach of municipal air quality policy, by promoting more sustainable mobility, more efficient energy use and a reduction in the types and sources of pollution.
- Progressive implementation of a more modern and efficient management model, founded on integration of services and payment based on quality of results, called Madrid "Smart City". This is a multi-activity service model that enables long-term planning, more synergy and better efficiency, both in terms of assignment of resources as well as in results and sustainability. This model promotes technological development and innovation and enables better quality control and greater participation from citizens. This greater efficiency will be particularly important with respect to energy consumption, fuel use, route optimization, promotion of renewable energy, use of information and communication technologies (ICTs) and reduction in the sources of pollution.
- Continuation of the drive for electronic administration, which would mean less need for citizens to travel in order to complete tasks and make contact involved in Madrid City Council services.

DUE DATE

Year 2011-2015

ESTIMATED COST

- The streamlining and integration model should not increase expenses.

POSITIVE IMPACT GENERATED

- More efficient use of resources, lower environmental impact by municipal services, greater energy savings and less pollution.

TRACKING INDICATOR

- Governmental restructuring in order to integrate air quality policies.
- Degree of implementation of the Madrid "Smart City" model.

Nº 60. Green public contracting drive**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Madrid City Council has developed an intense green-purchasing policy over recent years, via the addition of environmental criteria to contracting. To this end, in 2005 the Governing Board approved the Environmental Best Practices Code on the Matter of Local Contracting, which was later expanded and adapted to the new Public Contracting Law in 2010. Likewise, new green contracting criteria were adopted, which range from the municipal fleets of vehicles, through forest products (wood, paper, cardboard, etc.), to construction projects, supplies, services, public works concessions and project tenders. The result of this green public contracting policy is that Madrid City Council has advanced significantly with integrating environmental considerations into its management, by promoting responsible consumption, minimizing the use of raw materials, pushing for environmental certification, cleaner, more efficient technology and development of renewable energy.

Strengthening the application of green contracting during the 2011-2015 period is proposed, by placing a special emphasis on areas more directly related to air quality. To this end, particular attention will be paid to improving and expanding criteria relative to the use of cleaner technology and cleaner fuels, both concerning vehicles, machinery and other equipment generating emissions that pollute the air, as well as materials, such as asphalt or paint, or services and projects that may to some extent cause pollution.

The first step in implementing this measure is to do an analysis of the areas of activity that must be covered, in order to identify new criteria that should be added to contracting to strengthen and complete those already in place.

DUE DATE

Year 2011-2015

ESTIMATED COST

- No additional cost.

POSITIVE IMPACT GENERATED

- Increased use and consumption of goods and services with less negative environmental impact.
- Promotion of cleaner technologies and cleaner fuels.
- Air pollution reduction.

TRACKING INDICATOR

- New contracting requirements.

Nº 61. Promotion of sustainable public events**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The City of Madrid is the stage for a large number of public events each year, both in public as well as private places (more than 3000 in public places), which impact air quality due to massive influx, extra mobility or energy or material transport needs. In addition, such events represent a powerful opportunity for creating environmental awareness. Thus, based on the belief that integration of environmental considerations should extend to all areas of activity, the Council has been developing a line of work for incorporating environmental practices into events, both those which are organized by the Council itself, as well as those organized by external entities. The product of this labour has been the gradual incorporation of best practices into various public events, as well as the creation of Guides for the organization of

sustainable events, or initiation of the "Compensate Madrid" project, which allows public and private entities to compensate for their emissions of greenhouse gases by planting trees within the city.

The goal of this measure is to encourage actions that reduce the emissions of pollutants into the atmosphere caused by events. To accomplish this, the following actions are contemplated:

- Strengthen integration of sustainable mobility measures into events.
- Promote alternatives to conventional generators for meeting the electrical energy needs of public events.
- Favour the incorporation of renewable energy systems and cleaner HVAC systems at facilities (permanent or temporary) where events are held.
- Reduce the need for additional cleaning activities.
- Encourage event organizers to commit to municipal air quality policies through actions such as compensating for emissions through the "Compensate Madrid" project.

DUE DATE

Year 2011-2015

ESTIMATED COST

- No additional cost.

POSITIVE IMPACT GENERATED

- Reduction of pollution from events.
- Increase in citizen awareness concerning air quality through communication actions that reflect measures adopted at events.

TRACKING INDICATOR

- Events that incorporate sustainable practices.
- Tons of CO₂ generated at events compensated via the "Compensate Madrid" project.

Nº 62. Promotion of more sustainable sports activities and infrastructures

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

The pairing of the environment and sports is a first-order method of promoting sustainability. Thus, Madrid City Council has been implementing initiatives in this area for years, many of which have positive effects on improving air quality.

From this perspective, based on the wide range of experience Madrid City Council has acquired through its work as a candidate city for hosting the Olympic Games, the goal of this measure is to strengthen integration of environmental aspects into sports activities, by using the popularity of sports to stimulate environmental awareness and to promote development of sports installations that respect the environment, placing particular emphasis on improving air quality. To this end, the following actions will be implemented:

- Reinforce energy efficiency and savings measures, and promote cleaner technologies and cleaner fuels, as well as renewable energy at all municipal sports facilities.
- Promotion of the use of public transport to access sports facilities and encourage the use of bicycles.
- Promotion of implementation of environmental programmes concerning pollution and compensation for CO₂ emissions at large sporting events: Marathon, Tennis Open, European and World Championships hosted by Madrid.

- Establish collaboration formulas with leading sports clubs within the city for incorporation of environmental practices at their facilities and events.
- Promotion of the use of sports events to raise awareness of environmental issues.

DUE DATE

Year 2011-2015

ESTIMATED COST

- € 100,000

POSITIVE IMPACT GENERATED

- Energy savings.
- Reduction in the use of private motor vehicles.
- Reduction of CO₂ emissions and atmospheric pollutants.
- Role of public authorities to act as an example and creating environmental awareness.

TRACKING INDICATOR

- Municipal sports facilities at which energy savings and efficiency measures have been strengthened.
- Sports events at which best environmental practices have been applied and tons of CO₂ for which compensation has been made.

8. MONITORING, FORECASTING AND INFORMATION SYSTEMS

Nº 63. Improve the air quality monitoring, forecasting and information system of Madrid

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

With the restructuring done during 2009, Madrid City Council adopted its Air Quality Monitoring Network to Directive 2008/50, in order to obtain the best information on air pollution from a scientific/technical perspective and to achieve the best environmental and human health protection within Madrid municipality. As a result, the current Network meets the new micro-macro implementation and station classification criteria provided for in Directive 2008/50.

Within this context, the goal of this measure is to ensure continuous improvement in the air quality monitoring, forecasting and information system within the City of Madrid through the following actions:

- Implementation of an integrated environmental quality management procedure into the system. This action will enable the organization to continue to improve on both environmental matters, as well as in the quality of service offered for its later certification and verification per ISO-9001, ISO-14001 and EMAS European and international standards and regulations.
- Renewal of air quality monitoring network equipment. This action will enable permanent technical upgrading of the Network, which will ensure that pollution analyzers meet current standard methods as well as the demands of new evaluation parameters.

DUE DATE

2011 – 2015

ESTIMATED COST

- € 803,647

POSITIVE IMPACT GENERATED

- Improved information available for policy setters and managers.
- Improved offering of evaluation and information services to the public.

TRACKING INDICATOR

- Acquisition of annual renewal and certifications by an organization accredited by the national certification entity.
- Equipment renewed.

Nº 64. Improvements in the application of data control and analysis within air quality forecasting and information systems

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In keeping with the policy of continued improvements to air quality monitoring, forecasting and information within the City of Madrid, which were mentioned in Measure No. 63, the goal of this measure is to increase the quality of information analysis by system managers as well as that of the information offered to the public. To this end, this measure includes the following actions:

- Improve the air quality analysis, monitoring and control system of the City of Madrid by adding traffic model information.

- Improve air quality prediction tools by adding weather network information to the monitoring system.
- Improve the website design in order to make it more attractive to citizens and easier to access, by adding new static content.
- Improve the "Madrid Air" iPhone application by adding new functionalities and implementing new programmes on air quality from Madrid City Council in other smartphones.

DUE DATE

2011 – 2015

ESTIMATED COST

- € 240,000

POSITIVE IMPACT GENERATED

- Improvement in the quality of information managed by system administrators.
- Quantitative and qualitative increase in the information provided to citizens.

TRACKING INDICATOR

- Degree to which weather and traffic information is integrated into the system.
- Increase in visits to the web page.

Nº 65. Development of health information and monitoring tools for health protection**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

- Health protection actions during air pollution episodes implemented by the Environmental Health Alert System in order to improve efficacy of interventions.

This is a communications system that makes key reports to those requesting maximum distribution of health recommendations to the population, based on the pollutant that has exceeded limits, with special emphasis on the most vulnerable sections of the population.

- Development of air quality indicators within Madrid's Health Monitoring System of Environmental Factors.

Within the framework of its strategy on environmental health, the Council, via Madrid Health, is implementing a Health Monitoring System for Environmental Factors having an impact on health. To this end it is gathering and managing information on:

- Levels of the various environmental pollutants.
- Health information in order to estimate the cause/effect relationship.

In this context, the goal of this measure is to encourage development of a specific line relating to air quality within the System, which will gather information from two basic sources:

- Data on air quality from the air quality monitoring, forecasting and information system of Madrid.
- Health data from a wide variety of sources for statistics provided by independent, state and public organizations.
- As support for implementation of this line in the System, specific comparative studies will be initiated on particular aspects of health and their relationship to air pollution exposure.

DUE DATE

2011-2015

ESTIMATED COST

- € 118,000

POSITIVE IMPACT GENERATED

- Public awareness of the health effects of high levels of air pollution.
- Reduction in exposure of the most vulnerable portions of the population.
- Improvements to health prevention systems.
- Tracking of factors that may affect health.

TRACKING INDICATOR

- Number of days per year on which the Environmental Health Alerts System activates.
- Phases of development of the specific Environmental Health Risk Monitoring System.

9. TRAINING, INFORMATION AND AWARENESS

Nº 66. Train municipal service personnel on sustainability

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In order to properly integrate environmental considerations into the various municipal activity sectors, Council service personnel must be involved in the process. To this effect, it is essential that they acquire the necessary knowledge and skills. With this goal in mind, Madrid City Council has included many courses on matters such as sustainable mobility, green contracting or energy efficiency management in its Public Employees Training Plan. Likewise, both the Council and its Public Companies conduct eco-driving courses for specific groups (bus and tow truck drivers, etc.) which include energy-saving driving and pollution reduction techniques along with matters concerning safety.

The goal of this measure is to consolidate and strengthen sustainability training for municipal public employees, with special emphasis on subjects that may have a large effect on streamlined use of resources in municipal management and thus minimize negative impacts on the environment. To this end, the following actions will be implemented:

- Courses being conducted will be reviewed for possible improvements and to identify new areas of knowledge that may have particular impact in terms of air pollution.
- Maintenance of eco-driving courses for drivers in the Council as well as its independent organizations and public enterprises.

DUE DATE

Year 2011-2015

ESTIMATED COST

- No additional cost.

POSITIVE IMPACT GENERATED

- Increase in municipal training for more sustainable management.
- Increase in public employee awareness on matters of sustainability.
- Improved driving, reduced consumption and polluting emissions.

TRACKING INDICATOR

- Number of training classes conducted annually.
- Number of eco-driving courses.

Nº 67. Offer training on air quality at schools

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

In recent years Madrid City Council has been placing special emphasis on teaching students about environmental values and knowledge. To this end, various highly-ambitious programmes are being developed. Among the more noteworthy are "Educate today for a more sustainable Madrid," which includes the "Student 21 Agenda" and "Madrid, an open book" which offers city schools a wide range of educational projects for students on many aspects of the urban environment each year.

The goal of this measure is to consolidate and strengthen this line of municipal action using acquired experience, placing special emphasis on increasing awareness about air pollution, its causes, the main emission sources, current policies and measures and habits and behaviours that can contribute to improving air quality in the city.

Existing educational programmes will be reviewed with this in mind in order to reinforce or include, as the case may be, materials enabling Madrid students to learn the various aspects of air quality within the city and how to contribute to improving them.

DUE DATE

Year 2011-2015

ESTIMATED COST

- Included in the cost of current programmes.

POSITIVE IMPACT GENERATED

- Increased student awareness and sensitivity.
- Transfer of best practices to the school environment.

TRACKING INDICATOR

- Number of training classes conducted and programmes run annually.
- Number of students participating in courses and programmes.

Nº 68. Training to promote sustainable mobility
DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Experience acquired by Madrid City Council in promoting sustainable mobility has shown that, apart from offering quality transport alternatives and information on them, in order to advance the process of changing habits, it is essential to educate citizens and raise their awareness.

Bearing this in mind, the goal of this measure is to reinforce actions that have already been implemented by using the resources of the Environmental Activities Programme, the Environmental Education Centres Programme and the Learning Centres Programme, in order to reach all segments of the population. Specifically, the following objectives will be pursued:

- Promotion of social values embodied in the new sustainable mobility culture.
- Promotion of mobility alternatives other than private motor vehicles, with an emphasis on the value of pedestrian mobility.
- Increasing use of public transport by children.
- Improving awareness of information about alternative and public transport within the City of Madrid.

The methods used will be those pertaining to the aforementioned programmes themselves, including the material resources required to conduct training and raise awareness.

DUE DATE

Year 2012-2015

ESTIMATED COST

- € 120.000

POSITIVE IMPACT GENERATED

- Increased knowledge and awareness among citizens.
- Changes in the lifestyles of citizens.
- Transfer of best practices conducive to reducing pollution.

TRACKING INDICATOR

- Number of activities implemented annually.
- Number of people participating in the activities.

Nº 69. New comprehensive municipal information model on sustainable mobility alternatives in the City of Madrid**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

One of the factors that conditions what citizens consider when deciding how to travel is the availability of information. Providing all possible information on the various sustainable mobility alternatives within the city, promoting their advantages and detailing the conditions of their use favours use of alternative methods and, in principle, acts a deterrent to the use of private motor vehicles.

Madrid City Council has been developing many channels to facilitate this process in recent years, and these days information about transport via bus, bicycle or motorcycle is easily available.

The goal of this measure is to renew the municipal information drive for sustainable mobility within the city. To this end, a new information model will be developed, which is based on the different resources currently available, and into which all items relative to the various forms of sustainable mobility offered by the City of Madrid will be integrated. This does not simply mean grouping all available information, but rather creating new formulas and channels that are accessible to all citizens, which will inform them about more sustainable alternatives, their benefits and the power to thus opt for the most appropriate method of transport for each particular need.

The new comprehensive model will always include information about: public transport, pedestrian mobility, bicycle mobility, motorcycle mobility, electric mobility and carpooling.

An evaluation of the existing information will be performed, strengths and weaknesses will be examined, problems will be corrected and omissions filled, and the new content will be implemented and integrated into a single portal with various access routes.

DUE DATE

Year 2012-2015

ESTIMATED COST

- € 150,000

POSITIVE IMPACT GENERATED

- Increased awareness of sustainable mobility alternatives.
- Increased use of alternative mobility methods.
- Reduced usage of private motor vehicles and lower emissions.

TRACKING INDICATOR

- Creation of the new model; number of alternative mobility methods added.
- Number of system users.

Nº 70. Promotion of citizen awareness of the Air Quality Plan**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The Council now offers a City Air Quality Information Service on its website, which provides near real-time information on the quality index for each one of the main pollutants, as well as the hourly index and information relative to each one of the 25 monitoring stations. This information can also be accessed by downloading the free "Madrid Air" iPhone app which, besides providing information on pollutants, also includes a guide of practical recommendations for contributing to better air quality in Madrid. In addition, an SMS alert service has been implemented to provide information to the public on warning level limits and pollution alert thresholds exceeded (notification and alert). Anyone interested can sign up for free. As summarized in Measure 71, the Council plans to continue improving this information system in the years to come.

The council will continue to push this specific line within the framework of its annual Environmental Activities Programme at Environmental Education Centres, by using this measure to promote more and better citizen awareness on air quality. With this goal in mind, activities covering the following items will be carried out:

- Improved information on the Air Quality Plan directed towards citizens, by making it more understandable to all sectors of the population.
- Increased level of awareness on sources and types of pollutants.
- Distribution of information about the Air Quality Monitoring and Control Network within the City of Madrid and its accessibility via the website.

The resources of the Environmental Activities Programme resources will be used:

- To design specific informational and educational materials.
- To offer tours of monitoring and control facilities.
- To organize workshops, conferences and seminars.

DUE DATE

Year 2012-2015

ESTIMATED COST

- € 100,000

POSITIVE IMPACT GENERATED

- Increased knowledge and awareness among citizens.
- Transfer of best practices conducive to reducing pollution.

TRACKING INDICATOR

- Number of activities implemented annually.
- Number of people participating in the activities.

7. ESTIMATED POTENTIAL REDUCTION OF EMISSIONS FROM THE PLAN

Madrid's Air Quality Plan 2011-2015 includes a set of measures meant to reduce concentrations of nitrogen dioxide (NO_2) in the ambient air, by acting upon the main sources of nitrogen oxides (NO_x), one of the most significant of which is vehicular traffic. Consequently, the main goal of the measures provided for in the plan is to reduce NO_x emissions (generated from NO_2), with particular emphasis on those caused by traffic.

In order to understand the potential of the measures included in the Plan to reduce NO_x emissions, they have been subjected to a process of analysis carried out by the School of Industrial Engineering of the Universidad Politécnica de Madrid (UPM). To this end, the UPM has implemented and applied a methodology that has been validated in previous studies. A description of the methodology is detailed in Annex V.

According to the evaluation done by UPM, the Plan measures show quantifiable reductions that would imply a total decrease of 1,887 tons of NO_x emissions in 2014 with respect to 2009. This translates to a 9.2% reduction in overall emissions within the city over 2009. The previous total was 20,445 tons, according to the "1999-2009 inventory of the emissions of pollutants into the atmosphere within the municipal boundaries of Madrid (2011 Edition)."

Among the measures that achieve the best results are those associated with implementation of Low Emission Zones (LEZ), which restrict vehicular traffic, such as the creation of new areas of residential priority, completely pedestrianizing areas and reductions in road capacity. Reductions linked to renewal of public service fleets (EMT buses) and those applied to the taxi sector are also relevant. It is also worth pointing out the impact made by converting electrical generator motors at residential water purification stations.

In addition, according to UPM methodology, implementation of specific measures included in the Plan, along with all other national, local and independent measures and policies in force, would reduce total NO_x emissions within the city by 16% in 2014 with respect to 2009 values.

This additional average 16% reduction effort implies a sector-scale reduction with respect to 2009 values in the following order: 22% on vehicular traffic, 14% on waste treatment and disposal (including residential water) and 4% on Residential, Commercial and Institutional (RCI) sector combustion.

In order to evaluate the impact of these reductions on air quality in Madrid municipality, the UPM has also conducted a mesoscale simulation to estimate NO_2 concentration levels associated with the emissions reduction scenario described.

According to the simulation done, the NO_2 concentration values would be reduced very significantly within the borders of Madrid, as well as within adjacent municipalities. The results indicate that annual average concentrations within the borders of the municipality would decrease to below $40 \mu\text{g}/\text{m}^3$ and would drop below the legally-established limit values for this pollutant.

8. PLAN TRACKING AND AIR QUALITY INFORMATION

8.1. Plan tracking

Madrid's Air Quality Plan is a dynamic tool that requires an equally dynamic tracking and results evaluation system, which will enable achievement of its objectives in reducing polluting emissions.

The following objectives will be sought with Plan Tracking and Evaluation:

1. Analysis of the results obtained by measures included in the Plan.
2. Identification of possible deviations with respect to objectives.
3. Determination of corrective measures.
4. Public awareness of the Plan results.

Tracking and Evaluation of the Plan measures will be the responsibility of the General Directorate of Sustainability of the Government Division of Environment, Safety and Mobility.

The Plan indicators will be used to evaluate fulfilment of its objectives. This evaluation will determine the degree of fulfilment. Likewise, an annual follow-up of progress regarding emissions will be done via the municipal Inventory of the various sources of pollution, as well as progress with concentrations in the ambient air based on data provided by the Monitoring Network.

The General Directorate of Sustainability will issue an annual tracking report for Madrid's Air Quality Plan and will present its findings to the Air Quality Commission in a Technical Report.

The Annual Report will include the following items:

- Analysis of the Emissions Inventory from Madrid City Council and evaluation of the increase or decrease in emissions compared to the previous year and with respect to the Plan start date.
- A study of fulfilment of the annual objectives to reduce NO₂, levels, suspended particulates and O₃.
- An evaluation of fulfilment of the Plan's measures.

8.2 Air quality information system

Without prejudice to the annual Plan evaluation and tracking reports, Madrid City Council has an Air Quality Information System that enables citizens to check air quality status.

Citizens can check data recorded hour by hour at the measuring stations within the Madrid City Council Air Quality Monitoring Network via the Madrid City Council Air Quality website¹¹.

There is a graph of the data recorded at the stations, with filter options to facilitate access to all information concerning air quality for all citizens.

Likewise, general information is available on matters concerning air quality. It includes types of pollutants and their effects, a report on recommendations for improving air quality within Madrid municipality, applicable current law and an option to subscribe to the SMS alert service for free, in order to be informed when one of the warning or alert thresholds is exceeded.

"Madrid Air" applications for smart phones have also been developed. These enable hour-by-hour checks on the values measured at each station, as well as the air quality index and supplemental information.

There are also informational monitors located at strategic points within the city, like Barajas Airport, IFEMA and information panels in the city centre (Plaza de Colón).

¹¹ <http://www.mambiente.munimadrid.es/opencms/opencms/calaire>

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ANNEX I

EVALUATION OF COMPLIANCE WITH MEASURES IN THE LOCAL AIR QUALITY STRATEGY 2006-2010

REVIEW OF THE MEASURES ADOPTED IN THE CITY OF MADRID LOCAL AIR QUALITY STRATEGY 2006-2010	
1. TRAFFIC	
1.1. RESTRICTION MEASURES	
1.	- Expansion of restricted traffic areas
2.	- Recovery of urban space for pedestrians
3.	- Establishment of Low Emission Zones (LEZ)
4.	- Modification and expansion of the Regulated Parking System (RPS)
5.	- Modification of the parking spaces offered at municipal parking lots
6.	- Increase in the number of parking spaces available for two-wheeled vehicles
1.2. PUBLIC TRANSPORT PROMOTION MEASURES	
7.	- Action at public transport Interchanges
8.	- Expansion and improvement of the bus lane network
9.	- Construction of park and ride parking lots
10.	- Improvement to information provided on mobility
11.	- Expansion and improvement of the EMT network
12.	- Improvement of the Metro
13.	- Improvement of the Suburban train service
14.	- Implementation of public transport at industrial and business parks
1.3. CONTROL MEASURES	
15.	- Traffic Speed limits
16.	- Expansion of the Mobility Agent force
1.4. VEHICLE MEASURES	
17.	- Reduction of emissions from the taxi sector
18.	- Reduction of emissions from the goods delivery and transport sector
19.	- Renewal of the Municipal Services fleet of vehicles
20.	- Renewal of the Municipal Services fleet of vehicles. Natural Heritage
21.	- Establishment of agreements with private enterprises and institutions for acquiring low/no emission vehicles
22.	- Promote the use of fuels that are more respectful of the environment
23.	- Creation of a network of clean alternative fuel Service Stations
24.	- Incentive to replace cars with motorcycles
25.	- Incentive to replace cars with cleaner vehicles
1.5. OTHER MEASURES	
26.	- Promotion of the use of bicycles
27.	- Create the position of Mobility Manager
28.	- Promotion of the use of carpooling
29.	- Promotion of the carsharing service
30.	- Reduce emissions from the airport
31.	- Promotion of the efficient use of ICTs to reduce the need to commute
2. STATIONARY SOURCES	
2.1. RESPONSIBLE ENERGY USE	
32.	- City of Madrid efficient and sustainable energy use Plan
33.	- Modernize industrial production processes
2.2. EMISSIONS REDUCTIONS	
34.	- Boiler replacement
35.	- Reduce emissions from construction-related activities
36.	- Reduce emissions from volatile organic compounds
37.	- Promotion of the use of bituminous foam in asphalt for paving roads and pavements
38.	- Install vapour recovery units at service stations
3. GOVERNMENTAL MEASURES	
39.	- Addition of environmental criteria to municipal tax code
4. AWARENESS & PARTICIPATION COMMUNICATION	
40.	- Education and communication actions focusing on Air Quality Strategy

5. STUDIES AND KNOWLEDGE IMPROVEMENT
41. - Promotion of research and development regarding air pollution
6. MONITORING. MONITORING IMPROVEMENTS
42. - Set up specific networks for monitoring each pollutant
43. - Adaptation of particulate monitoring to advances in scientific knowledge and standards
7. WASTE
44. - Reduction of emissions into the atmosphere from waste management facilities at Valdemingómez Technology Park
8. CLIMATE CHANGE
45. - Action plan for the fight against climate change
9. OTHER MEASURES
9.1. MUNICIPAL CLEANING SERVICES
46. - Street cleaning
9.2. KNOWLEDGE IMPROVEMENT
47. - Study on the health impacts of air pollution

1. TRAFFIC**1.1. RESTRICTION MEASURES****1. Expansion of restricted traffic areas**

Creation of new restricted vehicle access areas. Studies required for the creation of new Areas of residential priority (ARP) will be done on this matter.

- Embajadores Neighbourhood.

Execution time

2006 - 2010

Indicators

- Size of ARPs (Letras, Cortes and Embajadores): 155 hectares.
- Number of residents within Areas of residential priority: 62,178.
- Number of parking spaces for residents within Areas of residential priority: 2,283 street-level parking spaces and 2,351 underground parking spaces.

Likewise, construction of a new parking area for residents in the Letras Neighbourhood (Calle Alameda) is planned, which will add 171 underground parking spaces to the total.

Notes and observations

Madrid ARPs are internationally renowned and one more step towards achieving sustainable mobility. Among the benefits worth noting are the reduction in pollution, reduction of noise, improved conditions for businesses and residents and streamlining of loading and unloading work. Moreover, incentive will be provided for using means of transport such as motorcycles, and cleaner delivery vehicles to circulate within these areas.

These are the first areas within the City of Madrid that permit access only to residents, public transport, emergency services, motorcycles and vehicles loading and unloading (during specific hours of the day). With their creation, clear support for restricting car access, in order to return these iconic neighbourhoods to residents and pedestrians, is shown for the first time.

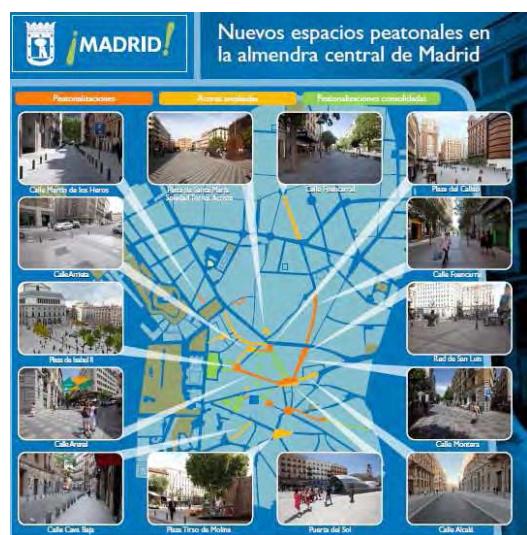
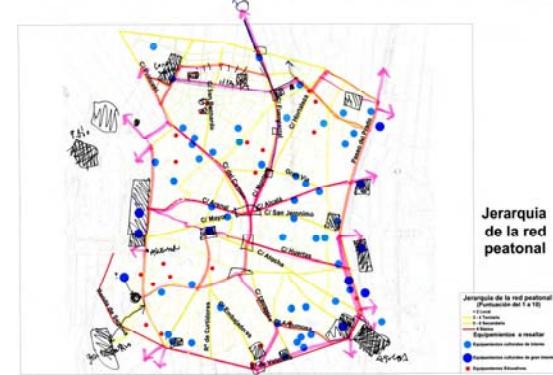
The ARP for the Embajadores Neighbourhood was set up and put into effect in July of 2006, adding to those in Letras and Cortes, which were put in place during 2004-2005. During the 2006-2010 period, improvements were made to the control and management of the automated infrastructure and access, with a noteworthy expansion to the number of access cameras, and in the communications network and the creation of a new website to inform the public. It is worth mentioning that every Area of residential priority has an associated customer service office available to the public.

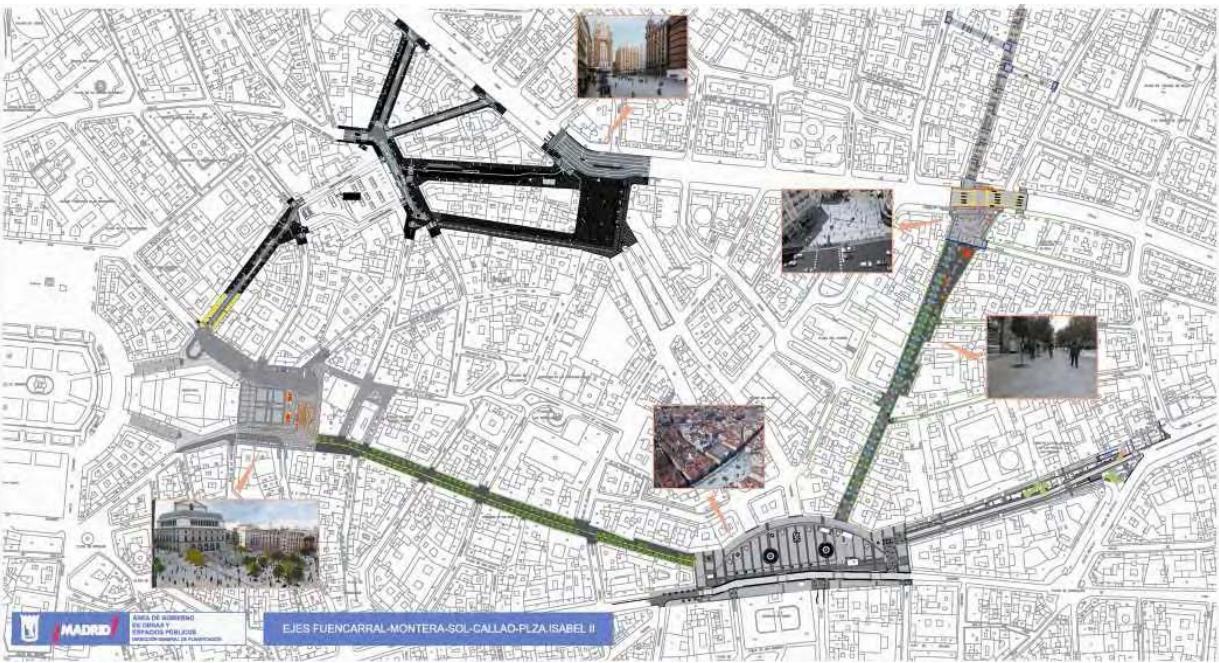
Management and maintenance of the ARP control systems costs 1,146,017.69 Euros per year.

2. Recovery of urban space for pedestrians

The Strategy does not propose a single, municipal-level solution. It covers an increase in pedestrian mobility using a combination of measures adapted to the actual circumstances in each area.

A draft of the Strategy has been created and entitled *Development of a strategy for creating a network of pedestrian priority routes within the City centre District*. Plans have been prepared and work done based on the strategy.



Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> • Increase in the amount of walking space. • Percentage of commuting done by residents on foot. 29% (2004) – 29% (2008). • Reduction in ADV. 5.25% decrease from 2006 to 2010. • Average vehicle speed within the municipality: 23.56 km/h (2006) – 24.16 km/h (2010).
Notes and observations
<p>Actions have been taken to partially or completely restrict use of private motor vehicles. These include various actions giving priority to pedestrian mobility tied to development of large commuter hubs.</p> <p>During the 2006-2010 period, the following actions were taken:</p> <ul style="list-style-type: none"> - North-South Hub: Fuencarral-Montera-Sol section: Montera, Fuencarral (between Hernan Cortes and the San Luis Network), Puerta del Sol and calle Alcala up to calle Sevilla were pedestrianized. - The Prado-Recoletos Hub was remodelled, which included pedestrianizing Cuesta de Moyano. - Calle de Serrano and adjoining streets as well as calle de Jorge Juan were remodelled. - The business centre at Bravo Murillo and Plaza de Castilla were remodelled. - Plaza de Callao and its surroundings were remodelled (calle de Preciados, Jacometrezo, Silva and San Bernardo). - Calle de Arenal and Plaza de Isabel II (Opera) were pedestrianized. <p>Among the actions taken within the central hub, the following pedestrian improvements stand out: Calle de Huertas and the Letras Neighbourhood, Plaza and Cuesta de Santo Domingo, Plaza de Marques de Vadillo, Plaza de Santa Bárbara, Calle de General Ricardos, Plaza de Tirso de Molina, calle de Pilar de Zaragoza, the surroundings of plaza de La Luna (Santa Maria Soledad Torres Acosta), and the pedestrian routes through the Tetuan Neighbourhood.</p> <p>In addition, all actions taken at Madrid-Rio, which have been in progress for the last four years, have been completed, giving the city a new linear park, with many pedestrian zones and recreation areas for city residents.</p> <p>The Madrid on Foot Project, which seeks to promote pedestrian mobility and fitness routes is worth noting.</p> <p>The Safe Road to School project has also been implemented. It focuses on improving road and citizen safety of children when commuting daily to or from schools, in a way that enables independent commuting and thus reduces the use of motor vehicles. There are 23 schools in the project, and several of them have completed all construction and signage measures proposed by the programme.</p> 

3. Establishment of Low Emission Zones (LEZ)
The goal of establishing a Low Emission Zone (LEZ) is to set aside a section of the city in which access is restricted to those vehicles that, through their technology, have higher emissions.
<ul style="list-style-type: none"> Four zone limitation actions.
Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> Average traffic volume measured at permanent stations installed on El Segundo Cinturón [belt highway] and in the section designated as the Low Emission Zone in the area it surrounds: 1,329,100 (2006) - 1,240,900 (2010).
Notes and observations
In October of 2009, after several projects were completed within the City of Madrid by the Division of the Environment in cooperation with the Division Safety and Mobility, including classification of vehicles in circulation, the borders of the area that will form the Low Emission Zone were approved. It has been established that the main sources of NO ₂ emissions include cars (57.9%), taxis (13.6%) and buses (11.7%). Of the cars circulating within Madrid, those running on diesel generate 98.5% of the NO ₂ emissions. It is worth noting that 68.7% of travel is done in vehicles that use diesel and that 96% of cars are less than 10 years old and run on diesel. Progressive implementation of a Low Emission Zone (LEZ) will be done in stages. The first will be defined within the area having the highest congestion and pollution levels within the city. This zone has been defined by technicians from the Divisions of Mobility and the Environment, based on the ISO pollution study conducted by the University of Alcalá de Henares and the circulating vehicle classification study conducted by the Council.

4. Modification and expansion of the Regulated Parking System (RPS)
The action on inner-city parking availability proposed one of the most significant deterrent measures on the use of private motor vehicles within the Strategy, because it reduces the ability to use cars by reducing and changing the conditions of use on space designated for parking.
<ul style="list-style-type: none"> In general terms, during this Strategy the service has expanded to most of the city, as well as the historical Fuencarral, Hortaleza, Vicalvaro, Villa de Vallecas and Barajas quarters. Special Areas will also be created, which require specific regulations due to the peculiar characteristics differentiating them from all other parking spaces (high rotation, health considerations, commercial hubs, public events and residential priority).
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> Number of regulated blue parking spaces: 39,942 (2006); 35,056 (2009). Number of regulated green parking spaces: 127,009 (2006); 131,248 (2009). Unregulated: 8.50 % hours/parking space (2006) - 2.94 % hours/parking space (2009). Blue zone occupancy (inside 2nd belt): 91 % hours/parking space (2007)-94 % hours/parking space (2009). Blue zone occupancy (outside 2nd belt): 78 % hours/parking space (2007)-87 % hours/parking space (2009). Vehicle/parking space/day ratio: blue zone: 4.15 (2006) – 5.13 (2009). Vehicle/parking space/day ratio: green zone: 1.30 (2006) – 1.37 (2009).
Notes and observations
The Regulated Parking System was implemented in November 2002 and has expanded progressively during 2003, 2004 and 2006. On March 1, 2006 it was expanded and its current configuration includes Zones 4, 5 and 6. Thus, it now includes the entire area inside the M-30 perimeter, as well as the historic Fuencarral, Hortaleza, Carabanchel Alto and Bajo quarters.
In October 2005 a new Mobility Ordinance was approved, which enabled legal creation and implementation of Special Areas requiring specific regulation that is different from all other parking spaces. The following Special Areas have been created under this law: "Commercial and Industrial Vehicles" on November 2, 2006; "La Paz Health Area" on June 25, 2007; "Vehicle Repair Garages" on July 1, 2008; and on March 8, 2009: "Public Events: Las Ventas Bullring."
Environmental criteria were added to RPS regulations. The first action implemented in this direction was approval of a reform of the Tax Ordinances for the year 2010, making electric and fuel-cell vehicles exempt from the RPS fee, and allowed to park for free in any regulated zone. Likewise, a study was initiated to articulate other possible credits within the scope of the RPS for cleaner vehicles, within the limits established by the applicable law.

5. Modification of the parking spaces offered at municipal parking lots																		
The number of available Residential Parking Spaces (RPS) will be increased, and between 45 and 50 parking lots will be studied for this purpose.																		
Execution time																		
2006-2010																		
Indicators																		
<ul style="list-style-type: none"> Number of parking spaces available for residents within Municipal Parking Lots: 86,769 (2006)-94,995 (2010). Number of metered parking spaces within Municipal Parking Lots: 16,869 (2006) –18,354 (2010). 																		
Notes and observations																		
The parking spaces within these parking lots will be reserved for local residents, through a draw, for a period of 40 years. Individuals who own vehicles and actually reside locally within the area of influence established for each parking lot will be able to use these parking spaces. The following table shows the latest results available regarding the number of parking lots and parking spaces available at these types of facilities:																		
<table border="1"> <thead> <tr> <th colspan="4">Parking Spaces Available for Residents within Parking Lots</th> </tr> <tr> <th rowspan="2">Year</th> <th rowspan="2">No. of Parking Lots</th> <th colspan="2">Parking</th> </tr> <tr> <th>Residents</th> <th>Metered</th> </tr> </thead> <tbody> <tr> <td>2006</td> <td>275</td> <td>86.769</td> <td>16.869</td> </tr> <tr> <td>2010</td> <td>286</td> <td>94.995</td> <td>18.354</td> </tr> </tbody> </table>	Parking Spaces Available for Residents within Parking Lots				Year	No. of Parking Lots	Parking		Residents	Metered	2006	275	86.769	16.869	2010	286	94.995	18.354
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		Residents	Metered															
2006	275	86.769	16.869															
2010	286	94.995	18.354															

6. Increase in the number of parking spaces available for two-wheeled vehicles																																			
Currently, one of the problems faced by owners of motorcycles and scooters is lack of space in parking lots that is set aside specifically for these types of vehicles.																																			
<ul style="list-style-type: none"> Report on kerbside parking conditions. Creation of specific parking areas for two-wheeled vehicles. Installation of anti-theft devices. Parking for more than one vehicle within each parking space of private parking lots. 																																			
Execution time																																			
2006 – 2010																																			
Indicators																																			
<ul style="list-style-type: none"> Number of parking spaces intended for two-wheeled vehicles: 2,246 (2006) – 4,109 (2010). In the area under question within the LEZ, motorcycles and scooters comprised approximately 10% of the vehicles in circulation in the year 2010. Increase in the number of motorcycles and scooters counted by the Madrid City Council: 161,803 (2006) – 188,083 (2010). 																																			
Notes and observations																																			
The effort being made by Madrid City Council to encourage mobility demands must be completed by promoting use of other means of individual transport besides cars and public transport, such as two-wheeled vehicles, which offer undeniable advantages like economy, commuting speed and ease of parking. As a result of the Motorcycle Plan, in the year 2010 there were a total of 377 municipal parking spaces distributed throughout public roadways within the city, which were reserved for motorcycles, with a capacity to park 4,109 motorcycles. Madrid City Council continues to install new spaces and expand many of those already in existence. Motorcycles and scooters are exempt from metered parking and are not subject to the RPS fee. The number of motorcycles and scooters has grown between 2006 and 2010 by 16.2%.																																			
<table border="1"> <thead> <tr> <th>Number of vehicles</th> <th>2006</th> <th>2007</th> <th>2008</th> <th>2009</th> <th>2010</th> <th>Growth 06-10</th> </tr> </thead> <tbody> <tr> <td>Motorcycles</td> <td>111.869</td> <td>124.401</td> <td>130.691</td> <td>134.281</td> <td>139.628</td> <td>24,8%</td> </tr> <tr> <td>Scooters</td> <td>49.934</td> <td>51.408</td> <td>50.765</td> <td>49.360</td> <td>48.455</td> <td>-3,0%</td> </tr> <tr> <td>Total (cycles & scooters)</td> <td>161.803</td> <td>175.809</td> <td>181.456</td> <td>183.641</td> <td>188.083</td> <td>16,2%</td> </tr> <tr> <td>Annual Variation</td> <td>--</td> <td>8,7%</td> <td>3,2%</td> <td>1,2%</td> <td>2,4%</td> <td></td> </tr> </tbody> </table>	Number of vehicles	2006	2007	2008	2009	2010	Growth 06-10	Motorcycles	111.869	124.401	130.691	134.281	139.628	24,8%	Scooters	49.934	51.408	50.765	49.360	48.455	-3,0%	Total (cycles & scooters)	161.803	175.809	181.456	183.641	188.083	16,2%	Annual Variation	--	8,7%	3,2%	1,2%	2,4%	
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1. TRAFFIC**1.2. PUBLIC TRANSPORT PROMOTION MEASURES****7. Action at public transport Interchanges**

Significant actions at public transport interchanges are planned during the undertaking of this Strategy, starting in March of 2007, which will enable an increase in their capacity. These actions, driven by the Community of Madrid through the Regional Transport Consortium, in cooperation with Madrid City Council, streamline transfers for the more than 750,000 passengers who use them daily, in a way that strengthens the connection between city and intercity public transport networks, and among the various means of transport they involve.

Execution time

2006 – 2010

Indicators

- Number of bus platforms available at interchanges: 169.
- Number of passengers using modal interchanges daily: 787,499 (2010).

Notes and observations

Príncipe Pío: A new underground interchange has been built beneath the platform of the Príncipe Pío Station. It handles 2,400 intercity buses from 13 lines serving the A-5 Highway. This gets them off the roadways and improves the interchange between three Metro lines, 8 EMT lines and two Suburban lines.

Moncloa: This interchange is used by 35 intercity lines and 14 EMT lines. The Metro connects with two lines. With the expansion, the number of bus platforms has increased from 16 to a total of 36.

Plaza de Castilla: Handles the 37 intercity lines coming from Highways A-1 and M-607. It serves the EMT lines at street level for the urban developments north of Madrid. It also has metered public parking with a capacity of around 400 spaces. In total, there are 45 bus platforms for city and intercity buses.

Plaza Elíptica: A new underground interchange with 20 bus platforms has been built. It optimizes connections for close to 60,000 intercity bus users with Metro lines 6 and 11, as well as with the three inner-city EMT lines and 10 other lines that service the surrounding areas.

Interchanges completed and operational (2006 - 2010):

- Castilla Plaza interchange€ 102 million
- Elíptica Plaza interchange€ 36 million
- Príncipe Pío interchange€ 50 million
- Expansion of Moncloa interchange€ 97 million

8. Expansion and improvement of the bus lane network

Expansion of this network will be focused on main streets of new developments and at points along the current roadway where there is high congestion that slows down city buses.

- The overall objective set for the execution stage of the Strategy is to increase the length of roadways devoted exclusively to bus lanes by some 30%, including all types of runs reserved for buses.
- Mobility Agents, Municipal Police and the Parking Control Support Service (PACE) will intensify their monitoring of Parking and traffic law compliance, paying special attention to improper use of the bus lanes and double parking.

Execution time

2006 - 2010

Indicators

- Kilometres of bus lanes: 94 (2006) – 94 (2010).
- Kilometres of protected bus lanes: 38 (2006) – 39 (2010).
- EMT bus fleet operating speed: 13.83 km/h (2006) – 13.49 km/h (2010).

Notes and observations

The most important action taken concerning bus lanes is the study on implementation of bus lanes in various transversal corridors located outside the perimeter of Calle 30, the preliminary plans for which were completed in 2010.

9. Construction of park and ride parking lots
Along with the rest of the Administration involved, creation of the Park and Ride Parking Area Network will be promoted. New action areas where this type of infrastructure could be implemented have been defined.
Execution time
2007 - 2010
Indicators
<ul style="list-style-type: none"> • Number of park and ride parking spaces available: 1,500 spaces. • Average annual occupancy of park and ride parking areas. • Percentage variation ADV on roadways entering the city: <ul style="list-style-type: none"> 2006-2010: -5.66 % (M-30) -0.02% (between M-30 and M-40) -20.71 % (outside M-40)
Notes and observations
A park and ride parking area has been built and is now open to the public at CIUDAD UNIVERSITARIA , below Plaza de Ramón y Cajal on Avenida Complutense. It has the following characteristics: <ul style="list-style-type: none"> o 1,500 parking space capacity. o Connection to Metro Line 6. o Bus pass users can obtain discounts up to 30% on the cost of parking. Hourly occupancy of the parking area is influenced by activity at Ciudad Universitaria, with the most occupancy occurring between nine in the morning and three in the afternoon, when most classes are in session. This goes down by about 50% during the period from four in the afternoon to six in the evening. Daily occupancy in 2011 is 60% greater than in 2010.

10. Improvement to information provided on mobility
The intention of this measure is to create and strengthen the various channels meant for public transport users. The idea is to make the best possible information available so that they may choose the most appropriate route for their own commute.
<ul style="list-style-type: none"> • More and better information on estimated times of arrival for EMT buses. • Better coordination between the organizations involved in traffic management. • Creation of an information channel specifically devoted to mobility and traffic and launch of an informational campaign to promote it. • More multi-modal information provided. • More information for the visually impaired. • Joint processing of information regarding private and shared means of transport.
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> • Number of informational panels installed at bus stops (PMV): 48 Information Terminals at TIP bus stops (similar to PMV, but prior) (2006) — 344 PMV (2010). • Number of visits to the EMT website: 6,342,261 (2010) (No prior data available). • Number of visits to Movilidad 2.0 (mobile computer systems) since its creation (October-December 2010): 12,006.
Notes and observations
There are various traffic information channels within the City of Madrid, but the effort made to centralize it via the website www.informomadrid.es is noteworthy. Information about everything concerning traffic and mobility can be found there, including traffic conditions, via real-time reports and cameras, access to information about ADV vehicle speeds within the city, mobility reports, etc. Likewise, the EMT has installed informational panels at many bus stops. These panels offer information on estimated times of arrival for buses, among other items. The EMT has also initiated information systems via mobile phones (Movilidad 2.0) and has redesigned its website to make it more intuitive, accessible and to improve the content offered to the public.

11. Expansion and improvement of the EMT network																																						
Support for sustainable transport in the City of Madrid via continuous improvement of the EMT.																																						
<ul style="list-style-type: none"> • Fleet renewal, by replacing older vehicles having higher emissions with more advanced vehicles that meet EURO standards. • Increased use of cleaner energy alternatives within the bus fleet, especially CNG, by suspending the purchase of diesel buses at public tenders in 2010, for acquisition of buses in 2012, as well as replacement of diesel fuel in all vehicles with biodiesel. • Study the feasibility of implementing catalytic particulate filters in the bus fleet in order to reduce emissions. • Update and optimize routes. 																																						
Execution time																																						
2006 - 2010																																						
Indicators																																						
<ul style="list-style-type: none"> With respect to emissions standards: <table> <tr> <td>No. of Euro I buses :</td> <td>23 (2006) -0 (2010)</td> </tr> <tr> <td>No. of Euro II buses:</td> <td>939 (2006) -372 (2010)</td> </tr> <tr> <td>No. of Euro III buses:</td> <td>872 (2006)-872 (2006)</td> </tr> <tr> <td>No. of Euro IV buses:</td> <td>3 (2006)-378 (2010)</td> </tr> <tr> <td>No. of Euro V buses:</td> <td>0 (2006)– 24 (2010)</td> </tr> <tr> <td>No. of EEV buses:</td> <td>185 (2006)-434 (2010)</td> </tr> <tr> <td>No. of electric buses:</td> <td>0 (2006) – 20 (2010)</td> </tr> </table> With respect to fuel used: <table> <tr> <td>No. of diesel buses:</td> <td>1603 (2006) – 0 (2010)</td> </tr> <tr> <td>No. of biodiesel buses:</td> <td>209 (2006) – 1610 (2010)</td> </tr> <tr> <td>No. of ethanol buses:</td> <td>5 (2006) – 5 (2010)</td> </tr> <tr> <td>No. of CNG buses:</td> <td>202 (2006) – 465 (2010)</td> </tr> <tr> <td>No. of electric buses:</td> <td>0 (2006) – 20 (2010)</td> </tr> </table> With respect to reduction of polluting emissions: <table> <tr> <td>HC emissions (g/km):</td> <td>0,655 (2006) – 0,389 (2010)</td> </tr> <tr> <td>NO_x emissions (g/km):</td> <td>12,116 (2006) – 8,668 (2010)</td> </tr> <tr> <td>Particulate emissions (g/km):</td> <td>0,286 (2006) – 0,161 (2010)</td> </tr> <tr> <td>CO emissions (g/km):</td> <td>4,16 (2006) – 3,413 (2010)</td> </tr> </table> Progress of the line network: <table> <tr> <td>Number of lines:</td> <td>209 (2006) – 216 (2010)</td> </tr> <tr> <td>Number of stops:</td> <td>9.794 (2006) – 10.461 (2010)</td> </tr> <tr> <td>Total length in kilometres (round trip):</td> <td>3.618 Km(2006) – 3.833 Km (2010)</td> </tr> </table> Average daily number of passengers on work days during winter: 1.744.853(2006) – 1.546.519 (2010) Operating speed: 13,83 Km/h (2006) – 13,49 Km/h (2010) 	No. of Euro I buses :	23 (2006) -0 (2010)	No. of Euro II buses:	939 (2006) -372 (2010)	No. of Euro III buses:	872 (2006)-872 (2006)	No. of Euro IV buses:	3 (2006)-378 (2010)	No. of Euro V buses:	0 (2006)– 24 (2010)	No. of EEV buses:	185 (2006)-434 (2010)	No. of electric buses:	0 (2006) – 20 (2010)	No. of diesel buses:	1603 (2006) – 0 (2010)	No. of biodiesel buses:	209 (2006) – 1610 (2010)	No. of ethanol buses:	5 (2006) – 5 (2010)	No. of CNG buses:	202 (2006) – 465 (2010)	No. of electric buses:	0 (2006) – 20 (2010)	HC emissions (g/km):	0,655 (2006) – 0,389 (2010)	NO _x emissions (g/km):	12,116 (2006) – 8,668 (2010)	Particulate emissions (g/km):	0,286 (2006) – 0,161 (2010)	CO emissions (g/km):	4,16 (2006) – 3,413 (2010)	Number of lines:	209 (2006) – 216 (2010)	Number of stops:	9.794 (2006) – 10.461 (2010)	Total length in kilometres (round trip):	3.618 Km(2006) – 3.833 Km (2010)
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Notes and observations																																						
The Municipal Transport Company (EMT) has a fleet of 2,100 buses, of which 1,610 operate on biodiesel, 465 with Compressed Natural Gas, 5 with ethanol and 20 on electricity. Regarding emission standards, there are 20 electric vehicles, 434 Enhanced Environmentally-Friendly Vehicles, 24 Euro V vehicles and 378 Euro IV vehicles. The remainder are Euro II and Euro III vehicles. The EMT fleet is one of the most modern in Europe, having a median age of six years and including vehicles equipped with the latest technological advances in safety, comfort and environmental requirements.																																						

12. Improvement of the Metro
Madrid Metro has various actions planned for contributing to the objectives of Madrid's Air Quality Plan. Among these, expansion of the network promoting the use of public transport stands out, by making this means available to a larger number of citizens.
<ul style="list-style-type: none"> • Extensions of the lines and the Metro light lines so that more people may have access to this means of transport (finalization of the 2003-2007 extension plan and 2007-2011 extension). • Improvements to the existing network, which are focused on acquisition of new rolling stock and remodelling of stations to increase their capacity and accessibility. • Technological innovation that reduces the impact of the Madrid Metro on the environment: e.g., Geothermal energy at Pacifico Station.

Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> Kilometres of Metro: 287.37 (2010). Number of stations: 295 (2010). Total number of trips/year (millions) 627.10 (2010).

Notes and observations

Length of the Network run by Madrid Metro as of December 31, 2010 is **287.37 kilometres and 295 stations**, the distribution of which by lines is shown in the following table:

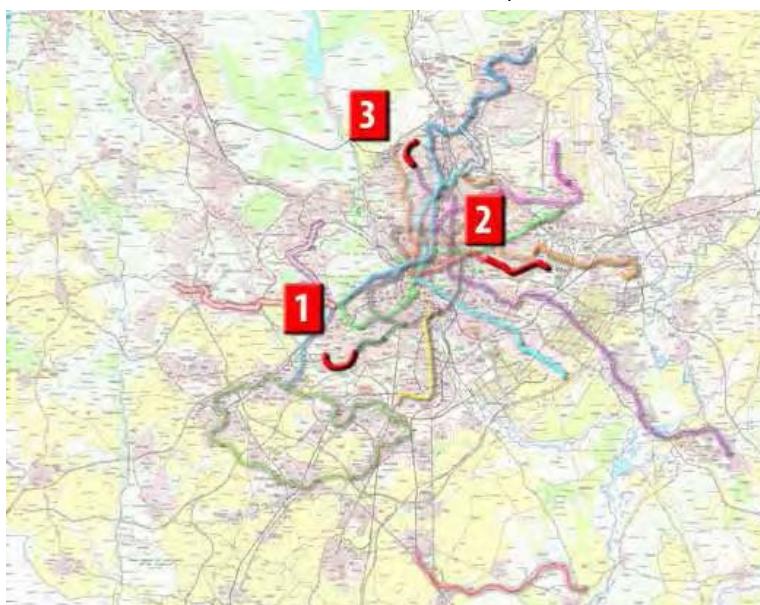
Network run by Madrid Metro, S.A.				
	Line	Length (km)**	No. Stations	No.Lobbies
1	Pinar de Chamartín - Valdecarros	23.320	33	59
2	La Elipa - Cuatro Caminos	9.365	16	21
3	Villaverde Alto - Moncloa	14.798	18	27
4	Pinar de Chamartín - Valdecarros	14.625	23	26
5	Alameda de Osuna - Casa de Campo	23.207	32	39
6	Circular	23.472	23	33
7	Estadio Olímpico - Pitis	19.676	23	22*
Metro East	Henares Hospital - Estadio Olímpico	9.341	8	9
8	Nuevos Ministerios - T4 Airport	16.459	8	6*
9	Herrera Oria - Arganda Port	18.960	22	26
TFM	Arganda Port - Arganda del Rey	19.040	6	5*
10	Tres Olivos - Puerta del Sur	24.216	21	19
Metro North	Hospital Infanta Sofía - Tres Olivos	15.568	11	11
11	Plaza Elíptica - La Fortuna	8.237	7	6*
12	Metrosur - Circular Southern Cities	40.596	28	27*
Branch	Ópera - Príncipe Pío	1.092	2	0*
ML1	Pinar de Chamartín - Las Tablas	5.401	9	10
TOTAL		237.373	295	346

(*) The reason some lines have fewer lobbies than stations is that the lobbies have been assigned to other lines that share the same interchange.

(**) The end of the line is included in the length data.

On December 31, 2010 the Madrid Metro Network had twelve lines in operation (besides the Ópera-Príncipe Pío and ML1 branches), with 242 nominal stations, of which 204 were basic (no connection), 27 double, 10 triple and 1 quadruple. Likewise, there is a direct connection with the RENFE Suburban network, the RENFE station for long-hauls, Airport Terminals or bus stations or transport interchanges at 43 of them. In the 2007-2011 Expansion, Metro reached densely-populated neighbourhoods like Las Rosas, Mirasierra and La Fortuna in Leganes.

- L11: La Peseta- La Fortuna Extension. 1 new station opened in October 2010.
- L2: Extension to Las Rosas. 4 new stations opened in March 2011.
- L9: Herrera Oria- Mirasierra Extension. 1 new station opened in March 2011.



Regarding **rolling stock**, the number of carriages in service as of December 31, 2010 was **2,369**. Among the changes experienced, with respect to the 2,281 carriages in service one year prior, it is worth noting the addition of 70 Series 8000 and 24 Series 3000 carriages which, combined with decommissioning of the Series 2000 units, demonstrates the efforts of Madrid Metro to offer its customers a modern fleet with the best features.

Geothermal heating and cooling at Pacifico

The Pacifico Metro Station has become the first station within the Metro network to take advantage of geothermal energy to heat and cool its facilities, thanks to a geothermal energy exchange system. This system makes use of heat and cold from the ground. Thanks to this installation, which was subsidized by the Department of Economy and Treasury, through the Energy Savings and Diversification Institute (IDAE), there is now a heating and cooling system that is completely respectful of the environment at the platforms of Line 1 of Pacifico Station, as well as in the machine rooms and commercial areas of the station. This includes heating and cooling for a total area of 1,090 square meters at the platforms and 450 square meters within the commercial and adjacent areas. This system uses a ground source heat exchanger and some ground source heat pumps to pump heat into the ground for cooling and absorb it from the ground for heating.

13. Improvement of the Suburban train service

Creation of new railroad lines by the Ministry of Public Works, which will contribute to reducing emissions generated within the city.

- Creation of a new tunnel to connect Atocha and Chamartín stations with a new station at Sol.
- Development of the northwest section of the existing network. This is a section that has already been built but is being underutilized by commercial transit. Includes a specific branch that will connect the city to Barajas Airport.
- Improved efficiency of the network thanks to addition of new, state-of-the-art rolling stock.
- Bioclimate Stations.
- Replacement of gas within equipment.

Execution time

2006 - 2010

Indicators

- Kilometres of network: 386.9 km (2010).
- Number of stations: 98 (2010).
- Millions of trips per year: 181.6 (2010).

Notes and observations

The most representative action taken within the suburban network has been construction of the new tunnel connecting the Atocha, Sol, Nuevos Ministerios and Chamartín stations, which has made it possible to get to the city centre via train, as well to shorten the trip to the suburbs around the railway, and connect to Barajas Airport in Madrid via the Nuevos Ministerios station.

14. Implementation of public transport at industrial and business parks

Many businesses located within Madrid municipality are moving to new commercial areas in the outskirts of the city, making the ideal of a compact city difficult to achieve, and requiring urban transport to be planned from a new perspective that gives industrial and business parks sufficient service.

- Create a network of Work Lines.
- Strengthen existing services.
- Increase the number of lines that run to the interchanges where intercity buses depart.
- Create an intercity municipal service in cooperation with destination municipalities where industrial parks are located.

Execution time

2008 - 2010

Indicators

- Expansion and improvement of the EMT network: Included in the EMT measure.
- Improvement of the Metro: Included in the Metro measure.
- Improved service to the suburbs: Included in the suburbs measure.

Notes and observations

On May 24, 2006 the "Sustainable Mobility to the Community of Madrid Work Centres Roundtable" was formed, for the purpose of researching transport to Industrial, Business and Technological Parks within the region. Its main goals included the creation of proposals and/or specific actions for improving accessibility via public transport to the aforementioned work centres, as well as promoting awareness concerning the public transport service most appropriate for each centre.

Among the first actions taken within Madrid municipality were several agreements with enterprises and organizations (Telefónica, Mercamadrid, Ministry for Education, Madrid Emprende) for increasing public transport service to their work centres. The Municipal Transport Company has created a Work Lines Network (TCT) with a new network logo, new name, common treatment, and image and awareness campaigns. The idea is to offer service to economic activity areas with the following lines:

- T11 Mar de Cristal – Cristalia Business Park
- T23 Puerta de Arganda – Vicálvaro Industrial Park
- T31 El Pozo Station - Sierra de Guadalupe
- T32 Legazpi – Mercamadrid
- T41 Villaverde Alto Suburban Station – La Resina Industrial Park
- T61 Fuencarral Suburban Station. – Ciudad de las Comunicaciones

Likewise, in 2010, the Sustainable Urban Mobility Plan was put into effect in the Ribera del Loira economic activity area (including the area north of the Cristalia business park). Mobility planning for the scenario typical of the economic activity areas requires deeper thought and more knowledge in order to identify the fundamentals of a strategy.

Innovative solutions and diagnoses, which can be used at other economic activity areas of the City of Madrid are sought and supported, including those from the Autonomous Community itself. Along these lines it is worth emphasizing the suitability of the Ribera del Loira commercial hub, not only for the large number of workers and mobility problems it represents, but also for the qualitative potential of the companies located there.

A Mobility Plan of this type allows a basis to be established for adopting measures with which to face challenges like those in question, both for businesses as well as for workers, such as traffic congestion, lack of parking or unavailability of adequate public transport. The possible improvement measures range from creation of shuttle lines or support for carpooling to roadway modifications or creation of stops.

1. TRAFFIC**1.3. CONTROL MEASURES****15. Traffic Speed limits**

Reducing speed limits on city streets and intercity highways is one alternative for saving fuel and reducing emissions of polluting gases from motor vehicles.

- Traffic control: in order to control the speed of vehicles circulating within the municipality, specific traffic control measures will be taken (roundabouts, speed bumps, etc.).
- Speed limit control: in coming years the number of permanent and mobile radar sites will be increased on the main highways, most of all on Calle-30. Expansion of this action has been studied at Paseo de la Castellana, Paseo de Recoletos and other high-speed roadways. Likewise, permanent radar stations will be installed to prevent speeding within tunnels.
- Technological innovation: work will be done on the line targeted by the PROSPER project. Here, installation of a satellite controlled speed limitation device is being considered, which would keep traffic at the speed limit on selected city streets, and act as a means of educating and issuing tickets.

Execution time

2008 – 2010

Indicators

- Increase in daily average speed: 24.15 km/h (2008) 24.16 km/h (2010).
- New radar installations: 11 on Calle 30 in 2008.

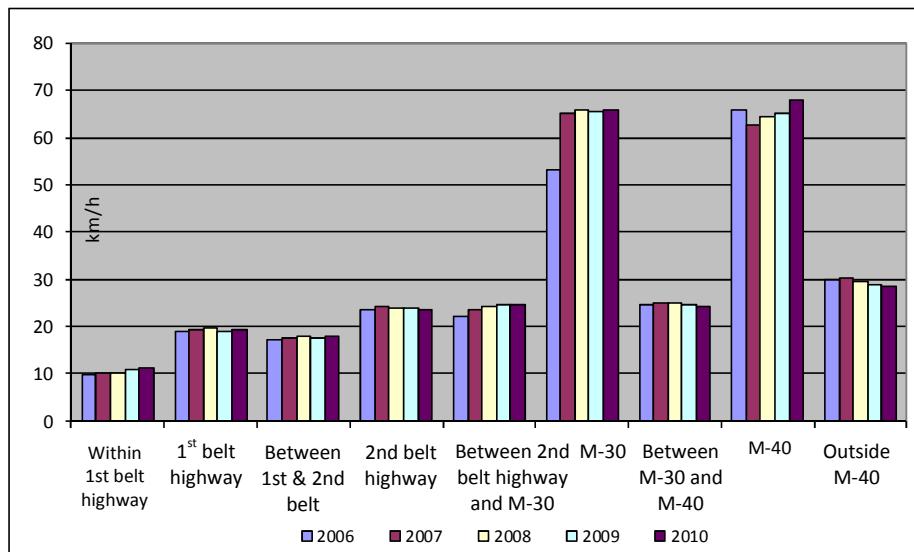
Notes and observations

Most of the radar stations within the City of Madrid, which are set up to prevent speeding and reduce accidents, are located on Calle 30, where 11 new ones were put into service in 2008 to control the new tunnels. These radar stations are well marked so that drivers travelling on Calle 30 will see them and know that their speed is being monitored.

In this context, the City of Madrid Road Safety Plan for the 2007-2010 period was conceived with the clear objective to create, design and enact measures meant to reduce the negative effects of traffic.

Installation of radars in the tunnels along Calle 30 is one of the measures proposed in the aforementioned City of Madrid Road Safety Plan for the 2007-2010 period.

The following figure shows data on the progress of traffic speed in different areas within Madrid municipality.



16. Expansion of the Mobility Agent force

The work being done by these agents will be closely followed, and their presence increased on roadways experiencing a large number of traffic problems and in locations where improper use of the bus lanes is common.

To supplement the presence of the mobility agents, the addition of vehicles equipped with the so-called Mobile Vehicle Identification System (VIS) to the service will be considered by the Council).

Execution time

2006 – 2010

Notes and observations

The Mobility Agent Force, which is a part of the Mobility Monitoring Department of the General Mobility Control Division, was created by Madrid City Council on July 19, 2004 in order to achieve two basic objectives:

- 1) To free the Madrid Municipal Police Force from the distraction of traffic control work, in order to enable them to place more attention on their commitment to keeping citizens safe.
- 2) To manage traffic in Madrid with specialized personnel who are devoted exclusively to that task and committed to a permanent physical presence.

The main task of the Mobility Agent Force is to control, signal and direct traffic within city limits, in accordance with traffic laws, and to handle specific citizen requirements related to traffic and parking.

1. TRAFFIC

1.4. VEHICLE MEASURES

17. Reduction of emissions from the taxi sector

The following methods will be established:

- An inventory will be taken of the environmental characteristics of taxi vehicles.
- Incentives will be offered for vehicles that use cleaner fuels.

Execution time

2006 – 2010

Indicators

- Percentage of diesel vehicles (2007) 99.72.
- Percentage of diesel vehicles (2010) 93.37.
- Percentage of alternative fuel vehicles (2007) 0.18.
- Percentage of alternative fuel vehicles (2010) 6.63.

Notes and observations

- The following agreements have been signed: In 2007, two framework collaboration agreements for implementing the use of cleaner fuels (natural gas and LNG) and in 2009, an Agreement with Repsol YPF for implementing use of Autogas within the city of Madrid.
- Environmental criteria, based primarily on emissions limits, have been established in the Council's annual budget for subsidies granted by the Community of Madrid and the IDAE to promote the acquisition of cleaner vehicles at public tenders for the purchase of Eurotaxis.
- More than 99% of the fleet were diesel vehicles at the beginning of 2007. At the end of 2010 this percentage had been reduced to 93%. The remainder of the fleet vehicles were run by alternative energy or fuels: LNG, natural gas and hybrids.
- In October of 2009, the Madrid City Council proposed measures for compliance with Directive 2008/50 concerning ambient air quality and a cleaner atmosphere in Europe. These included the negotiation of a Taxi Service Regulatory Ordinance with the sectors affected by addition of emissions limits in official approval of taxis, both for CO₂ as well as for Nitrogen Oxides.
- During negotiations with Associations representing the taxi sector for the purpose of drafting the Ordinance, there was a great deal of controversy concerning the environmental criteria established therein.

2007 FLEET		
FUEL	Number of vehicles	%
DIESEL	15.617	99,72%
NATURAL GAS	10	0,06%
LIQUID NATURAL GAS	19	0,12%
	15.646	

2008 FLEET		
FUEL	Number of vehicles	%
DIESEL	15.273	97,52%
NATURAL GAS	10	0,06%
LIQUID NATURAL GAS	278	1,78%
HYBRIDS	100	0,64%
	15.661	

2009 FLEET		
FUEL	Number of vehicles	%
DIESEL	15.065	96,05%
NATURAL GAS	10	0,06%
LIQUID NATURAL GAS	448	2,86%
HYBRIDS	162	1,03%
	15.685	

2010 FLEET		
FUEL	Number of vehicles	%
DIESEL	14.660	93,37%
NATURAL GAS	11	0,07%
LIQUID NATURAL GAS	564	3,59%
GASOLINE-ELECTRICITY	466	2,97%
	15.701	

18. Reduction of emissions from the goods delivery and transport sector

The plan covers legislative measures and actions, meant to ensure goods delivery would not hinder the flow of traffic and, at the same time, be accomplished with the lowest associated polluting emissions possible:

- Increase in the number of spaces reserved for loading and unloading.
- Modification of the schedule for loading and unloading.
- Regulation of loading and unloading tasks in large commercial centres.
- More vigilance for improperly parked vehicles.
- Cleaner vehicles.

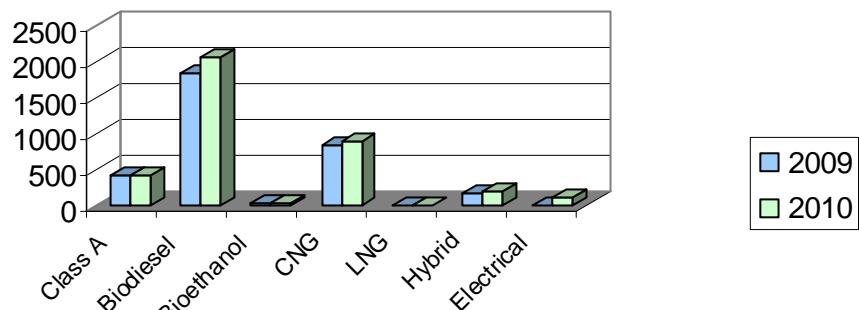
Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> Number of spaces reserved for loading and unloading: 2,115 (2006) – 2,403 (2010).
Notes and observations
<p>At the insistence of the Mobility Foundation, a Loading and Unloading Workshop has been developed, driving a change in the regulations in order to increase rotation, using limitation measures and time control (30 minutes), exclusive use for passenger vehicles and better adaptation to their needs (relocation and redesign). At the same time, it is considered important to take advantage of time control and limitation measures as an incentive for policies that reduce emissions. This supports the use of cleaner vehicles and energy.</p> <p>During the 2007-2008 period, various projects have been undertaken, such as the pilot programme started in the Tirso de Molina area. The experience implied addition of a regulation limiting maximum parking time to 30 minutes in spaces reserved for loading and unloading, and established the corresponding street marking and signage, as well as specific monitoring.</p> <p>Among the tasks involved in promoting cleaner vehicles in the city, Madrid City Council has proposed initiatives on transport and distribution of goods.</p> <p>Modification of the Tax Ordinance regulating the Vehicle Parking Rate in specific Areas of the Capital, in which full hybrid vehicles and those run on cleaner fuels would pay 25% less than all other vehicles within the Special "Industrial and Commercial Vehicles" Area. The industrial and commercial vehicles benefiting from the change are those weighing up to 5,000 kilos for vehicles run on cleaner fuels, such as Liquid Natural Gas (LNG) and Compressed Natural Gas (CNG) and full hybrids.</p> <p>Likewise, within the framework of cooperation from the Pro-Climate Forum, an agreement has been proposed to encourage the use of clean technology in the automotive sector and to contribute to improved air quality, under which 31 companies have committed to renewing their fleets to vehicles with cleaner technology.</p> <p>Some of these companies have already made this renewal to their goods delivery and transport fleets.</p> <ul style="list-style-type: none"> - Leche Pascual GROUP: <ul style="list-style-type: none"> o Added 13 LNG vehicles to their fleet in 2010. o Have continued the renewal effort and reached 65% of their fleet in January of 2011. Have added 120 hybrid vehicles and 13 LNG trucks. - Mercadona: <ul style="list-style-type: none"> o Replaced all Euro 3 vehicles with Euro 4 and 5 vehicles in the 2008-2010 period. Renewed 43.8% of the fleet within this period. - Mahou-San Miguel: <ul style="list-style-type: none"> o By May of 2010 they had already renewed 30% of the fleet by replacing Euro 3 vehicles with Euro 4 and 5 vehicles. - SEUR: <ul style="list-style-type: none"> o They have renewed 19 of 340 vehicles, including 1 CNG and 2 LNG vehicles.

19. Renewal of the Municipal Services fleet of vehicles
Implement a series of actions meant to create the green fleet of Madrid, by establishing fleet renewal criteria for vehicles owned by the public, and ensuring addition of cleaner vehicles, both cars as well as others making up the fleet (motorcycles, light vans, buses, etc.).
<ul style="list-style-type: none"> • Take an inventory of consumption, emissions and waste production from the municipal fleet of vehicles. • Add vehicles that use clean fuels.
Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> • Percentage reduction of emissions to the atmosphere from the fleet: CO₂eq emissions from the fleet of vehicles have been reduced by 12% during the 2008-2010 period. • Percentage increase in the use of cleaner alternative fuels: <ul style="list-style-type: none"> o The increase in the electric fleet (evaluated via electrical energy consumption of vehicles) has increased 91% during the 2008-2010 period. o Consumption of Natural Gas continues to rise. It has increased 8% during this period.

Notes and observations

The size of the municipal fleet reached 3,873 vehicles in 2010, to which vehicles must be added that belong to companies contracting services, for example, the waste collection and street cleaning fleet (1,973 vehicles). The figure below shows the distribution based on technology used.

Progress in concentration of clean vehicles within the Madrid City Council fleet (2009 - 2010)



The table below shows progress in fuel consumption and corresponding CO₂ emissions:

Progress in fuel consumption and CO ₂ emissions from the municipal fleet for the years 2008-2010				
	2008		2010	
	Consumption	Emissions CO ₂ eq	Consumption	Emissions CO ₂ eq
DIESEL (l)	25.101.882	67,072 Kt	2.167.642	5,79 Kt
GASOLINE (l)	763.642	1,773 Kt	890.685	2,068 Kt
BIOETHANOL (l)	257.090	0,171 Kt	291.027	0,193 Kt
BIODIESEL (l)	24.422.001	38,719 Kt	48.619.039	77,08 Kt
CNG (m ³)	23.061.083	46,749 Kt	24.972.846	50,62 Kt
ELECTRICITY (Kw)	110.164	0.031 kt	210.565	0.035 Kt
Total		154.515 Kt		135,79 Kt

There is a 12% reduction of CO₂eq emissions from the fleet of vehicles during the 2008-2010 period.

The renewal of the municipal waste collection and street cleaning fleet is a representative example. In the year 2010, 85% of the 529 vehicles comprising the urban waste loading and collection or pre-collection fleet used alternative fuels. The goal is to have the entire fleet running on natural gas. Save for a small portion, the rest of the loading and collection or pre-collection service vehicles are hybrids or run on bioethanol.

In addition, approximately 18% of the vehicles and machinery used in cleaning city districts (not including those belonging to SELUR or Special Services) are biodiesel, electric, hybrid or natural gas. From a fleet totalling 1,973 vehicles in 2010, approximately 37% are vehicles or machinery of various types using cleaner technology or alternative fuels.

VEHICLE TYPE	UNITS IN SERVICE
CNG VEHICLES	432
HYBRID VEHICLES	30
ELECTRIC VEHICLES	11
BIODIESEL VEHICLES	236
BIOETHANOL VEHICLES	15
TOTAL	724

20. Renewal of the Municipal Services fleet of vehicles. Natural Heritage																																																																																
Use of vehicles that respect the environment in maintenance and conservation work within municipal green areas.																																																																																
Technological innovations concerning reduction of environmental impact (air and noise pollution).																																																																																
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Construction of the Solar Pyramid at Parque Juan Carlos I enables self-sufficiency for the means of transport there.																																																																																

21. Establishment of agreements with private enterprises and institutions for acquiring low/no emission vehicles
Reduce emissions from vehicles in large fleets belonging to private businesses conducting business within the city on a daily basis.
The intention in applying this measure is to replace at least 12% of the primary fleet vehicles belonging to businesses that operate within Madrid municipality.
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> Number of companies adding low/no emission vehicles: As of December 31, 2010, within the framework of the Pro-Climate Forum, at least 13 companies out of 31 signatories to the Fleet Renewal commitment have made significant efforts to renew their fleets.

<ul style="list-style-type: none"> Number of vehicles replaced: Within the framework of this commitment, as of December 31, 2010, the signatory companies added the following low or no-emissions vehicles to their fleets: <ul style="list-style-type: none"> No-emissions vehicles: 71 electric vehicles. Hybrid vehicles: 153 vehicles. Other clean fuels: 24 LNG vehicles, 1 CNG vehicle.
Notes and observations
Within the Pro-Climate Initiative, developed by the Division of Sustainability and Agenda 21 in order to involve enterprises and institutions headquartered within the city in active policies in the fight against climate change, these actions concerning promotion of clean vehicles in the business sector stand out:
<ul style="list-style-type: none"> - Voluntary Agreement to renew 6% of fleet to low or no-emission vehicles. Since April of 2009, a total of 31 companies have signed, out of 50 taking part in the forum. The time horizon is the year 2012. The degree to which the signatory entities comply with the objective varies. During the course of 2010, the entities taking part have made significant advances in renewing their fleets to achieve this objective. The most noteworthy are: <ul style="list-style-type: none"> o Grupo Pascual. Renewal of the delivery fleet in the City of Madrid. Acquisition of 120 hybrid vehicles and 12 LNG trucks. o MERCADONA. 19.9% reduction in its fleet of delivery vehicles during the 2008-2010 period, and 54% fleet renewal to more efficient vehicles. o SEUR. Renewal of 5.6% of the vehicles operating within Madrid. It is worth noting the addition of 1 vehicle run on CNG and 2 vehicles run on CNG. o URBASER. Acquisition of 21 electric vehicles for Park and Garden Maintenance services and one hybrid vehicle in 2010. o MAHOU. Renewal of 30% of its delivery fleet to more efficient vehicles in 2010. EURO III vehicles have been replaced with Euro IV. o Toyota. Through renewal of its fleet, the average emissions per vehicle have decreased from 159 gr/km CO₂ and 0.141465909 gr/km of NO_x to 135 and 0.039544393 gr/km of NO_x. o ING DIRECT (RENTING). The following are worth noting among the clean vehicles offered to customers in 2010: <ul style="list-style-type: none"> Type I Hybrid Vehicles (Full Hybrid): 21 Type II Hybrid Vehicles (Partial Hybrid): 11 LNG Vehicles: 58 Electric Vehicles: 1 - In 2009, within the framework of the Pro-Climate Forum, Caja Madrid launched a Preferred Line of Credit to enable companies based in Madrid to get financing under favourable conditions for investments meant to improve energy efficiency and reduce CO₂ emissions. Using this line, businesses within the Community of Madrid will be able to finance the following investments that promote the fight against climate change: <ul style="list-style-type: none"> o Fleet renewal and acquisition of new vehicles that imply or contribute to lowering CO₂ emissions. o Goods loading and unloading systems and adaptations for refuelling stations. o New software and communications systems that help businesses track and manage their fleets.

22. Promote the use of fuels that are more respectful of the environment

Adoption of measures supporting the objective to replace the use of fossil fuels with others that are more respectful of the environment. Awareness or publicity campaigns that provide incentive for the use of cleaner fuels.

- Electrical mobility.
- Biofuels.
- Compressed Natural Gas (CNG) and Liquid Natural Gas (LNG).
- Hydrogen.

Execution time

2006 – 2010

Indicators																																								
<ul style="list-style-type: none"> Annual increase in the consumption of cleaner fuels. <p>The following are the results of the progress of fuel consumption according to data obtained on energy balance within the city from 2007 to 2009:</p> <ul style="list-style-type: none"> Biodiesel from 19.3 to 69.76 Ktep (265%) Bioethanol: from 0.1 to 0.15 Ktep (50%) CNG: from 20.06 to 24.18 Ktep (21%) LNG: from 1.77 to 1.67 Ktep (-6%) 																																								
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<p>It is important to point out that the addition of alternative fuels to the Madrid City Council fleet has required the creation of a network of alternative fuel supply points belonging to the municipality. The following are noteworthy:</p> <ul style="list-style-type: none"> The first E85 bioethanol supply point in the City of Madrid was installed at municipal facilities for the fleet of 20 E85 vehicles (BEST Project), which services the Government Division of Environment, Safety and Mobility. The EMT has supply points at its operations centres for CNG, Biodiesel, Bioethanol and Electricity. The Madrid City Council Waste Collection Service Equipment Fleet has a CNG Supply network for the trucks in its fleet. SAMER has a LNG pump for its fleet of ambulances that run on this fuel. The Pyramid at Parque Jan Carlos I supplies electricity for vehicles. <p>Madrid City Council has taken many actions to promote the use of alternative fuels within the city. The following are noteworthy in this area:</p> <ul style="list-style-type: none"> Promotion of Liquid Natural Gas (LNG). In 2009, an agreement was signed with REPSOL to promote Liquid Natural Gas (LNG). This fuel has experienced significant growth as a result of this initiative. Promotion of Bioethanol. Participation in the European BEST project (Bioethanol for Sustainable Transport). Promotion of Compressed Natural Gas (CNG). Madrid City Council has been the main promoter of this fuel. In 2010 it already had 5 CNG supply points tied mainly to EMT Buses and the fleet of Waste Collection Trucks. This number will increase to 9 in 2011. <p>Likewise, in 2010, work on drafting a public tender is under way for granting space on public roads for installation of 4 CNG supply stations distributed throughout the city. It must be emphasized that outside this municipal action, during the course of 2011, 3 new CNG supply stations will be opened to the public.</p> <p>Progress in the consumption of fuels that are more respectful of the environment regarding the most polluting fuel emissions has been as follows during the 2007-2009 period.</p>																																								
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23. Creation of a network of clean alternative fuel Service Stations
Promotion of the installation of supply points in strategic locations, which would provide public and private vehicles with cleaner fuels. Cooperation from the taxi and large fleet sectors is fundamental.
Research the possibility of using the current conventional service station network, as well as adapting pumps and fuel tanks to the requirements of the new energy sources.
This measure provides incentive for the acquisition of cleaner vehicles and facilitates the operation of Government vehicles.
Execution time
2008 - 2010

Indicators												
<ul style="list-style-type: none"> Number of public access service stations providing alternative fuels (2010): <ul style="list-style-type: none"> - 7 stations that supply LNG. - 5 stations that supply biofuels. - 81 electric vehicle charging points. 												
Notes and observations												
<p>The number of stations providing alternative fuels within the City of Madrid has increased significantly during the period from 2007 to 2011. This is shown in the table below, which excludes electric vehicle charging stations.</p> <table border="1"> <caption>Progress of the alternative fuel supply network by owner (2007-2011)</caption> <thead> <tr> <th>Year</th> <th>Municipal Facilities</th> <th>Public Stations</th> </tr> </thead> <tbody> <tr> <td>2007</td> <td>7</td> <td>2</td> </tr> <tr> <td>2010</td> <td>11</td> <td>7</td> </tr> <tr> <td>2011</td> <td>14</td> <td>17</td> </tr> </tbody> </table>	Year	Municipal Facilities	Public Stations	2007	7	2	2010	11	7	2011	14	17
Year	Municipal Facilities	Public Stations										
2007	7	2										
2010	11	7										
2011	14	17										

The following actions have enabled this figure to increase.

- Cooperation agreements between Madrid City Council and Repsol for implementation of the use of **Autogas (LNG)**.
- Promotion of the installation of public Supply Points **for Compressed Natural Gas**. (see above).

Regarding electric mobility, it must be pointed out that participation from the City of Madrid in the MOVELE Project, managed and coordinated by the IDAE, has made it possible for the city to have more than 80 electric vehicle charging points in 2010, for electric vehicles belonging to many entities and having a wide range of uses, such as municipal, public roads, divisions of private entities with public access, etc.

In July of 2011 the city already had 246 electric charging points. 40 of them were installed on public roads to favour so-called on-demand charging.

The following Gas Stations supply Biofuels within the City of Madrid:

Madrid	Avda. de la Democracia, 41 (Left side)	Valdebernardo I	Biodiesel
Madrid	Avda. de la Democracia, 62 (Right side)	Valdebernardo 2	Biodiesel
Madrid	Nuestra Señora de Fátima, 22	Star Petroleum	Biodiesel
Madrid	Avenida Santo Domingo, 10. Corner of Castilla de Jaca	Shell Las Tablas	Bioethanol
Madrid-Vicálvaro	Ctra. M-203, pk. 3,700	Top Oil	Biodiesel

24. Incentive to replace cars with motorcycles
Incentive to replace highly-polluting, four-wheeled vehicles with small motorcycles having four-stroke engines and meeting at least the Euro 3 standard. This measure will encourage the offering of service within the city via two-wheeled vehicles. Services currently using cars will be the primary target.
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> Reserved parking for motorcycles: 2,210 (2006) - 4,080 parking spaces (2010). Number of waiting areas at the head of the line for motorcycles at traffic signals and intersections: 3 (2008- date created) -27 (2010).

Notes and observations

The Traffic Safety Division created the Muévete en Moto por Madrid Programme [Move Yourself Through Madrid on Motorcycle]. Its most noteworthy benefits to mobility, and thus towards reducing air pollution, may be summarized as follows:

- In 2010 there were 4,080 parking spaces.
- Free parking within the RPS area.
- Project Avanza Moto [Motorcycles Ahead] Forward stop line at traffic signals and intersections, in order to facilitate mobility for motorcyclists in Madrid. 27 such areas have been created since 2010.
- Bus-taxi-motorcycle lane. Only these types of vehicles may use these lanes.
- Bus-HOV Lane. Motorcycles have been permitted to use these lanes since November 2006.
- Withdrawal of paints on zebra crossings, in order to minimize the possibility of motorcycle accidents in the city.
- Access to Areas of residential priority.

25. Incentive to replace cars with cleaner vehicles

The goal of this measure is to promote a change to the use of electric, hybrid or cleaner vehicles through a system of strict incentives. Need to promote a feasibility study by organizations such as the IDAE, municipal services and other such entities among those that should represent manufacturers of this type of vehicle. Other incentives could be proposed in order to make private acquisition of this type of vehicle more attractive, such as exemption from the RPS and access to restricted areas, including delivery fleets and similar. This type of facility could make it more attractive to purchase these vehicles, which are more expensive than traditional ones.

Execution time

2008 – 2010

Notes and observations

Madrid City Council has developed the following actions to promote alternative vehicles:

- Exclusion from metered parking limitations. The ordinance regulating the Vehicle Parking Fee within Specific Zones of the Capital and in Controlled Parking Areas has excluded electric, fuel cell or no-direct-emission vehicles, as well as Plug-in Hybrid Vehicles, from the limitations of controlled parking since 2009.
- Reduced annual fee for the Special "Industrial and Commercial Vehicles" Area. Full hybrid commercial vehicles and those run on cleaner fuels (LNG, CNG, etc.) will be able to request a 25% discount on the annual fee for the Special Industrial and Commercial Vehicles Area.
- Establishment of environmental credits on the Motor Vehicle Tax. The ordinance regulating the Motor Vehicle Tax (IVTM) offers an Environmental Credit, based on the type of fuel used, the motor characteristics and the impact of the vehicle on the environment. For electric, hybrid, CNG or LNG vehicles with catalytic converter, the amount of the credit applicable in 2010 is 75%.

1. TRAFFIC**1.5. OTHER MEASURES****26. Promotion of the use of bicycles**

The goal of this measure is to increase the use of bicycles as a means of transport by bringing on new users:

- Action on infrastructure (green ring, parking areas, etc.).
- Promotion of inter-modality (metro, bus).
- Direct promotion of mode change (rental bike or loaner).

Execution time

2006 - 2010

Indicators

- Kilometres of bicycle lane (including the green ring road for cyclists) 86 (2006)- 238 km (2010).
- Number of bicycle racks: 100 (2006) - 1,167 (2010).

Notes and observations

The Cyclist Mobility Master Plan was approved in the year 2007. Among its goals are the following:

1. To establish a municipal bicycle policy.
2. To give bicycles a significant role in daily mobility.

3. To standardize bicycle use and the image of cyclists.
4. To contribute to improving environmental quality.
5. To favour healthy habits within the populace.
6. To improve road safety.
7. To foster the recovery of public space.

In accordance with the PDMC, there is a Tracking Committee that meets periodically with different user associations, businesses within the sector and all agents related to bicycles, in order to answer their concerns and requests and thus promote general use of this means of transport within the city.

During this period, the "We Love Bikes in Madrid" awareness campaign was run, which included communication measures meant to promote coexistence between the different methods of commuting within the city. The first part of the series has been created and distributed electronically as well as in print.

The Bicycle Office, which is a tool for citizens to inquire and participate, was also provided for in the City of Madrid Cyclist Mobility Master Plan. This Virtual Office operates as a customer service centre for cyclists and pedestrians, which handles any questions concerning bicycle use, and provides information on cyclist infrastructure within the city, current laws, and public transport facilities and inter-modality. It is also the responsibility of the Bicycle Office to help manage and streamline citizen participation and establish channels through which to supply information to users and gather their opinions and pass them on to managers of the Plan. It includes dynamic, interactive elements, such as the "bicycle map", an application developed using the Google Maps programming interface.

Furthermore, the EMT has installed outdoor bicycle stands along its line 33 during this period, and fold-up bicycles are allowed access (providing they are folded up) on all bus lines within the city.

27. Create the position of Mobility Manager

The primary reason that residents of Madrid commute is to get to work, and cars are being used more and more for this trip. For this reason, the Mobility Manager at a business is a great help in reducing the number of cars on the streets and roads leading into the city.

The Mobility Manager is a position resulting from mobility planning processes within a business, and is understood to be an integral part of them. The Mobility Manager is the individual responsible for making decisions on management and promotion of sustainable mobility to be adopted via participation of and cooperation from the various agents within an enterprise or line of business. Thus, in order to create the position of Mobility Manager at businesses, they must get the message that there is a need to act on sustainable mobility within the environments where they do business.

Execution time

2006 – 2010

Indicators

- The number of businesses having a Mobility Manager.
- Number of Mobility Managers.

Notes and observations

Within this period, several actions from the defunct Mobility Foundation, promoting the use of Mobility Managers at Businesses, have been carried out.

In 2008 the Sustainable Mobility in Business Plan was launched. An awareness generating pilot programme was developed in cooperation with the Ferrovial Group. Likewise, the Guide to Sustainable Mobility for Responsible Businesses, published in cooperation with the Excellence in Sustainability Club, demonstrates the range of possibilities for businesses that support sustainable mobility, including creation of a Mobility Manager position.

In the same way, the Mobility Foundation has pushed Mobility Plans within Areas of Economic Activity, such as Ribera del Loira. A Workforce Mobility Workshop was conducted at the City of Madrid Mobility Roundtable, at which businesses were encouraged to promote the position of Mobility Manager and given reasoned arguments and technical criteria.

In addition, promotion of the carpool to work project in Madrid, also designed by the defunct Mobility Foundation, was meant to establish coordinator positions for actions benefiting sustainable mobility at participating businesses. These coordinators are the embryos of future Mobility Managers at businesses.

28. Promotion of the use of carpooling
The carpooling drive is based on shared use of a single vehicle, by at least two people. This is one of the measures that could possibly have a large positive impact on reasonable car use if the cost of investment and use are taken into account. Furthermore, it directly affects commuting between home and work done during rush hours.
Execution time
2006 - 2010
Indicators
The Carpool To Work programme in the City of Madrid was created in 2010, and thus there is no data yet available.
Notes and observations
The Mobility Foundation, disbanded in 2010, in its work to promote sustainability measures at businesses, promoted a small pilot programme for carpooling during 2008 at CESPA (Madrid), an affiliate of the Ferrovial Group. Experience was drawn and lessons learned during this pilot programme, both of which were used to feed and drive the Carpool to Work Programme within the City of Madrid and its Metropolitan Area , designed in 2010, which is called From A to B .
The goals of the Madrid Carpool to Work Programme, called From A to B , are as follows:
<ol style="list-style-type: none"> 1. To set a strategic objective: mobility to work. 2. To adopt a new cooperative focus between private institutions and enterprises, which enables implementation of joint actions. 3. To create strategic tools and make them available to participating institutions and enterprises and handle the details concerning functionality and aesthetics.
Project seeks to promote carpooling among employees of the same workplace or neighbouring businesses.
Promotion of carpooling has been attempted and failed several times in Spain. It has been limited overall to a website that facilitates the search for a carpool partner. This project goes well beyond, by proposing an innovative focus and technical assistance to businesses and offering:
<ol style="list-style-type: none"> A. Advertising campaign design and branding. B. Web Portal focused on awareness. C. Technical support in Change Management: Incentives, etc.
The programme will be launched in September 2011.

29. Promotion of the carsharing service
Carsharing is a car rental model in which the user rents the vehicle for short periods of time and pays only for the time used, without the need for a specific contract on each occasion.
It operates like a sort of users club, by which the vehicle may be reserved via phone or online, and payment is made by the minute and includes all related items, such as fuel, parking and insurance, among others.
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> • Number of carsharing businesses in the City of Madrid. 1 (2009) – 3 (2010). • Number of carsharing vehicles available in Madrid: 10 (2009) – 45 (2010).
Notes and observations
The first carsharing business in Madrid began operations in 2009. There were 3 businesses offering carsharing services in 2010: Bluemove (specializing in businesses), Respiro and Connect by Hertz.
The role played by the defunct Mobility Foundation in acting as mediator, facilitating the start-up of private initiatives, is noteworthy:
<ul style="list-style-type: none"> - Facilitated the arrival of carsharing businesses to the city in its promotion of good practices in entrepreneurship, innovation and sustainable urban mobility. - Promoted awareness of the concept via: <ul style="list-style-type: none"> o Conferences, presentations and technical seminars, university courses. (Summer courses at the Universidad Complutense). o Guide to Sustainable Mobility for Responsible Businesses.

30. Reduce emissions from the airport
Measures proposed in the Environmental Impact Report for the airport expansion project were tracked by Madrid City Council in cooperation with AENA.
<ul style="list-style-type: none"> • Ground Service Vehicle Replacement Programme. • APU-use measures (aircraft auxiliary power units). • Aircraft operating actions control, especially during takeoff and landing. • Promotion of good practices among aircraft companies and AENA.
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> • Reduction of emissions from aircraft during takeoff and landing. • Number of operations per year: 395,280 (2004) – 469,746 (2008).
Notes and observations
The measures implemented at the airport during 2007-2010 are:
2007
<ul style="list-style-type: none"> - Project AERGAS, proposed start-up and operation of CNG refuel pilot station both for AENA vehicles as well as for flightline assistance. - In 2007, the co-generation plant covered the entire demand for heat and a portion of the electricity at T4 and T5. - Eco-driving courses for employees conducted by the RACC. - Cooperation agreement with the Community of Madrid for extension of Metro Line 8 from Barajas Station to Airport T4.
2009
<ul style="list-style-type: none"> - AENA initiated a plan to implement continuous descent approaches (CDA). Consists of the aircraft making a continuous descent without horizontal runs and at low motor speeds, which would, on average, reduce NO_x emissions by 30% and CO₂ by 25%. The first phase of the plan was rolled out at night in 2010. - Addition of various electric vehicles as a pilot programme. - Cooperation framework with the Ministry of Development to coordinate rail access to Metro Line 8. - Collaboration with the Madrid City Council Ministry of Transport on the "preliminary plans for construction of the infrastructure of a platform reserved for public transport at Torrejón-Barajas."
2010
<ul style="list-style-type: none"> - Energy efficiency and savings actions, such as installation of motion detectors, shift to fluorescent lighting, disconnection of lighting in certain areas, installation of light sensors, etc. This has generated a savings of 8,241,000 kWh in 2010. - Installation of high-performance LNG and diesel tanks at service stations located alongside the airport. - Forested areas grew by 90 hectares in 2010.

31. Promotion of the efficient use of ICTs to reduce the need to commute
Reduce the amount of commuting done to or within the city, its duration and/or distance by applying Information and Communication Technologies.
Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> • No. of From A to B carshare programme users. • Number of best practices on efficient use of ICTs identified and promulgated.
Notes and observations
<ul style="list-style-type: none"> • Development of a "from A to B" carsharing pilot programme, which enables employees of different companies to find carpools by using a website. The idea is to reduce the number of individual commutes by increasing the number of people per vehicle. Positive impacts range from changing the habits of citizens to the implementation of active sustainable mobility policies at businesses. • Promotion of the application of ICTs to reduce commuting and improve its efficiency among businesses and other institutions by: <ul style="list-style-type: none"> ○ promulgation of best practices and success stories using information channels considered in the "Improvement to information provided on mobility" measure, by providing continuity for the "Guide to Sustainable Mobility for Responsible Businesses" published by the Council in May 2009,

- which gives details on how telecommuting, videoconferencing, intelligent route management and the rest of the initiatives contribute along these lines.
- Identification, recognition and promulgation of best practices through the "Move Green" programme, which sets forth the best sustainable mobility initiatives taken in the City of Madrid and includes a specific category on "Applying new technology to mobility".
 - Inclusion of the above information on existing ICT alternatives and procedures applicable to the mobility of people and goods in the Pro-Climate Forum work sessions.

2010 Budget: € 50,000

Although it is not yet possible to quantify on an overall scale, application of ICTs at businesses is already causing measurable reductions in emissions and energy consumption by effectively reducing the number of commutes made, whether in terms of the mobility of employees to and from work or concerning transport of goods produced from business activities. Experience in working on "Sustainable Mobility and Corporate Responsibility Policies" (2007) and with the "Guide to Sustainable Mobility for Responsible Businesses" (2009) has demonstrated the importance of providing the business sector with guides to action in this field, as implementation of such has gradually grown.

2. STATIONARY SOURCES**2.1. RESPONSIBLE ENERGY USE****32. City of Madrid efficient and sustainable energy use Plan**

The basic goals are to reduce consumption trends through energy efficiency and savings and to optimize use of actual renewable resources. In order to achieve these goals, it is essential to also create awareness among all players and sectors involved in energy consumption, by getting them involved in such actions.

- Contribution to the State Kyoto Protocol objective.
- Energy Efficiency and Savings.
- Promotion of Renewable Energy and Renewable Resources.
- Quality and Safety in the Supply.
- Communication and education in the sustainable use of energy.

Execution time

2006 – 2010

Indicators

- Drafting and approval of the Plan.
- Tracking Reports In order to facilitate accomplishment of the basic and supplemental objectives, the Plan provides a system for tracking and evaluating the results. The Second Tracking Report for the year 2009 was published in November 2010.

Notes and observations

The City of Madrid Climate Change Prevention and Sustainable Energy Use Plan (PUSECC), created by the Division of Sustainability and Agenda 21, was approved by resolution of the Governing Board of the city on June 12, 2008. It includes actions on mitigating climate change, energy efficiency, reducing energy consumption and promoting renewable energy in all sectors during a time horizon running from 2008 to 2012.

Noteworthy in the promotion and promulgation of energy efficiency are the 20% reduction in the use of fossil fuels during the 2004-2020 period, the reduced dependency on foreign energy, the increase in public awareness and sensitivity, as well as the support from and participation of the City of Madrid in institutional, national and international cooperation forums on matters related to clean energy.

As the first measure, the Plan proposes creating the Energy Agency (created by the Madrid City Government on October 8, 2009), to be responsible for coordinating and tracking the Plan measures proposed and implemented. The Energy Agency is a subdivision of the General Directorate of Sustainability of the Government Division of Environment, Safety and Mobility.

The Agency prepares a tracking report annually. A tracking file is created for each one of the 55 measures, in which the degree of compliance, amount of investment and, where applicable, the actions taken are evaluated. As an overall evaluation the following are worth noting:

Measures initiated

- 96.9% of the goal for the year 2009 was accomplished, with 32 of 33 proposed measures having been initiated.
- There were a total of 52 measures initiated between 2008 and 2009 out of a total of 55 measures proposed by the plan, which is an implementation rate of 94.5%.

Measures initiated with specific actions taken

- Out of the total number of measures initiated to date (52), specific actions have been taken on 37 measures, which is a rate of 71.1% at the mid-point of the Plan period.
- With respect to measures planned to start in 2009, the number of them initiated, and on which specific action has been taken, is 20 out of 32, or 62.5%.

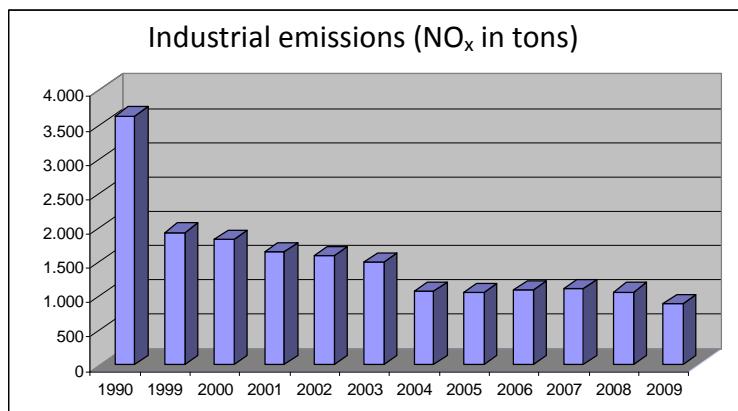
33. Modernize industrial production processes

It is considered essential for the industry as it is today or will be in the future to remain focused on environmental protection. Therefore, Madrid City Council will continue to promote, spread and apply so-called Best Available Techniques, within the framework of the IPPC objective, via the Agreement signed with the Madrid Chamber of Commerce and Industry and the Madrid Confederation of Business-CEO (CEIM).

Execution time

2007 - 2010

Indicators
• Permits issued.
Notes and observations
The efforts made in this area via use of Best Available Techniques have had results, as is demonstrated in the figure below, which shows nitrogen oxide emissions within Madrid municipality, from industrial combustion plants and combustion-free production processes. Emissions in these sectors dropped by more than 75% during the period from 1990 to 2009.



2. STATIONARY SOURCES

2.2. EMISSIONS REDUCTIONS

34. Boiler replacement
The goal of this measure is replacement of boilers fuelled by coal that are still being used in some buildings and residences within the municipality. The challenge is to succeed in reducing the number of coal-burning boilers in Madrid to below 500.
The goal is to reduce polluting emissions from the residential sector by increasing use of biofuels in boilers that operate on diesel.
Lastly, awareness campaigns will be developed to promote the Plan and inform Communities of Property Owners about financial assistance available and best alternatives for replacement.
Execution time
2006 - 2010
Indicators
• Number of boilers replaced per year: 439 boiler replacements were subsidized during the period from 2006 to 2010.
Notes and observations
The results of the change from installations using coal to using cleaner fuels are evident in reduced polluting inmission levels, especially sulphur dioxide. 7,224 permits totalling € 36,696,933.45 were issued from 1990 to 2010. It is noteworthy that 90% of the permits issued were for a change to natural gas installations.

35. Reduce emissions from construction-related activities
A policy covering reduced emissions from the building sector and public works will be pushed. This policy can be promoted through various channels, such as implementation of laws, awareness campaigns or an increase in the number of on-site inspections.
Establishment of procedures meant to regulate transport of materials that produce dust, excavation, circulation of vehicles on unpaved roadways and other actions, can mean a significant reduction of emissions from this sector.
Execution time
2007 - 2010

Indicators
<ul style="list-style-type: none"> • Particle levels within construction zones and their surroundings: No specific campaigns have been initiated regarding construction work. Nonetheless, a decrease in the PM₁₀ and PM_{2,5} networks has been observed.
Notes and observations
<p>In recent years, Madrid City Council has been working on creating procedures for promoting best practices within the construction sector for reducing dust emissions into the atmosphere.</p> <p>In the first place, an exhaustive list of the most significant environmental items associated with the work and tasks involved in the design, construction, maintenance, use and demolition of buildings and installations was created. This made it possible to set forth mandatory environmental specifications to be considered on equipment and installations and then to be able to define environmental recommendations from those criteria.</p> <p>Documentation compiled during the course of various city projects was used as a base of reference (Construction Project Environmental Quality and Energy Efficiency Design Criteria; Madrid City Council Public Manual for Sustainable Management of Public Works; General Sustainability Criteria applicable to New Construction, Renovation and Development Projects from the EMVYS; Guide to Best Practices in Construction, remodelling and demolition; Criteria for reducing the environmental impact associated with atmospheric emissions from construction).</p>

36. Reduce emissions from volatile organic compounds
The Council proposed two lines of action meant to reduce emissions in our city: To the extent possible, reduce VOC emissions by using paint containing low concentrations of VOCs.
Regulation of VOCs is the responsibility of the autonomous communities. Madrid City Council has a record of businesses with activities that may produce VOC emissions, such as dry cleaners, etc. There is also a separate Plan division for facilities using solvents. The control is regulated under RD 117/2003 on VOC emissions limits on the use of solvents, which is supplemented in turn by RD 227/2006 on emissions limits for paints and varnishes.
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> • Percentage of solvents in paints used in construction. • Volume of paint used in construction. • Number of companies inventoried. • Square meters treated with decontaminating road surfacing. • Annual VOC levels compiled for the Emissions Inventory.
Notes and observations
<p>Madrid City Council has conducted several experiments with road surfacing specifically designed to improve air quality by removing air pollutants, primarily by reducing NO_x concentrations and, to a lesser degree, by reducing VOCs. These "decontaminating" road surfaces have photocatalytic additives such as titanium oxide.</p> <p>Preliminary tracking results for these projects are very positive as far as their capacity to clean the air. Nevertheless, there are still some questions to resolve, both concerning their actual effect on reducing air pollution under various environmental conditions as well as other possible collateral effects there may be from their use. Likewise, based on studies done, testing standards and regulations must be defined for these materials and applications.</p> <p>Another source of VOCs is vehicle exhaust gases. Along these lines, all actions that deter the use of motor vehicles have contributed to reductions. This is the case of pedestrianizing streets, implementation of the RPS, promote the use of bicycles, etc.</p> <p>Promotion of electric vehicles (Project MOVELE), bioethanol (Project BEST), and development of a public and private fleet of vehicles more respectful of the environment (Pro-Climate Forum) have all had a positive effect on reducing VOC emissions. The Code of Best Practices in Local Contracting promotes the use of more ecological paints and varnishes, which emit fewer VOCs.</p>

37. Promotion of the use of bituminous foam in asphalt for paving roads and pavements
Madrid municipality covers approximately 70,000 hectares and has approximately 4,500 kilometres of streets and roads, which makes for a paved surface area within the city of close 5,000 hectares, about 60% of which is asphalt and 40% pavements.
Thus, there is great potential within the city to apply new materials that reduce air pollution and traffic noise.

Execution time								
2006 – 2010								
Indicators								
<ul style="list-style-type: none"> • Number of test sections executed and analyzed. • Number of tracking reports done. • Number of square meters with decontaminating road surfacing. 								
Notes and observations								
<p>Madrid City Council has begun work on improving road surfacing in 21 districts. As a result of this action, 110 streets (501,633 square meters) have been repaved with material that reduces traffic noise and includes bituminous foam modified and manufactured at a temperature significantly lower than traditional stone mastic mixes. The following reductions are possible with these mixes:</p> <table border="1"> <tbody> <tr> <td>Temperature of the gases</td> <td>25%</td> </tr> <tr> <td>CO₂ emissions</td> <td>25%</td> </tr> <tr> <td>NO_x emissions</td> <td>20-25%</td> </tr> <tr> <td>Particulates</td> <td>80-90%</td> </tr> </tbody> </table> <p>Madrid has installed 1.5 million square meters of this type of anti-noise asphalt since 2003 and will reach 1.7 million in the future.</p> <p>In 2008, as part of operation "Madrid Paves Madrid," an experimental section of road surfacing covering approximately 1,000 square meters was installed, and NO_x concentrations at 30 centimetres (10% of the height of an average person) were reduced by 30%. Two actions were carried out in 2010 using decontaminating road surfacing to cover pavements, which had very positive results: at 10 centimetres above ground, NO_x was reduced by 60%.</p>	Temperature of the gases	25%	CO ₂ emissions	25%	NO _x emissions	20-25%	Particulates	80-90%
Temperature of the gases	25%							
CO ₂ emissions	25%							
NO _x emissions	20-25%							
Particulates	80-90%							

38. Install vapour recovery units at service stations
Vapour recovery units are devices that draw in vapours and clean them of hydrocarbons by using a series of state-of-the-art membranes, then release them into the air. The recovered hydrocarbons are returned to the gasoline tank with the least octane, in liquid form, as condensed vapours.
Articulation of this measure can be done by changing the current Vehicle Fuel Supply Facilities Special Plan Regulations, which were approved in 1994.
Execution time
2006- 2010
Indicators
<ul style="list-style-type: none"> • Volume of gasoline evaporated during gasoline fuelling operations. • Percentage of pumps having vapour recovery systems.
Notes and observations
<p>As is the case with reducing VOC emissions, this measures falls within the framework of the regional area, and seeks the same objectives as Plan Blue created by the Community of Madrid.</p> <p>This measure is implemented through a voluntary agreement between the Ministry of Environment, the Community of Madrid Service Station Owners Association and eight oil companies: CEPSA, REPSOL, CAMPSA, GALP, BP, ESSO, AGIP and DISA, which affects 300 service stations (52% of the total).</p> <p>A 70% reduction of polluting emissions from gas pumps is sought via addition of the dual hose system at 1,200 pumps.</p>

3. GOVERNMENTAL MEASURES

39. Addition of environmental criteria to municipal tax code

There are many antecedents in Europe concerning Green Tax Reform and the addition of environmental criteria to tax systems, even though it has only begun to be applied recently (during the 90's).

This inclusion in municipal tax law will be based on the application of qualifying credits.

- Property Tax.
- Motor Vehicle Tax.

Execution time

2006 - 2010

Indicators

- Analysis of the main actions implemented.

Notes and observations

In accordance to the provisions of the Law regulating local ordinances, Madrid City Council has proposed a series of environmental credits within the framework of its tax law, in order to promote energy efficiency and renewable energy.

- Tax on Buildings, Facilities and Construction Projects (ICIO). - Tax ordinance ANM 2001/77 proposes tax credits for buildings that add solar installations for self-consumption. Facilities and construction projects installing systems that use solar energy for their own heating or electricity needs will enjoy a 30% credit on building permits. Moreover, for residential construction projects, the percentage credit will rise to 95%.
- Property Tax (IBI). Credits for installing systems that take advantage of solar energy. A 25% credit on the full tax amount will be available for buildings shown on the public record as being primarily for residential use, which have installed solar-powered heating systems. The amount of this credit will rise to 40% if solar-powered electrical systems are also installed at the same time as those solar-powered heating systems.
- Motor Vehicle Tax (IVTM). In order to promote the use of alternative vehicles, the following tax credits have been implemented:
 - Electric and/or zero emissions vehicles: 75% indefinitely.
 - Hybrid vehicles (natural gas or gasoline/diesel-electric): 75% for the first 6 years.
 - Natural gas vehicles with catalytic converter: 75% for the first 4 years.

- RPS exemptions for clean vehicles. The ordinance regulating the Vehicle Parking Fee within Specific Zones of the Capital and in Controlled Parking Areas has excluded electric, fuel cell or no direct emission vehicles, as well as PHEV (Plug-in Hybrid Electric Vehicles), from the limitations of controlled parking since 2009.

Likewise, support for promotion of more energy efficient technologies within the residential sector has been established.

- Replacement of coal-burning boilers (Environment Division).
- Support for Sustainable and Energy Efficient Improvements to Buildings for remodelling projects (EMVS).

4. AWARENESS & PARTICIPATION COMMUNICATION**40. Education and communication actions focusing on Air Quality Strategy**

The idea is to develop an education and awareness campaign that would enable all citizens to be informed about objectives and actions planned within the Strategy and to promote their implementation within the various sectors affected.

- To keep all agents involved informed about the status of the situation concerning air quality.
- To make citizens and administrations aware of the importance of the problem and the need to implement the proposed measures.
- To advertise the measures being put into effect, as well as the objectives and benefits sought in each case.
- To report improvements in air quality achieved after all measures are applied.

Execution time

2006 - 2010

Indicators

- Creation of indicators that offer information required in order to check the progress of campaigns or promotions of the Strategy.

Notes and observations

The main intention of the Madrid City Council air quality information system is to provide all information available concerning air quality derived from the air pollution monitoring network, forecasting system, weather system and other sources, and distribute it through various channels and information points.

The website, along with constant updates, is one of the basic elements of the information System. It was reconfigured in 2010, in order to improve accessibility by the general public, by using new display tools (maps, graphics), which make it easier for citizens to get information. Likewise, an SMS message service has been set up to deliver alerts in the event pollution thresholds are exceeded and development has begun for an iPhone app to check air quality.

Furthermore, in December 2009, the Governing Board of the City of Madrid approved the Air Quality Services Letter, a quality management model, which responds to the basic right citizens have to be informed about the services offered in their municipality, their quality level and the ways available to get involved.

This provides greater transparency in reporting and awareness of air quality management in the City of Madrid, in order to increase the degree of satisfaction with the services among citizens.

The Letter includes, among other things, commitments regarding permanent evaluation and control of air quality, maintenance of a continuously-updated information system, reporting to citizens when advisory and alert thresholds are exceeded in order to protect health better, as well as activities to spread awareness and sensitivity among the populace regarding air quality.

5. STUDIES AND KNOWLEDGE IMPROVEMENT

41. Promotion of research and development regarding air pollution
The various agents within the city have contributed to improving awareness concerning air pollution, by taking part in different projects ranging from basic research done at universities, to direct application of the cutting-edge innovations available.
<ul style="list-style-type: none"> • Increase in coordination among the various initiatives. • Participation in new projects. • Collaboration with other cities. • Development of an integrated data processing system for pollution and traffic.
Execution time
2007 - 2009
Indicators
<ul style="list-style-type: none"> • Number of R&D projects involving Madrid City Council and its subdivisions. • Number of R&D projects completed by Madrid City Council or its subdivisions.
Notes and observations
In recent years the Government Division for the Environment has taken part in various programmes within the international arena that are related to air quality, climate change and energy efficiency. Voluntary agreements involving various commitments to take action have been signed: <ul style="list-style-type: none"> • Spanish Network of pro-climate cities (FEMP). • Covenant of Mayors (European Union). • C40 Cities. With respect to specific air quality projects, the following have been implemented: <ul style="list-style-type: none"> – Comparative analysis of the air quality monitoring networks of European cities, by the Chemical Engineering Department of the School of Industrial Engineering. UNIVERSIDAD POLITÉCNICA DE MADRID July 2008. – Designation of ISO pollution zones within the City of Madrid conducted by the Network Design and Optimization Heuristics Group. Department of Signal Theory and Communications. Universidad de Alcalá. 2009. – Report on measures to reduce NO_x emissions from traffic, classification of vehicles in circulation. January 2010.

6. MONITORING. MONITORING IMPROVEMENTS

42. Set up specific networks for monitoring each pollutant

Design of a specific network for each pollutant has been proposed, under which a specific number of sampling points that are deemed sufficiently representative of the air quality within Madrid are chosen, concerning a specific pollutant, in accordance with criteria established by law. The goal in establishing these networks is to have a valid indicator of the air quality within city limits for each pollutant, because city air quality criteria are based on these measurements.

- SO₂ inmission levels monitoring network.
- NO₂ inmission levels monitoring network.
- PM₁₀ and PM_{2.5} inmission levels monitoring network.
- Benzene (C₆H₆) inmission levels monitoring network.
- Carbon monoxide (CO) inmission levels monitoring network.
- Ozone (O₃) inmission levels monitoring network.

Execution time

2006

Indicators

- Number of networks created: 1 network for the various parameters, with urban station of background pollution measurement (UF), of traffic pollution measurement (T) and suburban (S) stations.
- Number of analyzers for each pollutant: NO₂ (24); SO₂ (10); CO (10); PM₁₀ (12); PM_{2.5} (9); O₃ (14) and C₆H₆ (6).

Notes and observations

After approval of the Air Quality Strategy, Directive 2008/50/EC, of May 21, concerning ambient air quality and a cleaner atmosphere in Europe was adopted.

Adaptation of the Madrid City Council Air Quality Monitoring Network to Directive 2008/50 was approved on November 11, 2009 by resolution of the Directorate General of Environmental Quality, Control and Evaluation.

The objective sought in restructuring the network was to get better data on air pollution from a technical/scientific perspective and to better protect human health and the environment within Madrid municipality, as well as to adapt the new macro and micro-implementation and classification of stations provided for under Directive 2008/50, thus facilitating comparisons between European networks.

In order to create the proposal for the new network, in terms of choosing locations and parameters, various information sources were considered and several studies were conducted, such that the number and distribution of sampling points for the various pollutants would fit the spatial variation and contribution of each to the pollution problems.

Among the information sources were the Emissions Inventory, information from the existing monitoring network and an analysis of the trends for the different pollutants, as well as supplemental information from specific measuring campaigns. There were also technical and scientific studies done by various institutes or universities that were used to support the network design, among which included a comparative analysis of air quality monitoring networks in European cities, done by the Chemical Engineering Department at Universidad Politécnica de Madrid; the pollution spatial distribution model, done by the Network Design and Optimization Heuristics Group at Universidad de Alcalá de Henares; and the work entitled "Study and Evaluation of Air Pollution by Tropospheric Ozone in Spain" done by the Mediterranean Environmental Studies Centre for the Ministry of the Environment.

Likewise, in order to promote maximum public participation from citizens and entities, the proposed new network was made public and had the support of the Ministry for the Environment and Marine and Rural Affairs and the Community of Madrid.

43. Adaptation of particulate monitoring to advances in scientific knowledge and standards

The law¹² established two separate phases with respect to the inmission levels sought. In both phases, various PM₁₀ concentrations were set, because regulating particulates with an aerodynamic diameter of less than 10µg is of the greatest interest, given that these can be inhaled. Control of PM_{2.5} particulates was centred on requiring action plans meant to regulate PM₁₀ particle concentrations to also include the objective of reducing PM_{2.5} particle concentrations.

Implement a series of measures meant to adapt monitoring of suspended particulates to the implied change in law for particulates.

- Following developments in law and advancements in scientific knowledge on the presence of Saharan dust intrusions.
- Establishment of criteria for identifying other natural sources.
- Adjustment of sampling points to future law.
- Modification of information provided to other institutions and the public.

Execution time

2006 - 2010

Indicators

- Number of PM₁₀ sampling points: 12 collectors.
- Number of PM_{2.5} sampling points: 9 collectors.
- Information provided for this pollutant: Daily concentration levels at each station.

Notes and observations

At the same time the Air Quality Monitoring Network adaptation was being done, a study was done on the need to monitor PM₁₀ and PM_{2.5} suspended particulates.

New parameters must be measured, such as the portion of suspended PM_{2.5} particulates in urban station of background pollution measurement areas, by using the gravity reference method, in order to obtain the Average Exposure Indicator (AEI) and determine the concentration of heavy metals (arsenic, nickel, cadmium as well as lead) and benzo(a)pyrene.

For PM_{2.5}, three of the urban station of background pollution measurement locations are from the station network in Spain chosen for calculating the Average Exposure Indicator (AEI), in accordance with criteria agreed upon by the Air Quality Group at the Environment Sector Conference organized by the Ministry for the Environment and Marine and Rural Affairs.

¹² Directive 1999/30/EC, of April 22, concerning limit values on sulphur dioxide, nitrogen dioxide, nitrogen oxides, particulate matter and lead in ambient air. Royal Decree 1073/2002, of October 18, concerning evaluation and management of ambient air quality with respect to sulphur dioxide, nitrogen dioxide and nitrogen oxide, particulates, lead, benzene and carbon monoxide.

The second phase was never completed and was later superseded by Directive 2008/50/EC of May 21, concerning environmental quality and promotion of a cleaner atmosphere and by Royal Decree 102/2011, of January 28, concerning improvement of air quality, which replaced it.

7. WASTE

44. Reduction of emissions into the atmosphere from waste management facilities at Valdemingómez Technology Park
LAS LOMAS ENERGY VALUATION PLANT
Build a selective catalytic reduction system (SCR) facility in the year 2006, in order to reduce NO _x emissions according to the new limits set by Royal Decree 653/2003 on waste incineration.
DUE DATE
2006-2010-2020
TRACKING INDICATOR
<ul style="list-style-type: none"> • Level of NO_x emissions in mg/Nm³ released by incineration of Refuse Derived Fuel (RDF) at the Valdemingómez Technology Park.
Notes and observations
<p>With the aforementioned RDF, NO_x emissions decreased from concentrations of 269.3 mg/Nm³ (2005 average) to 127.2 mg/Nm³ in the year 2006 and stayed there or below in the years following. Quantifiable values:</p> <ul style="list-style-type: none"> - Emissions saved: more than 140 mg/Nm³ of NO_x each year. - NO_x emission levels at Las Lomas: <ul style="list-style-type: none"> Year 2005 269.3 mg/ Nm³ Year 2006 127.2 mg/ Nm³ Year 2007 108.2 mg/ Nm³ Year 2008 114.2 mg/ Nm³ Year 2009 122.7 mg/ Nm³ Year 2010 121.28 mg/ Nm³ - Estimated Cost: Cost of the investment in the year 2006 was € 9,817,375. <p>Total of all payments planned through the year 2020 is € 12,855,604.51.</p>

8. CLIMATE CHANGE**45. Action plan for the fight against climate change**

The commitment to the fight against climate change, which Madrid City Council may establish in drafting and implementing this Strategy, must include a Plan of Action for fighting climate change.

Madrid City Council's Action Policy against Climate Change is divided into two main lines of action:

- Addition of International Initiatives to Madrid.
- Creation of an Action Plan.

Execution time

2006-2007

Indicators

- Total CO₂ emissions:
14.217 kt CO₂ eq (2004) – 13.715 kt CO₂ (2008)- 13.382 kt. CO₂ (2009)

Notes and observations

- The City of Madrid Climate Change Prevention and Sustainable Energy Use Plan was approved by resolution of the Governing Board of the city on June 12, 2008. A tracking report is made annually.
- With respect to the addition of international initiatives, the presence of Madrid City Council in the Covenant of Mayors, sponsored by the Energy Division of the European Commission, the C40 Cities Climate Leadership Group and its association with the Clinton Climate Initiative and the Eurocities Climate Change and Air Quality Group is noteworthy. At the national level, the presence of Madrid City Council in the Spanish Federation of Municipalities and Provinces Network of Cities for the Climate stands out.

9. OTHER MEASURES**9.1. MUNICIPAL CLEANING SERVICES****46. Street cleaning**

Reduce airborne dust phenomena by reducing the amount of particulates present on paved surfaces, which are subject to being disturbed.

This measure will change the frequency of and procedure involved in street cleaning during episodes of high atmospheric stability and prolonged absence of precipitation.

The specific cleaning service that will be put into effect will cover the paved surfaces within the city (pavements, roads, boulevards, parks, etc.) having higher levels of suspended particulates. Preference will be given to performing this service in mixed form (tank truck and operator with pressure washer) and manual (street cleaning crew with hose carts), in order to be able to have better access to all paved surfaces. In this way, access will be increased to paved areas having less traffic, which are a large source of surface contamination.

Execution time

2006 - 2010

Indicators

- In the year 2006, street cleaning was accounted for in terms of kilometres of street cleaned (137,407 km of mixed cleaning and 234,222 km of mechanical street cleaning). Currently (beginning 2010) it is measured by the number of cleanings done.

Notes and observations

The Environmental Management Directorate General is in charge of carrying out these actions, which help prevent particles from rising again due to passage of vehicles or the effects of wind.

By districts, the areas where most street cleaning is done are City centre and Salamanca for mixed street cleaning and Carabanchel and Fuencarral for mechanical street cleaning.

These actions are done in coordination with the General Directorate of Sustainability and Mobility (Air Quality Service) in order to ensure treatment at times when there are high levels of particulate concentrations in the city.

In the year 2010, the following cleanings were undertaken:

- Number of mixed street cleanings: 32,731 (M-F) – 10,538 (Weekends & Holidays).
- Number of mechanical street cleanings: 22,741 (M-F) – 5,579 (Weekends & Holidays).

- Use of Non drinking water for street cleaning:

2006	2010
1.512.526 m ³	1.407.303 m ³ .

9. OTHER MEASURES**9.2. KNOWLEDGE IMPROVEMENT****47. Study on the health impacts of air pollution**

Adaptation measures will be pushed within the framework of applying the Climate Change Prevention and Sustainable Energy Use Plan, which are meant to control the possible impact of air pollution on health, such as changes in morbidity or mortality caused by increased temperatures, health effects from extreme weather and cardiorespiratory illnesses caused by air pollution.

Execution time

2007 - 2009

Indicators

- Levels of airborne particulates. A decrease in PM₁₀ and PM_{2.5} levels observed in network data.

Notes and observations

Within the framework of applying the PUSECC, the following action was taken with respect to Measure 51. Measure protocol and monitoring system for concentrations of pollen, particulates and other air pollutants.

- Adjustments to the City of Madrid air pollution monitoring system to adapt it to the new European Union criteria from Directive 2008/50 concerning ambient air quality were concluded in 2009.
- Pollen levels within the City of Madrid are provided via the Community of Madrid Health Portal, which can be accessed through the Madrid City Council air quality website.
- The Air Pollution Episodes Action Protocol was created by the City of Madrid Air Quality Commission in 2010: Population Alert and Information Procedures in Madrid municipality. Both information actions and containment measures as well as actions concerning health matters are included in this protocol.
- The most worrisome air pollutants from a health perspective are nitrogen dioxide, tropospheric ozone and suspended particulates, the effects of which could range from light respiratory distress to premature death.

The following actions are currently being taken by Madrid Health:

- Comparative study on mortality related to air pollution in large cities.
- Study to determine the effects of chronic exposure to air pollution on respiratory illnesses by estimating consumption of specific bronchodilator and anti-inflammatory medications.

ANNEX II

**DESCRIPTION OF OTHER MEASURES NOT INCLUDED IN STRATEGIES
ADOPTED DURING THE 2006-2010 PERIOD**

OTHER MEASURES NOT INCLUDED IN STRATEGIES ADOPTED DURING THE 2006-2010	
1. TRAFFIC	
1.1. PUBLIC TRANSPORT PROMOTION MEASURES	
1.	- Intermodal Transport Area Measures
2.	- Construction of platforms reserved for buses
3.	- Safe access and suppression of barriers to the transport infrastructure overall in Madrid. Remodelling work on bus stops and terminals. Installation and maintenance of prefabricated platforms
1.2. TRAFFIC IMPROVEMENT	
4.	- Large urban renewal projects
1.3. EMISSIONS CONTROL	
5.	- Installation of gas and particle filters in ventilation shafts on Calle 30 in Madrid
1.4. TRAFFIC PROMOTION OF SUSTAINABLE CITY PLANNING	
6.	- Legislative changes
2. HOUSING AND CITY PLANNING	
7.	- New city planning tools to manage competition and sustainability
8.	- Prado-Recoletos artistic/historic, environmental and cultural hub revitalization
9.	- Improve habitability, accessibility and sustainability of historic buildings, by supporting restoration
10.	- Green Bicycle Tour (3rd phase)
3. MADRID METRO	
11.	- Customer service and new website
12.	- Rolling Stock
13.	- Accessibility
14.	- Fare and sales system
15.	- Transport capacity
16.	- Perceived Quality Index
4. AWARENESS AND PARTICIPATION. EDUCATION, INFORMATION AND COMMUNICATION ACTIONS	
17.	- Training and awareness programmes for the Municipal Administration
18.	- Madrid Mobility Training
5. FIGHT AGAINST CLIMATE CHANGE	
19.	- Creation of green spaces and expansion of city forestation
6. STATIONARY SOURCES	
6.1. EMISSIONS REDUCTIONS	
20.	- Installation of solar energy collection systems at public buildings
6.2. RESPONSIBLE ENERGY USE	
21.	- Energy savings at traffic signals by installation of LEDs
6.3. OTHER MEASURES	
22.	- Environmental certification of buildings/installations
6.4. EMPRESA MUNICIPAL DE LA VIVIENDA Y SUELO	
23.	- Installation of photovoltaic solar collectors on buildings and city elements promoted by the EMVS
24.	- Construction of Heating District in the suburbs of San Francisco Javier and Nuestra Señora de los Angeles at Puente de Vallecas, Madrid
25.	- Low-temperature condensation boiler heating systems in buildings
26.	- Installation of Central Heating systems powered by solar panels/collectors in EMVS promotions
27.	- Installation of automated and semi-automated parking lots in EMVS public housing development buildings
28.	- Geothermal installation in public housing development building at 52 calle de Margaritas in Madrid
29.	- Pneumatic refuse collection facility in the suburbs of San Francisco Javier and Nuestra Señora de los Angeles, Puente de Vallecas, Madrid
7. BLUE PLAN MEASURES. COMMUNITY OF MADRID	
30.	- Urban mobility of people and products within the municipalities of the Community of Madrid
31.	- New railway infrastructure
32.	- New Light Metro railway infrastructure
33.	- New Suburban railway infrastructure

1. TRAFFIC
1.1. PUBLIC TRANSPORT PROMOTION MEASURES
1. Intermodal Transport Area Measures
Three Intermodal Transport Area actions are planned during the action period of this Strategy. These open-surface spaces, which are built into the metropolitan landscape, are designed to host both city and intercity bus terminals, and located at specific points within the city. They provide easy, comfortable and safe transfers between different modes of transport, such as Metro, Suburban RENFE, Light Train or between the regular bus lines themselves. Within the metropolitan area, Intermodal Areas are the base stations for public transport shuttles and, in some cases, based upon space available and at those in peripheral areas, may be related to a park and ride parking area. These actions, pushed by the Community of Madrid through the Regional Transport Consortium, in cooperation with Madrid City Council, enable citizens to get to the city centre faster, and add comfort and safety to walking involved between transfers.
Execution time
2006 -2010
Indicators
Number of Intermodal Areas: 13
Notes and observations
The three actions below were implemented during the planned period:
<ul style="list-style-type: none"> • Aviación Española: given a bus platform as distribution hub for EMT Line 1. • Casa de Campo: given two bus platforms servicing 3 EMT line distribution hubs. • Villaverde Alto: given one bus platform with two EMT line distribution hubs. • Villaverde Bajo-Cruce: given 8 bus platforms servicing 2 EMT lines and 4 intercity lines. • Doce de Octubre: given 1 bus platform with an EMT line distribution hub. • Jacometrezo: given 6 bus platforms with 6 EMT line distribution hubs. • Aluche: given 11 bus platforms with EMT line distribution hubs and 11 intercity lines. • Sierra de Guadalupe: has 3 bus platforms and 3 EMT line distribution hubs. • Plaza de Castilla: has 13 bus platforms and 1 double platform, with 12 EMT line distribution hubs and 3 intercity lines. • Ópera (Plaza de Isabel II): given 3 bus platforms with 3 EMT line distribution hubs. • Puerta de Atocha: given 8 bus platforms, 7 with one position and 1 double with 8 EMT line distribution hubs. • Canillejas: given 8 bus platforms and control zone with 3 EMT line distribution hubs and another 3 for intercity buses. • Pavones (Carabanchel).
2. Construction of platforms reserved for buses
Availability of platforms reserved for buses is at the top of the list for action plans in terms of infrastructure for prioritizing public ground transport.
Execution time
2006 -2010
Indicators
<ul style="list-style-type: none"> • Kilometres of platforms reserved for buses in metropolitan areas: 4.65 (2006) – 8.43 (2010)
Notes and observations
In fact, construction of reserved platforms is probably the most effective measure for improving operation of buses and, as such, is included in the public transport infrastructure programmes. In general, these actions have already been planned and completed, as is the case for the BUS-HOV lane of the A-6 on roadways belonging to the State.
During the 2006-2010 period, a qualitative change was made, which consisted of adding these platforms to the urban environment selectively, in specific areas of certain radial municipal transport hubs.

Specifically, the O'Donnell and Avenida de Cordoba reserved platforms were built. The former, for inbound traffic to the city, and the latter, a bi-directional configuration. Both platforms are positioned in the centre of the roadway. Both actions were built by Madrid City Council using plans drafted by the EMT, which acted as the project developer. In both cases, the action likewise included urban restoration and renovation actions on the roadways where they were built and/or at nearby intersections.

3. Safe access and suppression of barriers to the transport infrastructure overall in Madrid. Remodelling work on bus stops and terminals. Installation and maintenance of prefabricated platforms

The intention of this strategy is to improve bus stops. Pavements will be expanded so that no vehicle will be able to drive between the bus and the curb, in order to facilitate direct access by all people in general, and by those with reduced mobility in particular. This will reduce the time it takes for the bus to make a complete run of its route as well as reduce emissions.

Execution time

2006 -2010

Indicators

YEAR	NO. OF BUS STOPS WITH EXPANDED PAVEMENTS	NO. PREFABRICATED PLATFORMS INSTALLED	BUS STOP SIGNAGE AND MARKING	PLATFORM CLEANING
2006	98	56	160	189
2007	58	92	212	2
2008	29	61	173	128
2009	522	3	241	4

Notes and observations

Preference was given to pavement expansion projects when bus stop improvements were in progress, in order to enable installation of canopies. In many cases, prefabricated platforms were also installed.

Signage and marking at the bus stop consists of installing a directional panel and painting two-colour sections on the curbing.

Cleaning the prefabricated platforms enables removal of various waste that often gathers in the lower portion and causes obstructions.

1. TRAFFIC

1.2. TRAFFIC IMPROVEMENT

4. Large urban renewal projects

During the first legislative term, Madrid City Council completed the **Calle 30 Project** and the **City Mobility Infrastructure Improvement Programme**. Two projects meant to improve the competitiveness of the city through a process of urban infrastructure renovation, without which other basic actions could not have been taken.

The other large urban change project was Madrid Río. This project was made possible by and cannot be separated from the project to re-route the western section of Calle 30 of the city underground. This is the recovery of the shores of the Río Manzanares, by re-routing the western section of the M-30 underground, and thus taking back the area occupied by its surface for use as green area. This project enabled the creation of 429 hectares of new green areas planted with 296,600 trees, which eliminated the physical and social barriers existing in the six districts of Río Manzanares it passes through.

The investment made is as follows:

- Infrastructure programme.....1,167 million Euros
- Calle 30 Project.....3,688 million Euros
- Madrid-Río.....410 million Euros

Execution time

The execution time for these three projects was:

- Mobility improvement infrastructure programme..... 2004 / 2007
- Project Calle 30..... 2004 / 2007
- Madrid-Río..... 2007 / 2011

Indicators

- Elimination of some 150,000 vehicles per day in surface traffic.

Notes and observations
Expansion of green areas: 429 hectares of new, forested green areas, including 33,553 new trees planted, 460,054 new bushes and 160,000m ² of grass and vegetation. Construction process sustainability criteria were applied during its execution. An earth movement savings of 300,000 m ³ is estimated.
Furthermore, a new 11.280 meter recycled water network was built, with a capacity of 5,200 m ³ per day for watering and 5 reservoir tanks for watering and street cleaning. 234,920m ² of river shoreline area re-profiled and cleaned.
A figure of 3,060 tons of CO ₂ is estimated per year and a saving of 975 tons of CO ₂ and 367,500 pounds of diesel on construction.
<ul style="list-style-type: none"> ▪ Suppression of the barrier effect: creation of 110 hectares of new urban space in the city centre of Madrid and connection of the city centre and the southwest section of the city with 32 bridges and walkways. ▪ Creation of an environmental corridor from El Pardo to Getafe, which connects forests, parks and historical gardens. ▪ Reduced congestion: savings of 650 million trip hours valued at 3,915 million Euros (*). ▪ Reduced noise and emissions, due to improved functioning of roadways and particle filter and polluting gas filters and new acoustic barriers. ▪ Fewer accidents, with an economic impact of 770 million Euros (*).

1. TRAFFIC**1.3. EMISSIONS CONTROL****5. Installation of gas and particle filters in ventilation shafts on Calle 30 in Madrid**

Elimination of a high percentage of airborne suspended particulates exhausted from tunnel ventilation shafts on Calle 30 in Madrid.

Treatment of ventilation shaft exhausts from the Southern Bypass area of the M-30, by filtering suspended particulates (up to 1 micron in size) and purifying gas by eliminating nitrogen oxides, which are harmful to human health, by up to 80%.

Estimated Cost: 30 million Euros.

Execution time

2006-2010

Indicators

- Pollution elimination rates, measured by meters installed at each filtered shaft, which report equipment performance, both in terms of particle retention as well as gas purification.
- Amount of waste collected from particle filters as a percentage of the volume of air filtered during the period in question.

Notes and observations

The so-called by-pass area, which spans an area of 12 kilometres (counting both directions) has the newest air quality control system, with a dual mechanism, including a particle filter and an activated carbon filter to trap gases. There are four shafts having both systems. This combination was used in that area because it was the only one suitable for this type of installation and as a pilot programme for future projects. Each shaft is 12 meters high. Apparently, air quality measurements are taken at the filter input and output, and pollution is reduced by some 80% with respect to measurements taken at the entrance and exit to the tunnel.

1. TRAFFIC**1.4. TRAFFIC PROMOTION OF SUSTAINABLE CITY PLANNING**

6. Legislative changes
Madrid City Council is going to proceed to review its general and specific laws in order to adapt to new sustainability criteria, due to the relationship existing between uses and their influence on commuting done within the city.
Execution time
2008 – 2010
Indicators
<ul style="list-style-type: none"> • Laws in the process of being changed: A review of the General Plan for Urban Zoning and the Public Road Design Guide was initiated in the year 2010 and its results are yet to be published. • Modification of the Mobility Ordinance was approved on November 30, 2010.

Notes and observations

Various specific changes to the General Plan were proposed in 2010, in order to add sustainability criteria that would affect vehicle parking spaces, to promote less commuting and bicycle parking in order to encourage its use. All this is apart from the General Plan review process, which will begin in the year 2011.

Changes affect review of the number of commercial use parking spaces at buildings and tying the use of those spaces, in all case, to bicycle parking.

Review of the Mobility Ordinance sought to promote and increase the use of both motorcycles and bicycles.

All work done in reviewing the Public Road Design Guide was done during 2010 and it is now in the process of being approved. This new document is adapted to the new laws on accessibility and current sustainability criteria.

2. HOUSING AND CITY PLANNING

7. New city planning tools to manage competition and sustainability

- New legislation for improving habitability and sustainability of residences:
 - Modification of the General Plan to make elimination of sub-standard high-rise flats feasible.
 - Tool for improving control of building maintenance conditions.
 - Ordinance for the construction of automated parking structures.
 - Draft a new ordinance authorizing installation of elevators at the front.
 - Creation of the Dilapidated Building Condition, Renovation and Maintenance Ordinance (COINSURER).
- Tools for establishing strategies required in the future:
 - Project City centre Madrid.
 - Plaza Mayor Complete Urban Quality Plan.
 - Gran Vía Master Plan.
 - Río Manzanares area Urban Renewal Plan.
 - Fuencarral – Montera – Carretas – Doctor Cortezo Master Plan.
 - City's Urban Landscape Master Plan.

Execution time

2006 – 2010

Notes and observations

- Revitalization of the central hub of Madrid, where more than a million locals reside.
- Creation of new environmental hubs and support for commercial, cultural and artistic ones.
- Improved habitability, accessibility and sustainability of historic buildings.
- Increased competitiveness by updating the laws of Madrid for the Twenty-First Century.
- Improved quality of the urban landscape.
- Recovery of walking space through drafting the automated parking structure control ordinance.

8. Prado-Recoletos artistic/historic, environmental and cultural hub revitalization

- Restore the Paseo de Recoletos – Prado for use by residents, by placing pedestrians back at centre stage and restricting use and occupation by private motor vehicles.
- Return this walkway to its former glory as a landmark in the City of Madrid, to be enjoyed as a high-quality urban area for lodging and leisure, as well as for its character as the threshold of the most important cultural and institutional services.
- Propose another series of cultural and institutional hubs to follow this one.
- Enable citizens to take advantage of this new public space through participation, public awareness, accessibility and usability of the environment and integrating it with the city's other cultural hubs.

This project is divided into two phases and is 45% complete to date. The Culturally Significant Property (BIC) area remains to be finished.

Total cost to completion.....€ 35,785,457.78

Execution time

2006 – 2010

Notes and observations

Positive impact on the areas affected

- Elimination of surface traffic in favour of pedestrians, by widening pavements, adding green areas and trees.
- Change in the mobility model of the area.

Positive impact expected from the section pending completion (BIC area)

- Pedestrian surface area increased by 91.36%, going from 51,162 m² to 97,903 m².
- Improvement in terms of reduced air pollution is 85% less nitrogen oxide, 60% fewer particulates and 47% less carbon monoxide.
- - 6.1 dB (A) by day – 5.8 dB (A) by night at Casón del Buen Retiro.
- 32% reduction in traffic between Atocha-Neptuno, 29% between Neptuno and Cibeles and 14% between Cibeles and Colón.
- Noise reduction is estimated at – 5.1 dB (A) by day – 5.2 dB (A) by night at the Prado Museum and – 4.1 dB (A) by day – 3.9 dB (A) by night at the Thyssen Museum.

These environmental improvements are exactly what is required in order to reclassify this space as the highest quality cultural attraction of the city.

9. Improve habitability, accessibility and sustainability of historic buildings, by supporting restoration

The policy of access to housing does not just apply to new construction. There is another consolidated urban renewal effort in progress, which includes adding quality and sustainability to the process of restoring our neighbourhoods.

- *Integrated Renovation Areas.* Cover complete intervention processes, not only housing, but also infrastructure, provisions and public spaces. Involve local residents in the process of community development, thus improving coexistence in neighbourhoods and relationships between neighbours.
- *Sustainable Renovation.* Establish subsidies for renovation according to criteria including accessibility, improved architectural quality and sustainability in residences within consolidated urban areas of the City of Madrid.
- *Renovation through TEB.* After an unfavourable TEB inspection, in order to facilitate compliance with the responsibility to maintain buildings, the Council makes exclusive municipal grants, through the Empresa Municipal de la Vivienda y el Suelo, which are based on the degree to which the structure is protected, and the financial circumstances of the residents. These range from 3,600 to 7,215 Euros per residence, based on evaluation of both considerations.

Municipal investment made to date is as follows:

- *Integrated Renovation Areas.*
May 2003/April 2011.....€ 49,044,048.24
- *Sustainable Renovation.*
May 2006/April 2011.....€ 1,026,598.36
- *Renovation through TEB.*
May 2006/April 2011.....€ 19,357,763.65

Execution time

2006 – 2010

Notes and observations

Achieve the highest degree of energy efficiency in renovated buildings by involving all social agents in maintenance of the urban environment.

10. Green Bicycle Tour (3rd phase)

The main objective is to support cycling, not only as a tool for leisure, but also as an alternative means of transport.

- 3rd phase (40.7 kilometres).....33.4 million Euros

Execution time

Green Cycle Ring:

- 1st Phase (2000-2003).....18 kilometres
- 2nd Phase (2003-2005).....17 kilometres
- 3rd Phase (2006-2007).....40.7 kilometres

Notes and observations

- The raw material for the green cycle ring is construction waste.
- Pruning remains were used to plant 15,800 trees and 550,000 bushes along the sides of the entire length of the route.

3. MADRID METRO**11. Customer service and new website**

The objective is to strengthen and renew the following services:

- Interactive Centre:

This Centre, located in Alto del Arenal, is open and staffed every day of the year from 6.00 a.m. to 1.30 a.m. The personnel handle all requests for information about services provided, social and cultural activities of the City and Community of Madrid, and lost and found.

- Customer Service Centre:

Staffed with personal attention from 7.00 a.m. to 7.00 p.m. every day of the year. There are stations in Airport Terminals 1, 2 and 3, on Avenida de America, Nuevos Ministerios and Airport Terminal 4. The latter was opened in 2007. These centres are used to respond to requests for information from customers on matters related to the Metro Service, as well as inquiries about recreation or about the station itself.

- Commercial Supervisor:

New customer service model, which improves presence and proximity, by providing more personalized attention, and includes the use of new technology.

- Intercom and TV monitors:

The purpose of these is to better inform and serve customers during service interruptions.

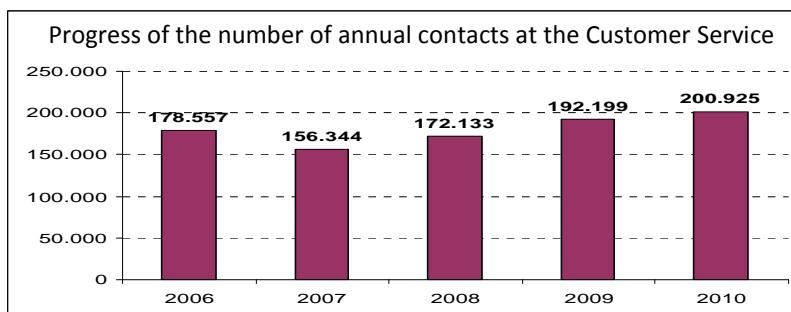
Execution time

2006-2010

Indicators

- Interactive Centre:

Number of contacts received:

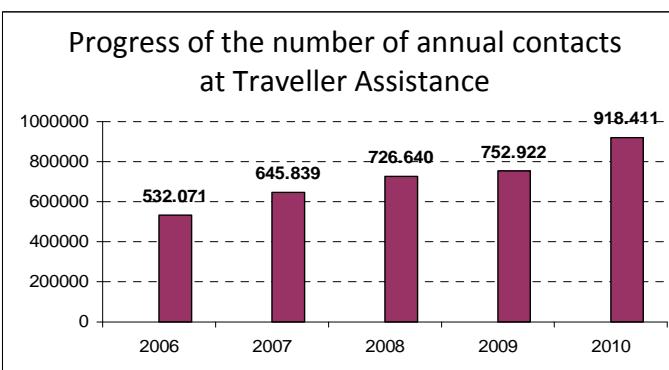


User ratings:

Year	2007	2008	2009	2010
Rating	8,51	8,36	8,28	8,52

- Customer Service Centre:

Number of contacts received:



User ratings:

Year	2007	2008	2009	2010
Rating	8,39	8,97	8,6	8,31

- Commercial Supervisor:

Extension of the commercial supervisor model in the network: Implementation of this model began with the 2003-2007 expansion plan of the stations at Lines 12 and 3. This was later extended for use of the stations at Lines 1 and 6.

- Intercom and TV monitors:

Number of elements:

	2006	2007	2008	2009	2010
Intercoms	3,517	4,610	4,691	4,721	4,801
Public Information	1,147	1,604	2,349	2,397	2,198 (*)

(*) Not including public information systems in elevators.

Besides all the services offered by these centres, the contents of the website were reviewed, and in March of 2009 a new website launched: www.metromadrid.es, which was adapted to AA standards in order to improve accessibility.

12. Rolling Stock

Over the course of the period from 2006 to 2010, Madrid Metro has improved the quality of its service by adding new rolling stock. The effort made to equip all its vehicles with state-of-the-art gear is noteworthy. This helped to achieve the best conditions in terms of amenities for the comfort and safety of its customers and to improve availability.

Execution time

2006-2010

Indicators

- Number of carriages:

Series	2006	2007	2008	2009	2010
2000	736	736	736	736	724
3000	140	368	432	432	456
5000	352	352	352	352	352
6000	129	132	132	132	132
7000	222	222	222	222	222
8000	148	155	155	155	225
9000	96	192	246	252	258
TOTAL	1,823	2,157	2,275	2,281	2,369

- Availability:

Series	2007	2008	2009	2010
2000	97,98%	97,93%	98,01%	97,84%
3000	95,21%	97,15%	98,44%	97,50%
5000	97,63%	97,94%	98,45%	98,51%
6000	97,05%	97,60%	97,12%	97,47%
7000	97,57%	96,42%	94,33%	93,00%
8000	96,73%	98,43%	98,96%	45,00%
9000	96,46%	98,39%	97,60%	97,59%
TOTAL	97,13%	97,86%	97,94%	97,65%

- Equipment in rolling stock (% of carriages with equipment available):

Elements	2006	2007	2008	2009	2010
	%	%	%	%	%
Air Conditioning	96,71	96,01	97,19	97,2	97,3
Video Surveillance	50,19	58,64	60,79	60,89	62,85
Interconnecting passageway for buses	40,32	49,56	52,17	52,3	54,58
Statio announcing system	83,71	86,09	86,81	86,85	87,84
Fire detection and extinguishers	34,34	44,37	47,25	47,39	49,85

13. Accessibility

One of the primary objectives of Madrid Metro over the years has been to increase accessibility to its network, by facilitating inclusion of people with all types of disabilities.

In terms of accessibility, Madrid Metro is a current leader among comparable cities in the world, not only due to the number of escalators and elevators, but also for the accessibility measures taken on trains and at stations. These include podotactile strips, signage and obstacle protection, Braille signage on handrails at fixed stairways and elevators, installation of elements in the network (easy-open docks on access doors in lobbies, seating with lumbar support on platforms, etc.) and within rolling stock (folding ramps, contrasting colours, audible or visible signage, etc.).

During the period from 2006 to 2010, the main actions taken by the Company along these lines were focused on installation of new elements, as well as renovation of existing ones (**Complete escalator renovation plan: 2008-2011**), in order to improve their reliability and reduce energy consumption.

Tracking Indicators

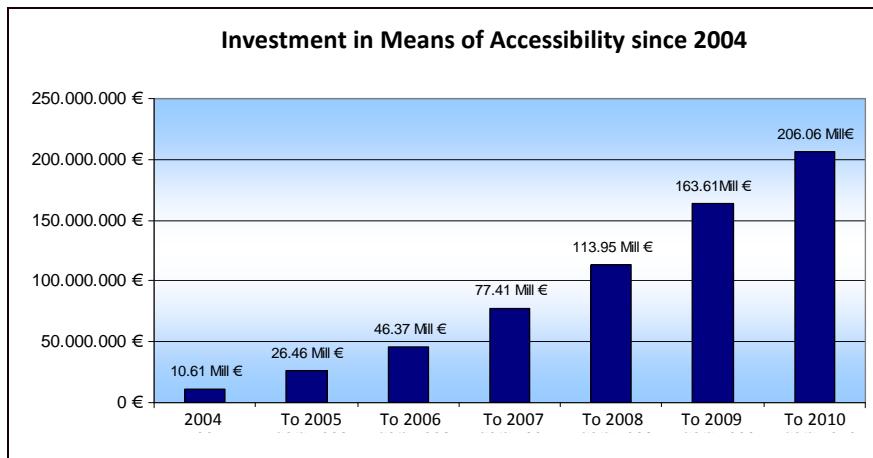
- Number of escalators, elevators, moving walkways and ramps:

	2006	2007	2008	2009	2010
Escalators	1,305	1,574	1,584	1,600	1,612
Moving walkways and ramps	26	26	30	34	38
Elevators	317	436	468	492	499

- Number of escalators renovated:

	2009	2010
Number of escalators renovated	84	106

- Investment in means of accessibility:



14. Fare and sales system

During the period from 2006 to 2010, the number of automatic ticket dispensers has increased, with the noteworthy addition of those accepting only credit cards.

Likewise, a fare system based on non-contact cards is being implemented.

Tracking Indicators

	2006	2007	2008	2009	2010
Automated Ticket Dispensers	938	1,611	1,716	1,449	1,489
Turnstiles	1,624	2,43	2,503	2,552	2,609

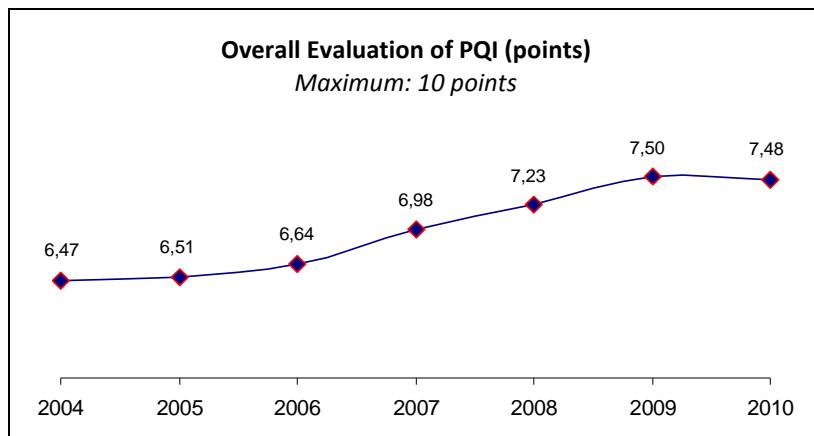
15. Transport capacity

Several actions meant to increase transport capacity are being implemented, in order to improve service quality. The following are worth noting:

- Signage: New signage incorporating Communication-Based Train Control (CBC) technology has been added to Lines 1 and 6, in order to increase transport capacity there and to safely reduce the time interval between compatible trains.
- Installation of prototypes (platform doors and line automation) in order to increase transport capacity by reducing stop times at each station.
- Operation Management Assistance and Information Systems manage driving staff efficiently by optimizing rotations and breaks for drivers and improving information related to quality of service being given in real-time.

16. Perceived Quality Index

All of the above has rendered an improvement in the customer Perceived Quality Index, which has reached record highs in recent years.



4. AWARENESS AND PARTICIPATION. EDUCATION, INFORMATION AND COMMUNICATION ACTIONS

17. Training and awareness programmes for the Municipal Administration
Madrid City Council implemented an intense, environmental awareness and training policy for its employees through the Study and Training Institute and by rolling out internal campaigns. Some of these actions influence air quality, for example, the eco-driving training programme for municipal fleet drivers, which has made a significant contribution in recent years. A climate change awareness and training campaign has also been designed and implemented. It was directed towards all local administration personnel, including political representatives, individuals in charge of contracting and building maintenance. Noteworthy in this regard is the creation of an Energy Manager position at municipal buildings. The role of the municipality as an example and the adoption of cleaner technology and practices both contribute to improving air quality.
Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> • Number of eco-driving courses conducted per year by municipal government divisions. • Number of energy managers trained. • Number of students attending training courses. • Number of conferences on energy and climate change organized by the Council each year.
Notes and observations
<p>Specifically, the main actions implemented that influence air quality are as follows:</p> <ul style="list-style-type: none"> - Training actions: <ul style="list-style-type: none"> ○ Perfecting driving. ○ Practical management of public contracting. ○ Promulgation and Promotion of Energy Efficiency and Savings Awareness. ○ Eco-driving (EMT in cooperation with IDAE and GEDESMA). ○ Eco-driving for Mobility Agents (conducted by the RACC). ○ Municipal energy manager training. - Updating of the Code of best environmental practices regarding local contracting and in the Decree on forest products, both of which influence climate change and, to a lesser degree, air quality. - The EMVS organizes technical training conferences for company professionals and for other municipal departments, in order to promote awareness regarding sustainable processes, systems and materials. - Promotional seminars on energy measures from Madrid City Council, held during 2008 and 2009. - Creation of Guides to Best Environmental Practices at Municipal Facilities.

18. Madrid Mobility Training
Eco-driving course for production personnel.
Execution time
2006 – 2011
Indicators
<ul style="list-style-type: none"> • Number of drivers trained in eco-driving. • - 41% compliance. • Reduction in CO₂ emissions. • Fuel consumption.
Notes and observations
All types of Madrid Mobility drivers are being trained in order to ensure that vehicles over 3.5 tons, which are being driven daily, are used efficiently, both in terms of fuel consumption as well as in emissions. This training thus implies a reduction in air and noise pollution.
Training completed:
Year 2008 18 drivers trained → 144 training hours.
Year 2009 33 drivers trained → 264 training hours.
Year 2010 20 drivers trained → 160 training hours.
Year 2011 20 drivers trained → 160 training hours.

5. FIGHT AGAINST CLIMATE CHANGE

19. Creation of green spaces and expansion of city forestation
Madrid City Council increased its already rich natural heritage by increasing the number of trees within the city, in its green areas, and by improving conservation. New green areas were created and more than 1,000,000 trees were planted within the city (Valdebebas Park, green centre, ring, etc.) improving the city environment as well as the air quality.
Execution time
2006 – 2010
Indicators
<ul style="list-style-type: none"> • Number of trees planted within the municipality annually. • Number of trees planted by the "Madrid Compensates" project per year. • Hectares of green areas per year within the municipality.
Notes and observations
<p>150,742 trees and 605,520 bushes were planted during the year 2009, and 5,888.92 hectares of green areas were the object of conservation, which is 3.49% more than in 2008.</p> <p>A Guide to Sustainable Gardening and Parks was created and an awareness campaign implemented in order to promote the best practices set forth in the guide. The contents of the Guide were promoted in gardening courses at schools offered by the Division of the Environment in autumn, summer, spring and winter.</p> <p>Moreover, the "Madrid Compensates" project was initiated, which offers citizens the chance to get involved in compensating for greenhouse gas emissions by planting trees, and the collaboration project with Caja Madrid Social Work continued planting trees within the green ring of the city.</p>

6. STATIONARY SOURCES**6.1. EMISSIONS REDUCTIONS****20. Installation of solar energy collection systems at public buildings**

The increase in solar energy use within the municipality is shown in the City of Madrid Energy Balance (2009). It has grown some 1,275% with respect to the base year 2003, going from 0.4 to 5.1 kTep generated with this energy source. Specifically, solar power has grown 470% and solar heat 1,543% since 2003.

Different Council Divisions promote actions meant to implement photovoltaic solar panels to generate electricity and domestic hot water (DHW) in municipal buildings.

Execution time

2006 – 2010

Indicators

- m² of solar heating panels each year.
- Electrical energy (kWh) generated per year.
- Annual consumption (kWh) of each installation with photovoltaic solar panels.
- Ktep/year from primary solar energy sources belonging to the municipality.

Notes and observations

The primary actions regarding solar energy within the municipality in recent years are as follows:

- Installation of photovoltaic solar panels on the roof of the Carabanchel business incubator. (Madrid Emprende).
- Installation of photovoltaic solar panels at EMVS residential innovation projects, such as: Sanchinarro promotion, Espíritu Santo building, etc.
- Installation of solar heating and power panels by the Heritage Division at various locations, such as: Sports Arenas at Almenara, Daoiz and Velarde, San Francisco de la Prensa Multi-purpose Centre, etc.
- The EMT has continued construction of the San Chinarro Operations Centre, where enough photovoltaic solar panels will be installed to supply the CNG refuelling station (1 MW). Furthermore, specifications have been drafted for installation of photovoltaic solar panels at operations centres in Entrevías and additions have been made to those already installed at Carabanchel.
- Installation of solar power and heating panels at twenty-nine municipal buildings (sports arenas, grade schools, centres for senior citizens, etc.).

6. STATIONARY SOURCES**6.2. RESPONSIBLE ENERGY USE****21. Energy savings at traffic signals by installation of LEDs**

Madrid City Council will add LED traffic signals at all municipal intersections to replace traditional traffic lights. A mass replacement has been rolled out in all city districts, and now 34% of all intersections with traffic lights (675) have this technology.

Execution time

2006 – 2010

Indicators

- LED lights Installed.

Notes and observations

Supply and installation of LED lights	2008	2009	2010
Total	15,000	15,000	15,000
TOTAL MEASURE			45,000

- Total new traffic light installations in 2005, as well as significant changes made with LED technology, which imply 80% savings.
- To date, 47,895 LEDs have been installed, which is 46.6% of the 2,108 existing intersections having traffic signals: 10,000 bulbs were replaced in 2008, at 167 intersections, and in 2009, changes and adjustments were made to equipment at 175 intersections.

- The investment made to date is 4,740,000 Euros, including both the unit cost of LED lamps as well as the work required to adapt the equipment and wiring to work with and use the services offered by LED and installation or replacement of the old optical signals.
 Project budget (2008-2009) - € 446,281

6. STATIONARY SOURCES

6.3. OTHER MEASURES

22. Environmental certification of buildings/installations

The purpose of this measure is to initiate operation and certification of environmental management systems, which contribute to reducing polluting emissions and to energy efficiency, at EMT divisions. Environmental certification can be ISO 14001, EMAS or LID certification for sustainable buildings.

Besides improvements already proposed for start-up of these management systems, enabling an improved public image due to this certification is also sought.

Execution time

2006 -2010

Indicators

- Number of installations or buildings with environmental certification.

EMT has certified:

- ISO 14001: Entrevías and La Elipa Operations Centres (2009 & 2010).
- EMAS: Carabanchel and Main Office Operations Centres (2007 & 2009).

The Sanchinarro Operations Centre was built according to LID criteria, but as of 2010 it is not yet certified. Implementation of ISO 14001 (2011) has begun at this Centre.

Notes and observations

Installations/buildings certified through EMAS and ISO 14001 Environmental Management Systems must make goals for continued improvement regarding energy savings and energy efficiency.

In order to track these goal, the following indicators are proposed:

Energy savings:

- Tm of CO₂ released to the atmosphere as a percentage of total employees.
- KJ of energy consumed as a percentage of total employees.

6. STATIONARY SOURCES

6.4. EMPRESA MUNICIPAL DE LA VIVIENDA Y SUELO

23. Installation of photovoltaic solar collectors on buildings and city elements promoted by the EMVS

Execution time

2006 -2010

Indicators

- Number of public promotion buildings with photovoltaic panels installed –3.
- Number of urban elements with photovoltaic panels installed – 3.

Notes and observations

The EMVS installed photovoltaic solar panels for energy production on the roofs of residential buildings and on urban elements installed on public roads. The promotions are: Espíritu Santo, 23 in the city centre, and Pintor Zuloaga, 10 and 16 in the urban expansion area in Sanchinarro.

The street furniture consist of 3 "Climate, Culture & Media" Air Trees on the Bulevar de la Naturaleza in Ensanche de Vallecas. The photovoltaic installations imply a significant energy savings in generating electricity, because they do not release NO_x or CO₂ into the atmosphere.

The total power installed is 91,727 kWh/year and installation required a **total investment of € 450,000**.

24. Construction of Heating District in the suburbs of San Francisco Javier and Nuestra Señora de los Angeles at Puente de Vallecas. Madrid
Execution time
2006 -2011
Indicators
<ul style="list-style-type: none"> • Construction of cogeneration District Heating with fuel cells and condensation boilers.
Notes and observations
District Heating was built in cooperation with the General Subdirectorate of Housing of the Department of Housing and City Planning. Heating and Air Conditioning for 1,637 residences within 16 public housing development buildings will be supplied by the hot water from District Heating . The cogeneration installation with fuel cells in turn generates electricity that will be passed on by the power company that provides general electrical service to the neighbourhood. Hot water, which is a by-product of the electricity generated, is pumped into the installation's collection tank, adding to the hot water produced by the boilers, and thus increasing the efficiency of the system. This cogeneration installation will significantly reduce emissions of CO ₂ , NO _x , etc.
The investment in the installation has amounted to € 6,000,000 to which the work required to bury the distribution lines installed up to the building connections must be added.
It will be managed by an Energy Services Company that will be contracted by public tender.

25. Low-temperature condensation boiler heating systems in buildings
Execution time
2006 -2010
Indicators
<ul style="list-style-type: none"> • Number of public housing development buildings with central boilers 34. • Number of residences built 1,805.
Notes and observations
The Empresa Municipal de la Vivienda y Suelo has included highly energy-efficient, low-temperature or condensation boiler central heating systems in almost all its public housing development buildings since 2006. Some of them do not have solar collectors due to having been contracted to be built prior to the existence of ETC requirements. Centralized heating, as opposed to individual boilers, has reduced gas consumption some 30% compared to a traditional boiler, as well as reducing emissions of CO ₂ , NO _x , etc., by 30%.
€ 5,415,000 has been invested in the installations so far.

26. Installation of Central Heating systems powered by solar panels/collectors in EMVS promotions
Execution time
2006 - 2010
Indicators
<ul style="list-style-type: none"> • Number of public housing development buildings in Madrid 82. • Number of residences built: 6,174.
Notes and observations
Public housing development buildings promoted and built by the EMVS include installation of solar collectors, most being solar panels, and others using vacuum tubes, to produce 70% of the domestic hot water and as support for the centralized low-temperature or condensation heating systems with low-temperature radiators. All that adds up to an energy savings of 35% and a corresponding equal reduction of emissions of CO ₂ , CO, NO _x , etc. € 24,696,000 has been invested in the installations so far.

27. Installation of automated and semi-automated parking lots in EMVS public housing development buildings
Execution time
2006 -2010
Indicators
<ul style="list-style-type: none"> • Number of parking lots installed = 5 (1 automated and 4 semi-automated). • Number of vehicle parking spaces = 236.

Notes and observations
Automated parking with 55 spaces was installed in the renovation building located at calle de Lope de Vega 10 – Huertas 39, and semi-automated parking was installed in buildings at calle de Cincuentín No. 4-6 with 113 spaces, calle de Margaritas No. 52 with 46 spaces, calle de Rodio No. 12 with 17 spaces and calle de Olmo No. 11 with 5 spaces. These systems make a significant contribution to reducing air pollution from vehicles (CO ₂ , NO _x , etc.). As the vehicles enter with their motors off, this also reduces pollution generated while searching for a space, with a noteworthy reduction of polluting elements in the life cycles of the materials, which are also recyclable.
The cost of the automated parking was € 16,000 per space and at the semi-automated lots the cost was € 6,000 per space.
Total invested for parking € 1,906,000. In both cases the cost of preparing the site prior to building the parking lots would have to be added.

28. Geothermal installation in public housing development building at 52 calle de Margaritas in Madrid
Execution time
2006 -2010
Indicators
<ul style="list-style-type: none"> • Number of homes 33. • Semi-automated parking lot with 46 spaces. • Madrid City Council District Cleaning (Division of Environment, Safety and Mobility) 1.
Notes and observations
<p>The building was built by the EMVS to hold: 33 residences for youths under 30 years of age within the Madrid Rental Plan regimen, a semi-automated parking lot with 46 spaces for vehicles and a Municipal Cleaning District.</p> <p>The geothermal equipment installed in residences for the first time in Madrid use ground source pumps to heat and cool the building and provide hot water, which is augmented by solar heating panels. This Renewable Energy installation (geothermal and solar) reduces energy consumption and emissions of CO₂, NO_x, etc. The semi-automated parking lot contributes to this reduction of emissions and adds to the overall operation of these systems in the neighbourhood.</p> <p>Total invested for the geothermal installation is € 122,000.</p>

29. Pneumatic refuse collection facility in the suburbs of San Francisco Javier and Nuestra Señora de los Ángeles, Puente de Vallecas, Madrid
Execution time
2006 -2010
Indicators
<ul style="list-style-type: none"> • Waste collection at 1,637 residences
Notes and observations
<p>The installation comprises the facility, the underground distribution network and the drop points where waste and containers are separated, at each of the 16 buildings (1,637 residential units). This separation by type augments environmental sustainability.</p> <p>The entire facility is monitored by a DACS system that detects its efficiency and can be controlled by a single person via modem.</p> <p>The pneumatic refuse collection facility also reduces noise and hazards in the area, as well as pollution from CO₂ and NO_x emissions generated by traditional waste collection vehicles.</p> <p>To the total cost of the pneumatic refuse collection would have to be added the site preparation costs required prior to installation of the underground distribution network.</p> <p>Total investment for the facility is € 4,900,000.</p>

7. BLUE PLAN MEASURES. COMMUNITY OF MADRID 1

30. Urban mobility of people and products within the municipalities of the Community of Madrid

Implementation of measures related to Sustainable Urban Mobility Plans within Community of Madrid Municipalities with urban transport: 39 municipalities, almost 2.5 million inhabitants, not including the capital, Madrid.

Execution time

2007 -2010

Indicators

- Percentage of increase in demand for intercity buses and metropolitan railways.

Notes and Observations

Through IDAE Action Plans (60%) and the individual councils (40%), during the 2005-2007 and 2008-2012 periods:

- public transport has been improved (accessibility to bus stops, bus lanes, preferential traffic lights);
- bicycle use has been encouraged (more bicycle lanes, public bicycle system);
- parking has been controlled (metered parking systems on public roads, parking for residents);
- urban quality has been renewed (pedestrian areas, metered traffic zones, low emission zones);
- municipal fleets have been made more efficient and cleaner;
- electric bicycles have been added to municipal services and to companies;
- school transport;
- mobility office, etc.

With a budget of 7.6 million Euros financed by the Community of Madrid, the goal of this measure is to increase environmentally-friendly urban mobility in municipalities within metropolitan areas and reduce the use of cars.

7. BLUE PLAN MEASURES. COMMUNITY OF MADRID 2

31. New railway infrastructure

Development of new branches in the Community of Madrid's Metro network.

Execution time

2006 -2010

Indicators

- Percentage shift from cars to public transport.

Notes and observations

The following actions have been taken for the purpose of expanding mobility via public transport within the period indicated:

- Line 1 -Extension to its northern end (Pinar de Chamartín) and southern end (Valdecarros).
- Line 2 -Extension to Las Rosas (San Blas district).
- Line 3 -Extension to Villaverde district and its connection to suburban lines C4 and C5.
- Line 4 -Extension to Pinar de Chamartín.
- Line 5 -Extension to Alameda de Osuna.
- Line 7 -Extension to the municipalities of Coslada and San Fernando de Henares (Metro East).
- Line 8 -Extension to Airport Terminal 4 and the new station at Pinar del Rey.
- Line 10-Extension to the municipalities of Alcobendas and San Sebastián de los Reyes (Metro North).

Estimated cost: 4.855 billion Euros.

7. BLUE PLAN MEASURES. COMMUNITY OF MADRID 3

32. New Light Metro railway infrastructure

Enlargement of the Light Metro railway managed by Community of Madrid.

Execution time

2006 – 2010

Indicators

- Percentage shift from cars to public transport.

Notes and observations

4 new Metro Light and Tram lines commissioned:

- Line ML1 Pinar de Chamartín-Las Tablas, municipalities of Madrid.
- Line ML2 Colonia Jardín-Estación de Aravaca, municipalities of Madrid and Pozuelo de Alarcón.
- Line ML3 Colonia Jardín-Puerta de Boadilla, municipalities of Madrid and Boadilla del Monte.
- Parla circular Tram Line.

Estimated cost financed by the Community of Madrid: 905 million Euros.

7. BLUE PLAN MEASURES. COMMUNITY OF MADRID 4**33. New Suburban railway infrastructure**

Development of new branches in the Community of Madrid's Suburban network.

Execution time

2006 – 2010

Indicators

- Percentage shift from cars to public transport.

Notes and observations

The following action was taken for the purpose of increasing public transport mobility:

1. New tunnel between Atocha and Chamartín with a station at Puerta del Sol.

Estimated cost, financed by the Ministry of Development and Community of Madrid: 550 million Euros.

ANNEX III

MEASURES FROM OTHER ENTITIES AND ADMINISTRATIONS FOR THE 2011-2015 PERIOD

MEASURES FROM OTHER ENTITIES AND ADMINISTRATIONS FOR THE 2011-2015 PERIOD	
1. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT	
1.1. INTERCITY AND METROPOLITAN TRANSPORT	
1.	- Renewal of the intercity bus fleet to cleaner technology
2.	- Improvements in customer service on intercity buses
3.	- Improvements for users of the Metro service
4.	- New Metro and Suburban railway infrastructure
5.	- Promotion of sustainable transport in municipalities within the Community of Madrid
6.	- Community of Madrid's Integrated Transport Centre (CITRAM)
7.	- Interchange and Intermodal Transport Area Actions
1.2. MOBILITY AND TRANSPORT MEASURES AT BARAJAS AIRPORT	
8.	- Reduction of emissions from Barajas Airport

1. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT**1.1. INTERCITY AND METROPOLITAN TRANSPORT****1. Renewal of the intercity bus fleet to cleaner technology****DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The purpose of this measure is to reduce polluting emissions from the intercity bus fleet by changing the technology it uses.

During the 2011-2015 action period, the Regional Transport Consortium initiated a Plan to renew the intercity bus fleet on all lines. The first phase of the Plan, which included companion measures for the 2012-2015 period, was completed in 2011.

Recently renewed concessions to run intercity bus services, which are granted by the Community of Madrid, require the concession owner to convert to more environmentally-efficient fleet vehicles (Euro IV and Euro V).

This implies renewal of 400 vehicles before December 31, 2011 and 800 vehicles through to 2015.

DUE DATE

Year 2011-2015

ESTIMATED COST

€ 360,000,000 (private concessionaire financing).

POSITIVE IMPACT GENERATED

- The planned fleet renewal will have a significant effect on reducing the emissions of pollutants into the atmosphere.

TRACKING INDICATOR

- Number of buses renewed as a percentage of the fleet.

2. Improvements in customer service on intercity buses**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

The goal of this measure, within the framework of the Intercity Bus Modernization Plan¹³ being implemented by the Regional Transport Consortium, is to make use of new technology in order to better service customers.

The measure comprises two actions:

- Improving payment systems by adding non-contact technology to tickets.
- Improving delivery of information to customers by installing real-time information systems in the 2,000 intercity buses within the Community of Madrid.

DUE DATE

Year 2011-2015

ESTIMATED COST

€ 50,000,000

POSITIVE IMPACT GENERATED

- Promote the use of public transport.
- Reduction in the use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Percentage increase in demand for intercity buses.

3. Improvements for users of the Metro service**DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS**

Among the reasons that the City of Madrid has been able to have one of the best metro systems in the world is the extraordinary expansion of the network and the number of stations during the last decade, as well as the investments in new technology that improves its energy efficiency, the number of runs and their timeliness. The emphasis placed on continued improvements in customer service is also significant.

¹³ *Intercity Bus Modernization Plan* approved on 10/23/2009 by Resolution of the Managing Director, which was approved by the Executive Committee on the same date. Published in the Official Journal on October 27, 2009. Created in response to Law 5/2009 of October 20 from the Community of Madrid on Traffic Control and Highway Mobility

Within this framework, the goal of this measure is to implement new improvements for users and thus promote the use of this means of public transport.

The following actions are planned:

- Rolling stock: actions in this area are focused on renewing obsolete vehicles as well as acquiring and purchasing new units.
- Accessibility:
 - Escalator renovation plan based on age. Install new, safer, more reliable units with remote-control energy-saving systems and higher passenger transport capacity.
 - Design and/or implementation of new alternative systems and procedures for accessibility at stations for disabled persons.
- Actions concerning payment methods to be taken in the years to come focus on:
 - Adaptation of ticket machines and turnstiles to non-contact cards.
 - Addition of machines with universal access.
 - Adaptation of sales and fare equipment to new commercial and technological requirements.
- With respect to Improved capacity, implementation of organizational and technical measures will be continued in order to increase transport capacity, especially at high-demand stations. The following stand out as primary measures:
 - Implementation of the new change system for drivers (ARCO) throughout the network.
 - Automatic ATO startup between stations.
 - CBTC.
 - Platform doors.
- Pilot programme on improving the temperature inside carriages: improved comfort and significant energy savings (around 300,000 kWh/year) will be achieved by lowering the temperature assigned to carriages from 22 to 20 degrees during winter, using software-based remote control changes.
- Pilot programme on improving ventilation and environmental conditions at stations: the goal is to optimize the ventilation systems by analyzing all factors that influence inside temperature (user heat sources, trains and power cables), as well as heat transmission and the requirements for optimum ventilation.
- User information: there are plans to extend the commercial supervisor model to other stations in the years to come. Likewise, work is being done on gradually adding the Company to the various Social Networks. There are also plans to open new customer service centres (Plaza de Castilla).

DUE DATE

Year 2012-2015

ESTIMATED COST

This will vary based on the degree to which each of the measures is implemented and the technologies that are ultimately applied.

POSITIVE IMPACT GENERATED

- Promote the use of the Metro.
- Deterrent to use of private motor vehicles.
- Reduction of traffic congestion and traffic pollution.

TRACKING INDICATOR

- Rolling Stock renewed.
- Number of escalators renovated.
- Investment in means of accessibility.
- Research and pilot projects completed.
- Evaluation by users.

4. New Metro and Suburban railway infrastructure

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

This measure falls within the plans that state, independent and municipal administrations implement jointly, in order to increase public railway transport capacity and service within the City of Madrid metropolitan area.

These actions, which have helped to increase metro and suburban rail service significantly in recent years, play a critical role in shifting private motor vehicles users, who commute to the city on a daily basis, to using public transport, with the resulting reduction in congestion and pollution from traffic. These actions are of particular

interest due to their effect on the mobility environment outside the central hub, where use of private motor vehicles is particularly prevalent.

The following are some of the more noteworthy actions planned within this measure:

- Extension of the Suburban and high-speed railway lines to Madrid Barajas Airport.
- Penetration of the Suburban railway at Torrejón and connection to Chamartín.
- New railway penetration at Moncloa.
- Extension of Metro Line 9 at Mirasierra and Suburban train interchange.
- Extension of Metro Line 3 at El Casar and Suburban train interchange.

Considering the socioeconomic conditions and taking into account the magnitude of the investment required, the degree to which this measure is implemented will depend upon the availability of funds.

DUE DATE
Year 2011-2015
ESTIMATED COST
€ 500,000,000
POSITIVE IMPACT GENERATED
<ul style="list-style-type: none"> • Commuters shifted away from using private motor vehicles to public transport. • Reduced congestion, especially during rush hour. • Reduced polluting emissions from traffic.
TRACKING INDICATOR
<ul style="list-style-type: none"> • New infrastructure.

5. Promotion of sustainable transport in municipalities within the Community of Madrid

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

This measure covers implementation of plans for sustainable urban mobility measures in municipalities within the Community of Madrid, for urban transport affecting 39 municipalities (almost 2.5 million inhabitants) not including the capital, Madrid.

The means to carry out these measures originate in the 2011-2020 Action Plan from the Energy Savings and Diversification Institute (IDAE) (60%) and from the individual councils (40%).

The measures include the following types of actions: public transport improvements (accessibility to bus stops, bus lanes, preferential traffic lights); promotion of bicycle use (more bicycle lanes, public bicycle system); parking controls (metered parking systems on public roads, parking for residents); urban renewal (pedestrian areas, metered traffic zones, low emission zones); cleaner, more efficient municipal fleets; addition of electric bicycles to municipal services and to companies; school transport; mobility office, etc.

DUE DATE
Year 2011-2015
ESTIMATED COST
€ 30,000,000
POSITIVE IMPACT GENERATED
<ul style="list-style-type: none"> • Improved public transport. • Promotion of means of transport other than motor vehicles. • Reduction in the use of private motor vehicles. • Reduced polluting emissions from traffic.
TRACKING INDICATOR
<ul style="list-style-type: none"> • Number of actions initiated.

6. Community of Madrid's Integrated Transport Centre (CITRAM)

DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS

Within the framework of sustainable mobility plans, the intention of this measure is to promote public transport by improving information, by offering it in a way that integrates all means of transport existing within the Community of Madrid.

Implementation of the measure will be the responsibility of the Regional Transport Consortium of Madrid.

Actions: implementation of a system that combines information on all means of public transport within the Community of Madrid, which includes all operators, whether public or private, as well as the highway situation.

The information will be broadcast using the most modern information and communication technologies, both remote and on-site at bus stops, on board vehicles, etc.
DUE DATE
Year 2011-2015
ESTIMATED COST
Will depend upon the technology used and the scope of the measure.
POSITIVE IMPACT GENERATED
<ul style="list-style-type: none"> • Improved public transport. • Promotion of means of transport other than motor vehicles. • Reduction in the use of private motor vehicles. • Reduced polluting emissions from traffic.
TRACKING INDICATOR
<ul style="list-style-type: none"> • Number of actions initiated.

7. Interchange and Intermodal Transport Area Actions
DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS
The goal of this measure is to continue driving improvement and expansion of equipment and infrastructure such as intermodal and interchange areas. These encourage the use of different means of public transport using areas designed to host both city and intercity bus terminals, and located at specific points within the city. They provide easy, comfortable and safe transfers between different modes of transport, such as Metro, Suburban RENFE, Light Train or between the regular bus lines themselves.
Various actions in Intermodal Transport Areas and interchanges are planned, depending upon availability of budgetary funds, which will be driven by the Community of Madrid via the Regional Transport Consortium, in cooperation with Madrid City Council. The following actions are planned within the current schedule for the 2011-2015 period: Plaza de Alsacia; Mar de Cristal; Colonia Jardín; Puerta de Arganda; Conde de Casal and remodelling of Avenida de America.
DUE DATE
Year 2011-2015
ESTIMATED COST
<ul style="list-style-type: none"> - Plaza de Alsacia: € 1,500,000 - Colonia Jardín: € 4,500,000 - Remodelling of Avenida de América: € 12,000,000 - Plaza de Alsacia: € 1,500,000 - Colonia Jardín: € 4,500,000 - Remodelling of Avenida de América: € 12,000,000
POSITIVE IMPACT GENERATED
<ul style="list-style-type: none"> • Promotion of public transport. • Reduction in the use of private motor vehicles. • Reduction of traffic congestion and traffic pollution.
TRACKING INDICATOR
<ul style="list-style-type: none"> • Number of bus platforms. • Number of bus lines. • Number of daily commuters benefited.

1. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT
1.2. MOBILITY AND TRANSPORT MEASURES AT BARAJAS AIRPORT

8. Reduction of emissions from Barajas Airport
DESCRIPTION OF OBJECTIVES, MEANS AND ACTIONS
The following actions are planned for the Madrid-Barajas Airport in order to improve air quality:
<ul style="list-style-type: none"> - Continuous descent approaches: green landings. Continued implementation is planned for this type of manoeuvre at high-traffic airports, including Madrid-Barajas. Starting in 2013, AENA plans to implement continuous descent approaches during all airport hours of operation. There is no additional cost for AENA associated with this. The cost here will be borne by the airline companies. - Addition of electric vehicles, in a second phase of the plan, for which a study of 10 electric vehicles will be done (among cars and light-duty vehicles), which will compile their basic parameters (consumption, performance,

<p>costs and impact). As a part of this action the airport will be supplied with the recharging infrastructure required. A budget of € 110,000 per year is planned for this action. The charging infrastructure required is considered a one-time investment of approximately € 40,000 rather than an annual cost.</p> <ul style="list-style-type: none"> - Construction of a new CNG station in the area of Terminal 4 and various mobile stations at other terminals. Start-up is planned for the end of 2012. This action will enable gradual replacement of ground support vehicles. Cost of the CNG station: 5,740,000 Euros (plans and construction). - Replanting of trees within the interior of the airport where this will not present an operational hazard. A planting was done during the year 2011, which cost approximately € 112,000 Euros. - Signature of a collaboration agreement between the Regional Transport Consortium of Madrid, AENA Airports, Madrid City Council, the Air Safety Agency and SENASA (Aeronautical Safety and Air Navigation Studies and Services) for implementation of the airport Sustainable Mobility Plan, with support from IDAE. Signing the agreement as such implies no additional cost for AENA.
DUE DATE
2011-15
ESTIMATED COST
€ 6,000,000
POSITIVE IMPACT GENERATED
<ul style="list-style-type: none"> • Reduction of emissions associated with landing aircraft. • Promotion of cleaner vehicles and cleaner fuels. • Improved airport mobility.
TRACKING INDICATOR
<ul style="list-style-type: none"> • More electric vehicles. • Reduced consumption of gasoline and diesel. • Reduced air pollution.

ANNEX IV

**COST DETAILS OF MEASURES DRIVEN BY THE COUNCIL FOR
THE 2011-2015 PERIOD**

MADRID'S AIR QUALITY PLAN 2011-2015
COST OF NEW MUNICIPAL MEASURES

MEASURE		2011	2012	2013	2014	TOTAL
1. TRANSPORT AND MOBILITY SECTOR		46,042,673	42,465,144	27,025,676	38,196,125	153,729,618
1.1. DETERRENCE AND RESTRICTION OF THE USE OF PRIVATE MOTOR VEHICLES		0	1,448,969	4,079,723	5,199,723	10,728,415
1.	- Implementation of a low emission zone (LEZ)	0	25,000	0	0	25,000
2.	- New areas of residential priority and restricted vehicle traffic areas within the LEZ	0	0	770,000	1,230,000	2,000,000
3.	- Completely pedestrianizing areas	0	0	200,000	400,000	600,000
4.	- Reduction of road capacity on LEZ routes	0	60,000	440,000	900,000	1,400,000
5.	- Implementation of a separate RPS rate within the LEZ	0	25,000	0	0	25,000
6.	- Expanded RPS schedule	0	1,338,969	2,669,723	2,669,723	6,678,415
7.	- Implementation of an intelligent RPS	-	-	-	-	NAD
8.	- Regulate the prohibition on keeping motors running on parked vehicles	-	-	-	-	NAD
1-2. PROMOTION OF CLEANER TECHNOLOGIES AND CLEANER FUELS		68,503	51,302	46,967	0	166,772
9.	- Electric Vehicle Promotion and Implementation Strategic Plan Framework	68,503	51,302	46,967	0	166,772
10.	- Consolidate and expand the supply points for cleaner fuels	-	-	-	-	PF
11.	- Consolidate and expand government measures to promote the use of cleaner technologies and cleaner fuels	-	-	-	-	NAD
12.	- Consolidation and strengthening renewal of the municipal fleet of vehicles to cleaner technology	-	-	-	-	NAD
1.3. PROMOTION OF A MORE EFFICIENT AND SUSTAINABLE PUBLIC TRANSPORT		45,810,702	39,587,173	19,237,986	21,453,402	126,089,263
1.3.1. Taxi						
13.	- New schedule regimen	-	-	-	-	PF
14.	- Drive to renew taxi fleet to cleaner technology	344,000	344,000	700,000	344,000	1,376,000
1.3.2. City buses (EMT)						
15.	- 100% of the EMT Bus Fleet within the LEZ with clean technology	44,894,702	37,943,173	16,714,986	1,249,402	100,802,263

	MEASURE	2011	2012	2013	2014	TOTAL
	- New CNG buses	44,894,702	36,693,771	13,154,190	0	
	- Filter installation	0	1,249,402	3,560,796	1,249,402	
16.	- Expand the number of alternative supply points at EMT centres	0	100,000	20,000	0	120,000
17.	- Promotion of best practices and use of new technology for more efficient use of EMT buses	0	0	0	1,910,000	1,910,000
18.	- Reserved platform for buses	0	0	500,000	6,500,000	7,000,000
19.	- Complete transversal line network	0	0	0	10,000,000	10,000,000
20.	- Implement lines with special vehicles	0	1,100,000	0	0	1,100,000
21.	- Suppress barriers, make access safe and optimize use of space within the bus stop infrastructure		100,000	300,000	200,000	600,000
22.	- Increase the number of conventional bus lanes with separator	-	-	-	-	CU
23.	- New payment systems (mobile phone, Internet, etc.)	0	0	750,000	0	750,000
24.	- Improve information to passengers	572,000	0	253,000	0	825,000
25.	- Integrated public transport interpretation centre	0	0	0	1,250,000	1,250,000
1.4. MANAGEMENT MEASURES FOR IMPROVING PASSENGER TRANSPORT		0	36,000	96,000	18,000	150,000
26.	- Management tools for special use of conventional transport services and school transport services	0	18,000	84,000	18,000	120,000
27.	- Parking and services management plan for Occasional Transport and tour buses	0	18,000	12,000	0	30,000
1.5. 5 PROMOTION OF ALTERNATIVE MEANS OF MOBILITY		113,468	776,700	2,500,000	9,770,000	13,160,168
28.	- Promotion of the use of carpooling and carsharing	0	20,000	20,000	30,000	70,000
29.	- Promotion of the use of bicycles	0	591,700	2,450,000	6,200,000	9,255,168
	Infrastructure	0	578,000	1,680,000	1,680,000	
	Promotion	13,468	13,700	20,000	20,000	67,168
	Public rental system	0	0	750,000	4,500,000	5,250,000
30.	- Promote walking	0	35,000	0	0	35,000
31.	- Promotion of the use of motorcycles	0	30,000	30,000	40,000	100,000
32.	- Promotion of alternative school mobility	100,000	100,000	0	0	200,000
33.	- Promotion of the use of public transport for mobility to work	0	0	0	3,500,000	3,500,000

MEASURE		2011	2012	2013	2014	TOTAL
1.6. SUSTAINABLE GOODS TRANSPORT		-	-	-	-	-
34.	- Promotion of voluntary agreements with the private sector to push renewal of commercial and delivery fleets to cleaner technology	-	-	-	-	PF
35.	- Grant benefits on mobility to commercial and delivery vehicles with cleaner technology	-	-	-	-	NAD
36.	- Research sustainable loading and unloading	-	-	-	-	NAD
1.7. PARKING LOTS		-	-	-	-	FP
37.	- Promotion of public/private cooperation for construction of resident and park-and-ride parking lots	-	-	-	-	PF
1.8. ROAD MAINTENANCE		50,000	400,000	900,000	1,650,000	3,000,000
38.	- Drive for sustainable road surfacing	50,000	400,000	900,000	1,650,000	3,000,000
39.	- Use of less contaminating paint for markings	-	-	-	-	CU
1.9 MEASURES FOR RESEARCH AND INVESTIGATION ON THE SUBJECT OF SUSTAINABLE TRANSPORT AND MOBILITY		0	165,000	165,000	105,000	435,000
40.	- Mobility Roundtable	0	55,000	55,000	55,000	165,000
41.	- Projects and Studies Drive	0	50,000	50,000	50,000	150,000
42.	- Specific measures for environments in areas with records of high pollution	0	60,000	60,000	0	120,000
2. RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL SECTOR		60,000	80,000	660,000	660,000	1,460,000
43.	- Subsidize replacement of boilers that burn fuel oil	0	0	600,000	600,000	1,200,000
44.	- Promotion of housing energy renovation	-	-	-	-	CU
45.	- Madrid City Council Energy Optimization Plan Drive	60,000	80,000	60,000	60,000	260,000
46.	- Voluntary agreements with the private sector to increase energy efficiency and savings	-	-	-	-	PF
3. CONSTRUCTION AND DEMOLITION WORK		7,000	7,000	0	0	14,000
47.	- Promotion of best practices for reducing air pollution during the construction and demolition of buildings	7,000	0	0	0	7,000
48.	- Promotion of best practices in mobility infrastructure projects	0	7,000	0	0	7,000
4. CLEANING AND WASTE MANAGEMENT		0	100,000	2,311,615	2,602,888	5,014,503
49.	- Pneumatic waste collection	-	-	-	-	CU

MEASURE		2011	2012	2013	2014	TOTAL
50.	- Reduce pollution via street cleaning	-	100,000	100,000	300,000	500,000
51.	- Renew street cleaning fleet to new technology	-	-	-	-	CU
52.	- Renew waste water purification equipment motors to new technology	0	0	2,211,615	2,302,888	4,514,503
5. URBAN PLANNING		-	-	-	-	-
53.	- Integrate items concerning air quality into the new General Plan for Urban Zoning	-	-	-	-	NAD
54.	- Roadway system review and development	-	-	-	-	CU
55.	- City centre revitalization measures	-	-	-	-	CU
56.	- Eco neighbourhoods: towards a more global idea of sustainability	-	-	-	-	CU
6. NATURAL HERITAGE		0	0	0	0	0
57.	- Consolidate the contribution to the fight against air pollution of the city's natural heritage	-	-	-	-	NAD
58.	- Reduce polluting emissions from maintenance tasks in green areas	-	-	-	-	NAD
7. REFUERZO DE LA INTEGRACIÓN DE LAS CONSIDERACIONES RELATIVAS A LA CALIDAD DEL AIRE EN POLÍTICAS MUNICIPALES		25,000	25,000	25,000	25,000	100,000
59.	- Improve municipal governance	-	-	-	-	NAD
60.	- Green public contracting drive	-	-	-	-	NAD
61.	- Promotion of sustainable events	-	-	-	-	NAD
62.	- Promotion of more sustainable sports activities and infrastructures	25,000	25,000	25,000	25,000	100,000
8. MONITORING, FORECASTING AND INFORMATION SYSTEMS		151,000	475,000	449,323	86,324	1,161,647
63.	- Improve the air quality monitoring, forecasting and information system of Madrid	107,000	326,000	360,323	10,324	803,647
64.	- Improvements in the application of data control and analysis within air quality forecasting and information systems	40,000	105,000	45,000	50,000	240,000
65.	- Development of air quality indicators within Madrid's Health Monitoring System of Environmental Factors	4,000	44,000	44,000	26,000	118,000
9. TRAINING, INFORMATION AND AWARENESS		0	70,000	210,000	90,000	370,000
66.	- Train municipal service personnel on sustainability	-	-	-	-	NAD
67.	- Offer training on air quality at schools	-	-	-	-	NAD
68.	- Training to promote sustainable mobility	-	-	120,000	-	120,000



MEASURE		2011	2012	2013	2014	TOTAL
69.	- New comprehensive municipal information model on sustainable mobility alternatives in the City of Madrid		50,000	50,000	50,000	150,000
70.	- Promotion of citizen awareness of the Air Quality Plan	0	20,000	40,000	40,000	100,000
PLAN TOTAL		46,285,673	43,222,144	30,681,614	41,660,337	161,849,768

NAD: No Additional Cost;

CU: Cost Unknown;

PF: Private financing .

ANNEX V

**AIR QUALITY MODELING SYSTEM USED
IN THE MUNICIPALITY OF MADRID
(2011-2015 AIR QUALITY PLAN)**

1. Introduction

Ambient air quality is the product of a series of processes that take place in the atmosphere simultaneously, which can be verified on different time and space scales. For example, photochemical concentration levels are determined by an intricate system of physical and chemical processes that include emissions of precursor substances, varying chemical reactions and many physical transport and deposit phenomena. These processes in turn are closely related to other phenomena like secondary aerosol production and acidification. As a result, estimating pollutant concentration levels requires the use of advanced simulation systems that take into account all these phenomena along with numerical algorithms and techniques able to give the model enough flexibility to be applied satisfactorily at different scales.

2. Modelling system

In order to simulate air quality levels within the framework of the development of the 2011-2015 City of Madrid Air Quality Plan, the Technical University of Madrid (UPM) applied a state-of-the-art mesoscale simulation system encompassing the WRF, SMOKE and CMAQ (Figure 1) models. Ambient air concentration values are provided by the *Community Multiscale Air Quality* (CMAQ), an Eulerian (the space is separated into cells and the equations are processed locally) chemical-transport model developed by the *United States Environmental Protection Agency* (US EPA). The meteorological data required for this chemical transport and reaction model was obtained from the *Weather Research and Forecasting* (WRF) model. This is a limited-area, nonhydrostatic, Eulerian model, that solves the primitive equations for a fully comprehensible flow. Emission inventories and projections are processed by the *Sparse Matrix Operator Kernel Emission* (SMOKE) system, in order to adjust emissions to the chemical-transport model requirements.

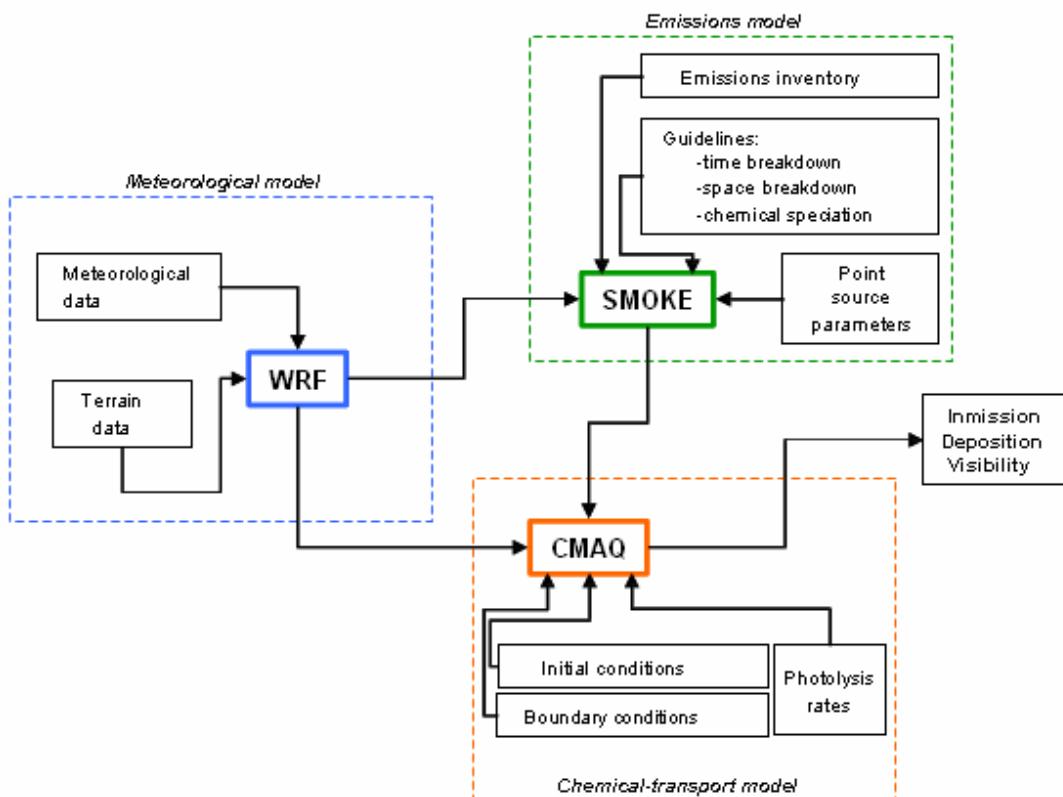


Figure 1. Basic diagram of the air quality simulation system used

The modelling system represents the state of the art in multiscale-multipollutant air quality simulation techniques, and has been specifically adapted for this case study in order to provide consistent results through the scales involved.

Four nested domains were used (Figure 2) to capture pollution processes from the continental to the local scale, in accordance with the study requirements (e.g. source apportionment). In this respect, it must be borne in mind that concentration levels of any compound at a specific point are the result of emission and transport processes verified on a very wide scale. Thus, air quality may be influenced by local, regional and even international sources. On the other hand, reconstruction of meteorological variables that influence the destination of atmospheric pollutants as well as chemical boundary conditions requires the simulation system to be applied in different nested domains.

The mother domain (D1), with a horizontal resolution of 48 km, covers most of Europe.

The intermediate domains cover the Iberian Peninsula (D2) and the Madrid Greater Region (D3) with resolutions of 16 and 4 km respectively.

The innermost domain (D4) corresponds to the metropolitan area of Madrid. It is a 40x44 km domain with 1 km² grid cells centered at the Madrid municipality.

Due to the irregular geometry of the legal boundaries of the municipality, the grid includes adjacent municipalities relevant from the emissions and air quality dynamics point of view.

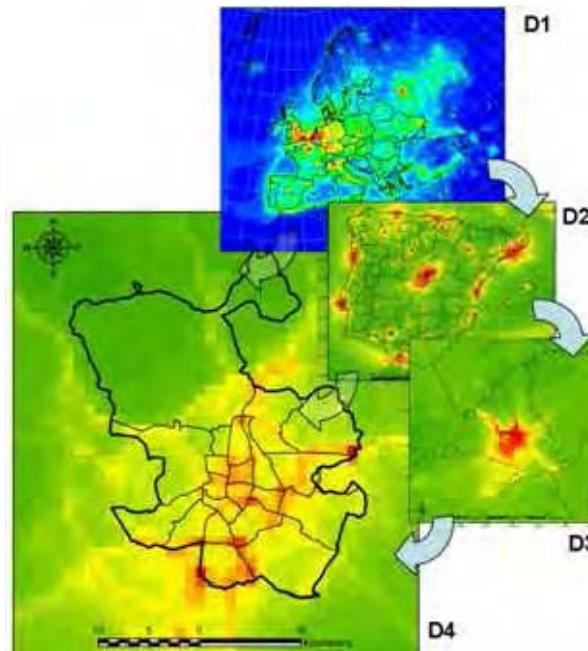


Figure 2. Nested domains used in the simulation

The WRF-ARW model was used to simulate the meteorology of the whole year 2007. This choice for the reference year was based on emission inventory availability when the study was started.

2.2. Emissions

The Consistent Emission Projections (CEP) model was used by the UPM to create future emission scenarios for the different modelling domains. Applications and evaluation of CEP have been presented at international conferences and reported in scientific publications.

This projection model does not make forecasts or predictions, but rather compiles possible variations of emissions based on measures included in the future scenario. The model includes all sector projections and sets the general basis for obtaining emissions projections, at any scale, which cover all activities within the SNAP nomenclature (*Selected Nomenclature for Air Pollution*). Special attention was paid on building a bottom-up emission inventory and projections for road traffic which includes the Madrid City Council traffic model.

In general, the projections are based on emissions projection methodologies developed by the European Environment Agency (EEA) and the official North American organization (*Environmental Protection Agency*, EPA). In order to systematize the work and ensure conditions of uniformity and compatibility between different projections, it was decided to reduce all of them to two basic formulations:



$$E_i = A_i \cdot FE_i \cdot \prod_{j=1}^n FC_j \quad (\text{Equation 1})$$

$$E_i = G_{a-i} \cdot E_a \cdot \prod_{j=1}^n FC_j \quad (\text{Equation 2})$$

Where:

E_i – Emission in year i (projection subject year) for the pollutant in question

E_a – Emission in the Base year (reference year) for the pollutant in question

A_i – Activity variable in year i

FE_i – Emission factor in year i for the pollutant in question, by units of A_i

G_{a-i} – Emissions growth factor between years a and i

FC_j – Control factors. N factors are considered based on whether entry of some specific control factor (technological, legislative, etc.) is required.

Nevertheless, each activity has a specific emissions projection methodology. Therefore, obtaining all parameters for equations 1 and 2 is very complex and different in each case. It must be borne in mind that a scenario is a set of considerations regarding socioeconomic, legislative, technological, statistical factors. The scenario proposed for 2014 presumes compliance with all local, regional and national measures and policies (including those included in the Air Quality Plan), as well as sector legislation.

The following references are the basis for the compilation of emission inventories for 2007 and 2014 projection scenario:

- D1: European Monitoring and Evaluation Program (EMEP)
- D2: National Emissions Inventory 1990-2007
- D3: Community of Madrid Emissions Inventory 2007
- D4: Municipality of Madrid Emissions Inventory 2007 and municipal traffic model

The flexibility of the CEP model has enabled the integration of the Madrid City Council traffic model for calculating roadway traffic emissions with the help of COPERT⁴ (*Computer Program to calculate Emissions from road Transport*, development of which was coordinated by the European Environment Agency).

Likewise base-year inventories, emissions projections results obtained with the CEP model were processed by SMOKE for their inclusion in the chemical-transport model.

The chemical breakdown or speciation of the compounds inventoried as a group (NO_x, NMVOC and non-specific PM_{2.5}) into the corresponding chemical mechanism species used to represent the atmospheric chemicals, is an essential item in modelling air quality in mesoscale Eulerian photochemical models, because the individual compounds within these groups have very different chemical behaviours. Chemical speciation was done in accordance with Carbon Bond 5 (CB05) chemical mechanism requirements.

All information related to emissions projections was estimated on an annual basis. Nevertheless, the modelling system has an hourly time resolution, which made it necessary to develop suitable temporal profiles in order to breakdown the annual totals into monthly figures, then into days of the week and, lastly, into the 24 hours of a single day, with specific profiles for work days and weekends (with occasional differences between summer and winter).

Spatial allocation of point sources was done through the coordinates available, considering stack parameters and release conditions. For the remaining sources (regarded as area sources), spatial surrogates were generated. This enables the distribution of total emissions into the grid cells of the 3-D Eulerian modelling domain. Spatial surrogate processing is based on land use covers and spatial variables such as population density, infrastructure, vegetation, etc.

2.3. Concentrations in the ambient air

Air quality levels were obtained using the CMAQ model. All relevant metrics (annual averages and specific percentiles) were computed at grid-cell level from hourly outputs corresponding to the first vertical layer.

3. Results

The analysis of that kind of results for the main pollutants within the time horizon of the Plan enabled the evaluation of the measures proposed as well as the type of representations shown in Figure 3 to be obtained. Figure 3 shows of the expected annual average concentration of nitrogen dioxide for the metropolitan area of Madrid in 2014.

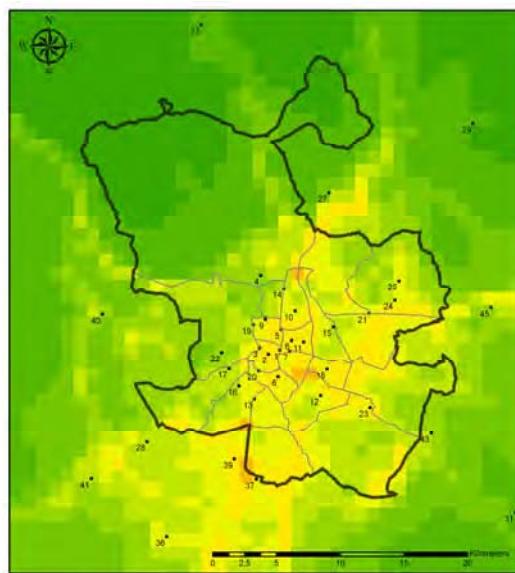


Figure 3: NO_2 annual average concentration for 2014 according to the air quality model

4. Bibliography

Web pages

A list of web sites containing detailed descriptions of the models used and some related publications from the research team are provided are as follows:

WRF:

<http://www.mmm.ucar.edu/wrf/users/>, the model, tutorials and other information may be downloaded.

CMAQ y SMOKE:

<http://www.cmascenter.org/>, contains links to the CMAQ and SMOKE websites.

<http://www.cmaq-model.org>

<http://www.smoke-model.org/index.cfm>

COPERT:

<http://www.emisia.com/copert>

International Journal Articles:

Borge, R., Alexandrov, V., del Vas, J.J., Lumbreiras, J., Rodríguez, M.E., A comprehensive sensitivity analysis of the WRF model for air quality applications over the Iberian Peninsula. *Atmospheric Environment* 42, -85741 (2008).



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Lumbreiras, J., García-Martos, C., Mira, J., Borge, R. Computation of uncertainty for atmospheric emission projections from key pollutant sources in Spain., *Atmospheric Environment* 43, 1557–1564 (2009)

Lumbreiras, J., Borge, R., de Andres, J.M., Rodriguez, M.E., A model to calculate consistent atmospheric emission projections. Application to Spain. *Atmospheric Environment*, 42/21, 5251-5266 (2008)

Lumbreiras, J., Valdés, M., Borge, R. and Rodríguez, M.E., Assessment of vehicle emissions projections in Madrid (Spain) from 2004 to 2012 considering several control strategies. *Transportation Research Part A* 42, 646-658 (2008).

Madrid, December 23, 2011