Best Sustainable Mobility Initiative Award

Sustainable mobility promotion in Sant Cugat del Vallès

A. Initiative explanation

The main objectives set out in the initiatives implemented by the Mobility Service of Sant Cugat del Vallès City Council are the following:

- Reduce pollutant emissions as well as noise pollution generated by vehicles traffic in the city.
- Improve mobility management in order to encourage people to use more sustainable means of transport.
- Promote and improve mobility conditions by foot and bike.
- Increase the use of public transport.
- Rationalize the use of motorized private vehicles.
- Promote the use of bike fleet during working hours.
- Achieve economic savings.

In order to achieve this, different projects have been carried out **simultaneously**:

1. **Green parking area** implementation for residents and **blue area expansion**.
2. **Bike lanes** creation.
3. **Surveillance cameras** installation in the city center to control car circulation there.
4. **Parking area (*Park & Ride*)** opening, located in the city outskirts.
5. Free **shuttle bus** implementation from the same parking area to the city center, going through the FGC station, favoring intermodality and avoiding traffic as well as the use of private transports.
6. **Low emissions zone** implementation.

The table below shows the implementation date of each project carried out:

Project	Implementation date
Green and blue areas	30/04/2018
Can Magí Av. bike lane	01/05/2018
Can Graells Av. bike lane	01/03/2018
Alcalde Barnils Av. bike lane	31/04/2017
Surveillance cameras	01/03/2018
Park & Ride	30/04/2018
Shuttle bus	30/04/2018
Low emissions zone	01/01/2018

Reasons and content exhibition about the experience:

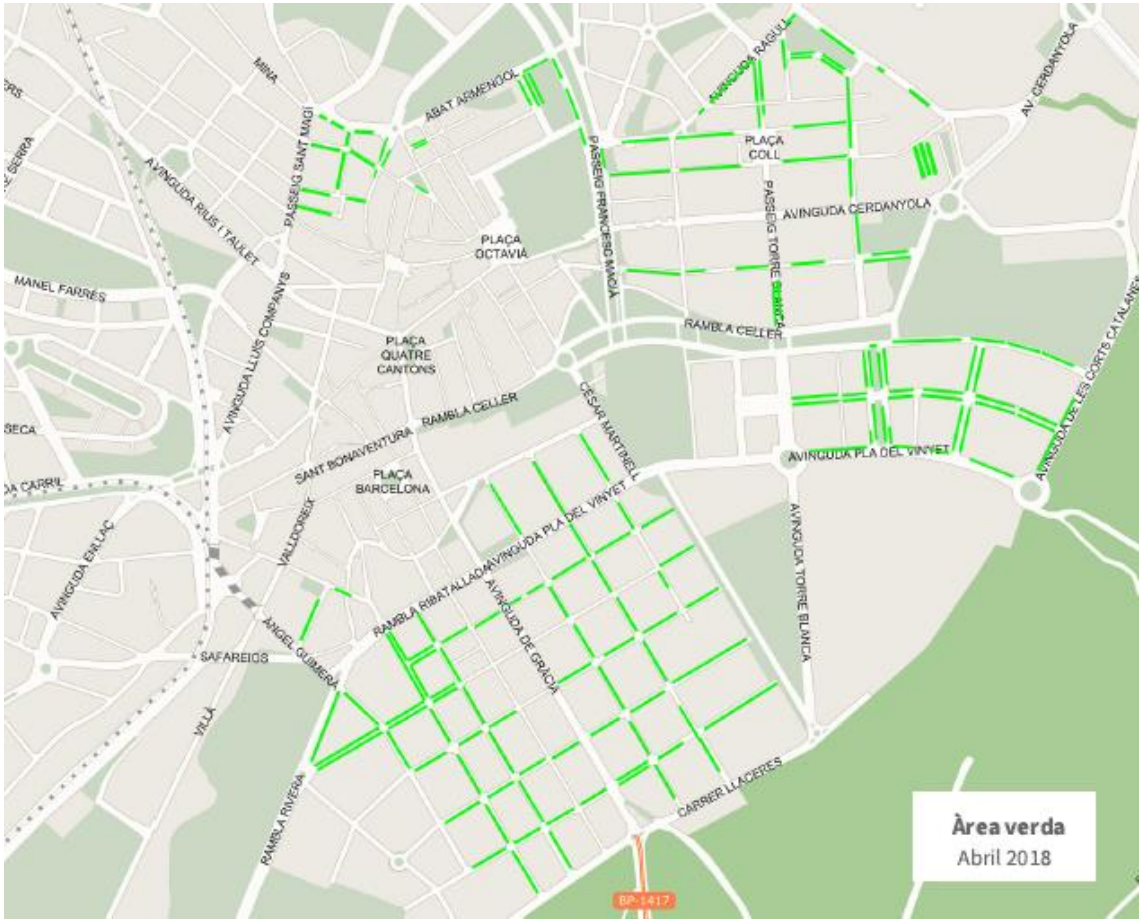
1. Green parking area establishment and expansion of blue one:

Sant Cugat regulated parking is an integral parking management system in which all parking space, within the regulation area, is distributed according to some priorities and regulated through some rules and fees. This project has been carried out since it is a proposal included in the Urban Mobility Plan and requested by citizens, especially residents of this area, where there are not any parking places because of the cars that come from outside the city.

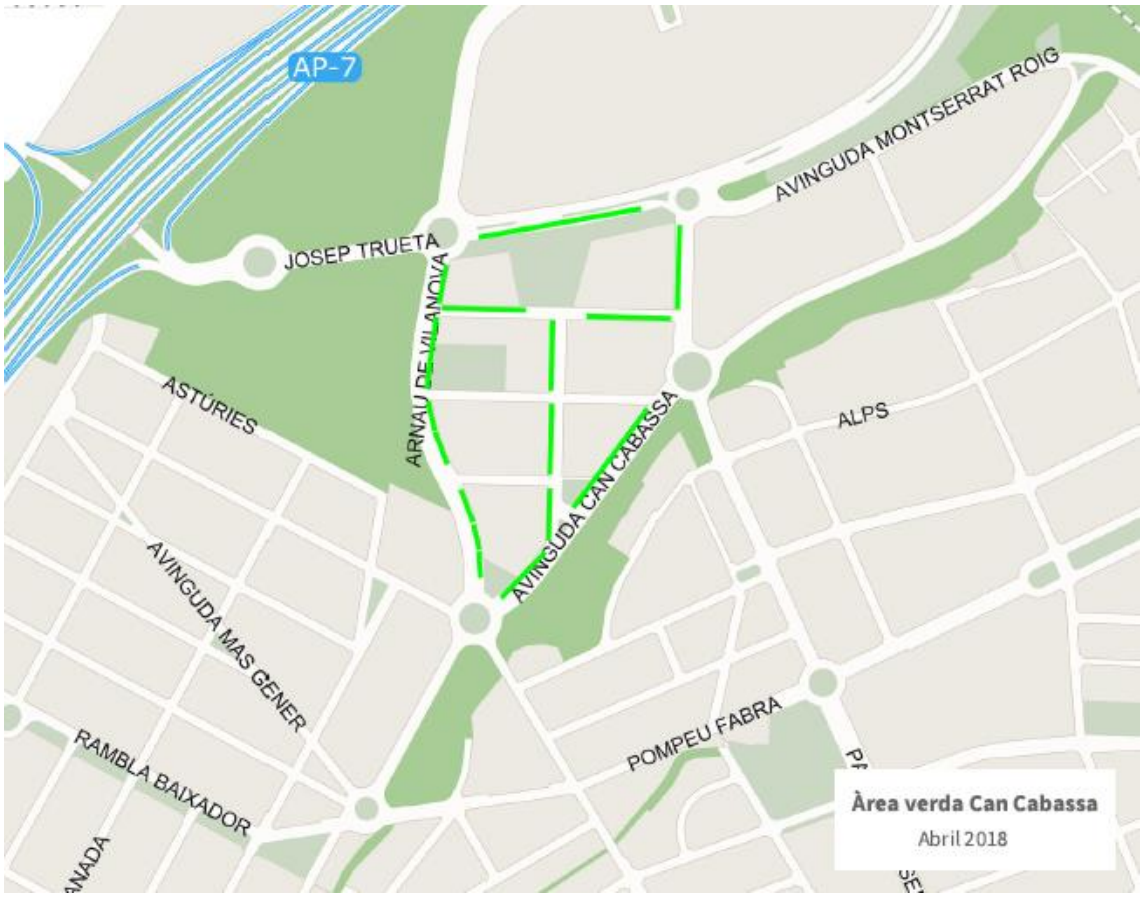
The objectives that are pursued with this regulated parking area are the following:

- To participate in air quality plans and reduce polluting emissions and noise, as well as promoting the use of public transports within the framework of sustainable mobility.
- To prioritize parking for Sant Cugat residents.
- To make easier to park in high occupancy and foreign pressure areas.
- To reduce traffic while looking for parking places, as well as reduce traffic in the city center.
- To take advantage of parking places, assuring high rotation rates and promoting local trade and Sant Cugat economy.
- To reduce indiscipline using security systems in this part of the city.

Green area has been implanted in those neighborhoods with a higher parking occupancy throughout the day, these are: Centre, Torreblanca, Eixample, Monestir and Can Cabassa. The map below shows green area implementation:



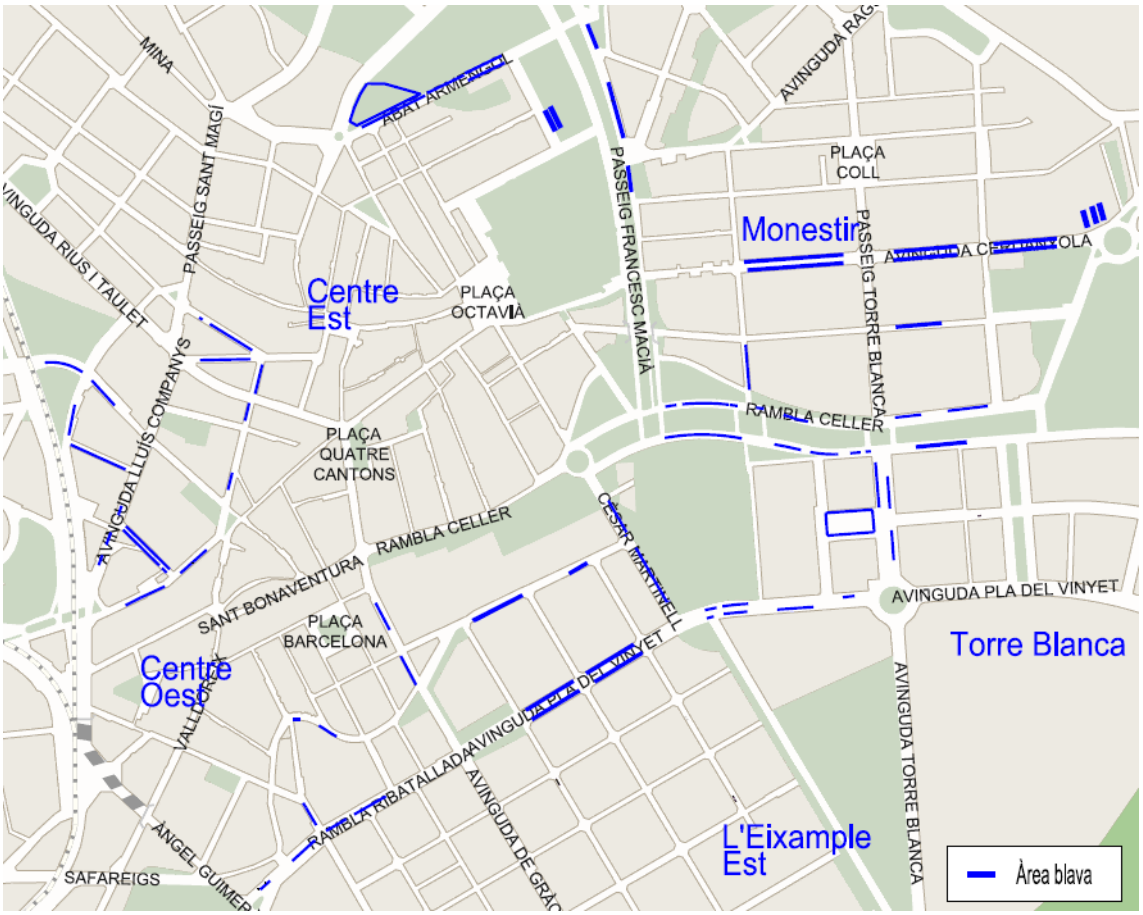
Picture 1: Centre, Torreblanca, Eixample and Monestir neighborhoods



Picture 2: Can Cabassa neighborhood

2.000 green parking places have been created altogether, working from Monday to Friday, from 8 a.m. to 8 p.m. with three user types: area residents, Sant Cugat residents and foreign.

Blue area expansion consists of a total of 150 new parking places. Before the expansion, there were 650 parking places in total.



Picture 3: Current blue area

It has been considered appropriate to offer discounts to those vehicles with the environmental distinction issued by the DGT to promote sustainability and reduce CO_2 emissions and noise pollution: those cars with zero emissions label are totally exempt from payment in green area, on the other hand, cars with ECO emissions label have a 50 % discount on green area rate.

2. Bike lanes creation:

As a measure to promote bike usage and improve their accessibility, Sant Cugat City Council plans to create more than 20 km of bike lanes over next year.

Coinciding with previous actions described, three new bike lanes have been created to connect the city center from city suburbs. A section has been created on Can Graells Avenue, another on Can Magí Avenue and finally, on Alcalde Barnils Avenue.

This three projects respond to Participatory Budgets, democratic processes through that neighbors can directly decide on which to invest a part of the municipal budget.

- **Can Magí Avenue:** work defined in this project, constitute the constructive concretion of one of the 12 proposals voted by citizens. One of the main premises when writing the project has been to create a safe itinerary for bicycles which connects the city center with the Languages Official School, Collserola School, IES Pla Farreras and Can Magí football field. Therefore, this cycle path not only connects the center to Can Magí neighborhood, but also with San Francisco historic district and its main educational and sports facilities.

  The total bike lane meters created as well as the section that have been adapted are **1.319 m**.

Picture 4: Can Magí Avenue bike lane

- **Can Graells Avenue:** the project aim is to implement a bike lane in Can Graells Avenue, Rius i Taulet Avenue and Pere Serra Street, connecting isolated bike sections in north and south of the site.

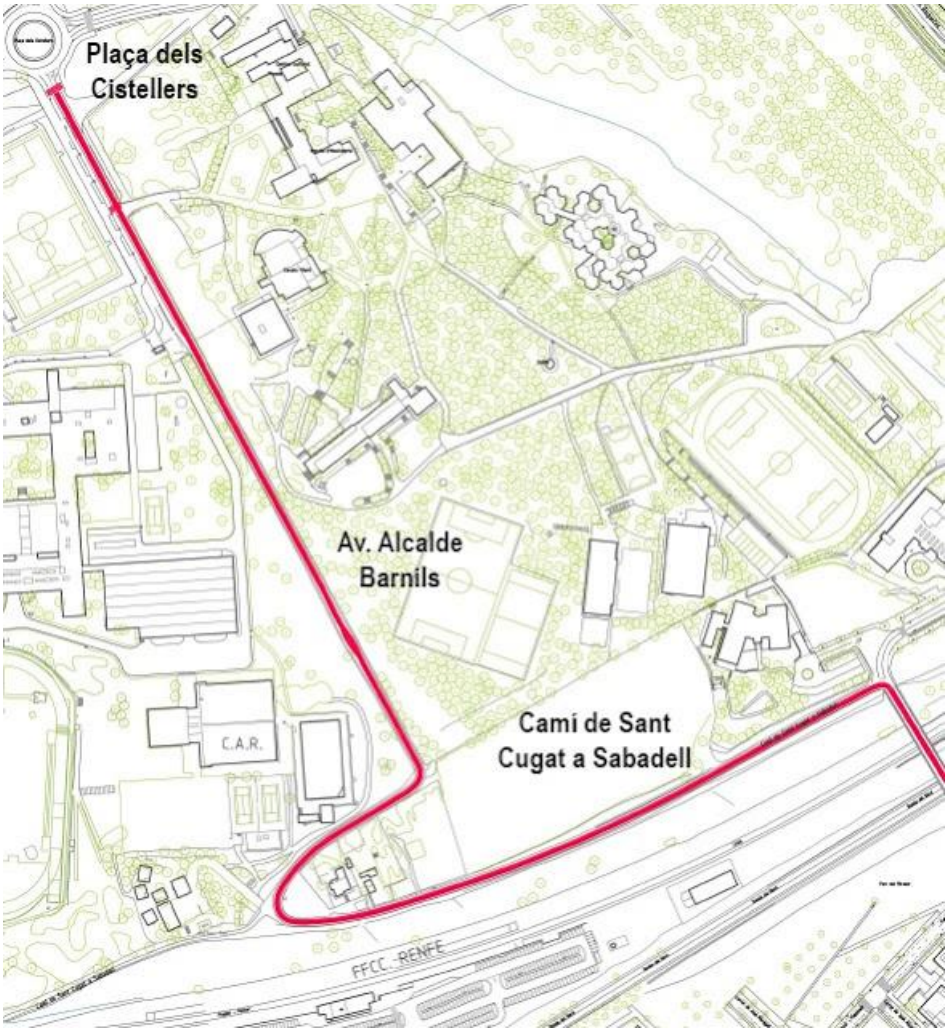
  The project has been approved to create an accessible itinerary for pedestrians and bicycles between Rubí and Sant Cugat center station which gives continuity to Can Graells bike lane, represented in red on the map below.

  The total bike lane meters that have been created are **1.009 m**.

Picture 5: Can Graells Avenue bike lane

- **Alcalde Barnils Avenue:** the project aim is to implement a bike lane in Camí de Sant Cugat a Sabadell and Alcalde Barnils Avenue.

  The total bike lane meters that have been created are **1.134 m**.



Picture 6: Alcalde Barnils Avenue bike lane

3. Surveillance cameras installation in the city center:

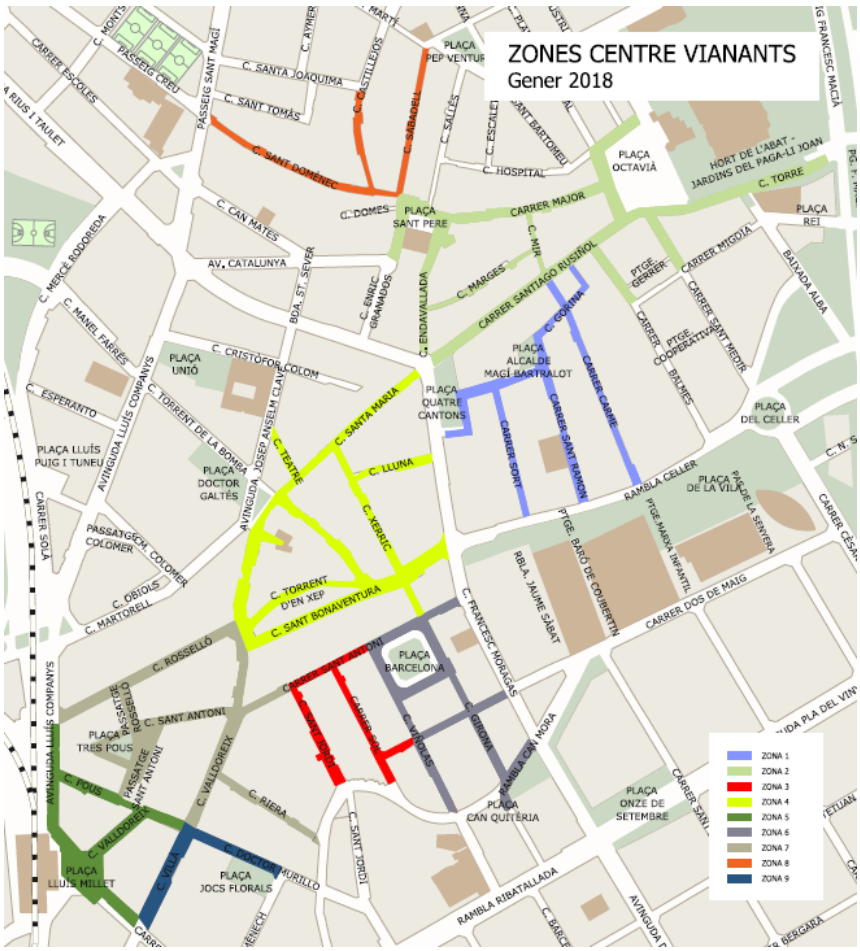
A new vehicle access system was launched on March 1 at Sant Cugat pedestrian center using cameras with a license plate reader. There are 25 cameras in total.

Access to pedestrian center during the hours regulated by traffic lights works as follows:

- Vehicles that want to enter to a restricted access street, must stop before the traffic light.

- A camera reads the car or motorcycle license plate and checks it in the database.
- If license plate is authorized, the traffic lights change from red to intermittent amber.
- Once inside the pedestrian zone, vehicles have a maximum of 20 minutes to park.
- In pedestrian zone exit streets, there are also cameras that control opposite direction accesses.

Registered people and those who own a parking place in pedestrian center, can access at all times with their vehicles in the area that corresponds to them. There are also schedules for center's merchants who need to load and unload merchandise.



Picture 7: Surveillance zone

4. Parking area (*Park & Ride*):

In regards to the new parking mentioned above, it has been installed in Roquetes Avenue, near of one of the city entrances. It has a 715 vehicles capacity.

Picture 8: Park & Ride parking

5. Free shuttle bus implementation from the same parking area to the city center:

At the same time, a shuttle bus service has been launched between Roquetes Avenue Parking and Sant Cugat center. This new free bus line, runs from 5.40 to 22.55 hours, with a 10-20 minutes frequency, depending on time zone, and consists of four stops.

Picture 9: Parking and shuttle bus route

6. Low emissions zone implementation:

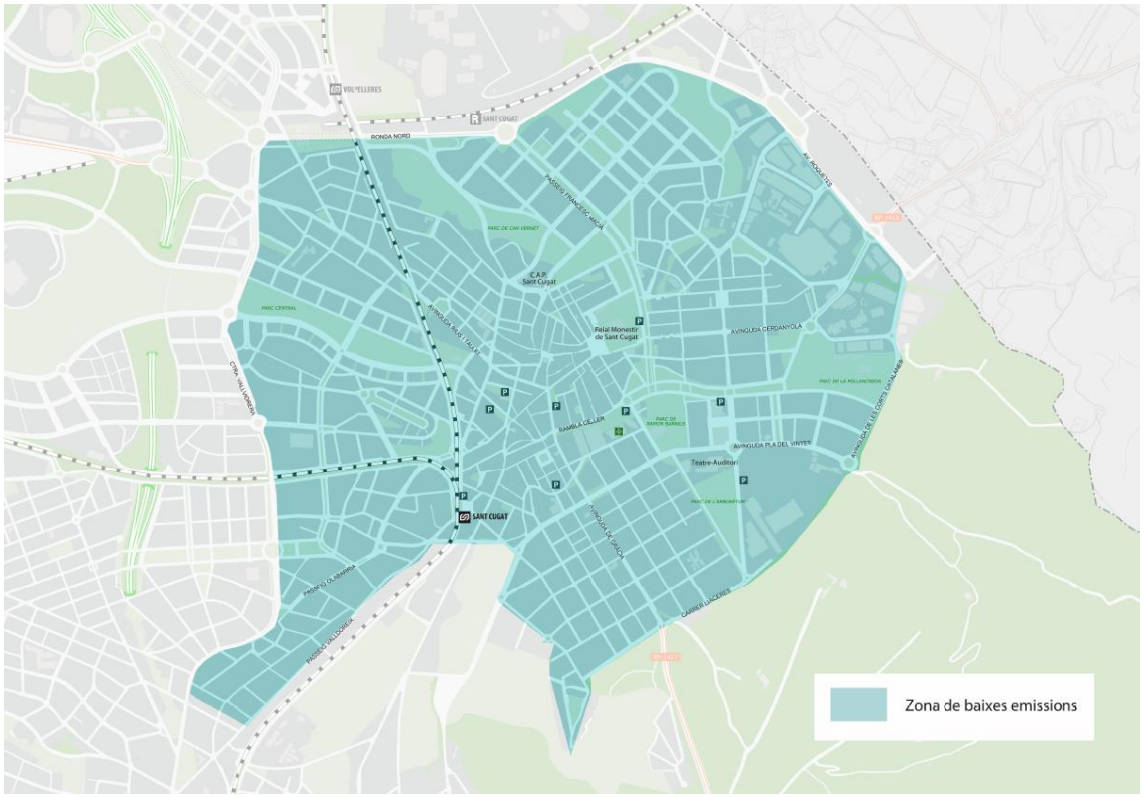
As of January 2018, with the aim of getting a healthier air, most polluting vehicles in low emissions zone (located in the city center) will be restricted when there are high pollution episodes.

This measure affects vehicles that do not have a Sant Cugat resident's label and those foreign that do not have any environmental DGT label.

Restrictions are carried out on working days from 7 a.m. to 8:00 p.m. the day after declaring an episode of high pollution and are maintained until pollution level improves.

Motorcycles, bus and emergency vehicles, as well as reduce mobility people and basic services, are exempt. During this high pollution episodes, City Council will reinforce public transport.

This measure is expected to be permanent from 2020.



Picture 10: Low emissions zone

All projects mentioned above are aligned with the Urban Mobility Plan that includes the proposal to achieve a sustainable environment while avoiding traffic increasing and pollution. In this way and with their implementation, they are able to achieve goals set.

B. Social impact

During last 20 years, due to technological innovation and Sant Cugat economic growth, population has increased considerably as well as private vehicles around 32%.

At the same time, a large number of new companies have been implemented in Sant Cugat PAES.

All this has also been accompanied by a significant mobility increase and, consequently, an atmospheric and acoustic pollution growth. Wanting to manage and encourage this mobility increase to be more sustainable by reducing pollution levels and achieving a better life quality, initiatives mentioned above have been carried out, which have had quite a positive social impact:

- Due to green area implementation and blue area expansion, neighbors of the different neighborhoods are allowed to enjoy free parking spaces in streets near their homes. In addition, there is less acoustic and environmental pollution because of car reduction looking for parking places. On the other hand, Sant Cugat residents have a lower rate than foreign ones to facilitate them when looking for cheaper parking places than those in blue area.

  Finally, it must be remembered that reduced mobility people can park for free in all blue and green places to provide them accessibility. Parking spaces for reduced mobility people are about 200 but considering green and blue areas, they are converted into 2.800 places that can be used freely.

- Bike lanes and *bike box* expansion has allowed to promote sustainable mobility means and improve physical health and welfare through the exercise done. In the same way, private transport displacements are reduced and consequently, atmospheric and acoustic pollution are reduced too. In addition, safety is gained due to bike lanes creation because vehicles circulate with more caution.

- The new car park and shuttle bus arrival, moves private transport displacements outside city center and promotes public transport, as well as going on foot or by bike. In addition, this new bus service has provided new jobs creation because drivers are needed.

- Surveillance cameras implementation in the city center restrict private transport traffic leaving this zone almost free to pedestrians. It allows to walk calmly and enjoy environment free of dangers, noise and pollution.

- Finally, with the vehicle restriction in low emissions zone during high atmospheric pollution days, the promotion of public transport use is encouraged and it favors having a better air quality and a free pollution environment.

It should be remembered that betting on sustainability not only allows combating air pollution, but also making a better city benefiting vulnerable groups such as old people, unemployed or people with low incomes who are usually the ones with the least accessible to private transport.

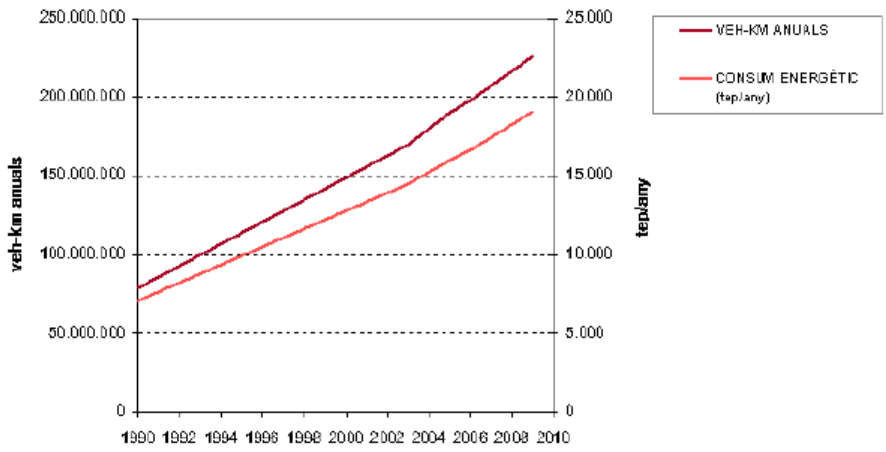
To sum up, it is necessary to reduce pollution in order to improve public health and reduce premature deaths as well as brain maturation incidences in children.

C. Environmental impact

The main environmental problems associated with motorized mobility include: energy consumption of transport, atmospheric pollution and acoustic pollution.

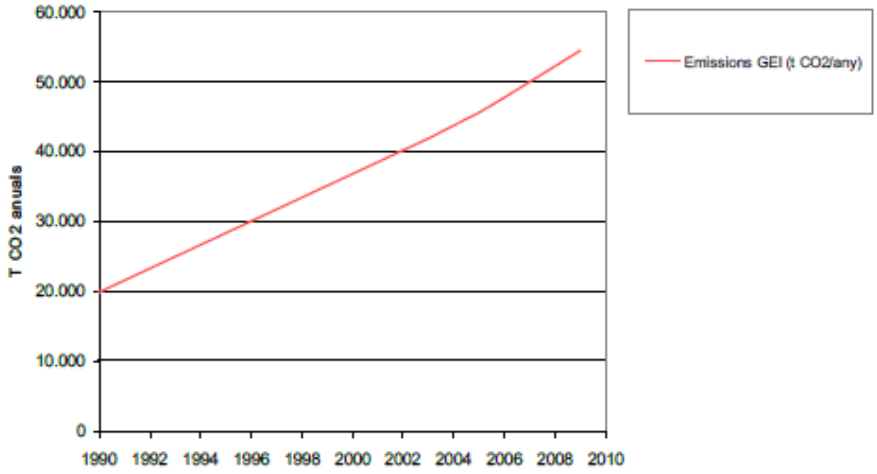
In regards to energy consumption, among several sectors that consume a lot of energy, transport stands out.

According to the Urban Mobility Plan, the energy balance of Sant Cugat (calculated using AMBIMOB-U tool) shows increasing fuel consumption volumes for road transport and railway electricity consumption between 1990 and 2009. In 2009, energy consumption of the transport sector in Sant Cugat was 19.100 tep per year.



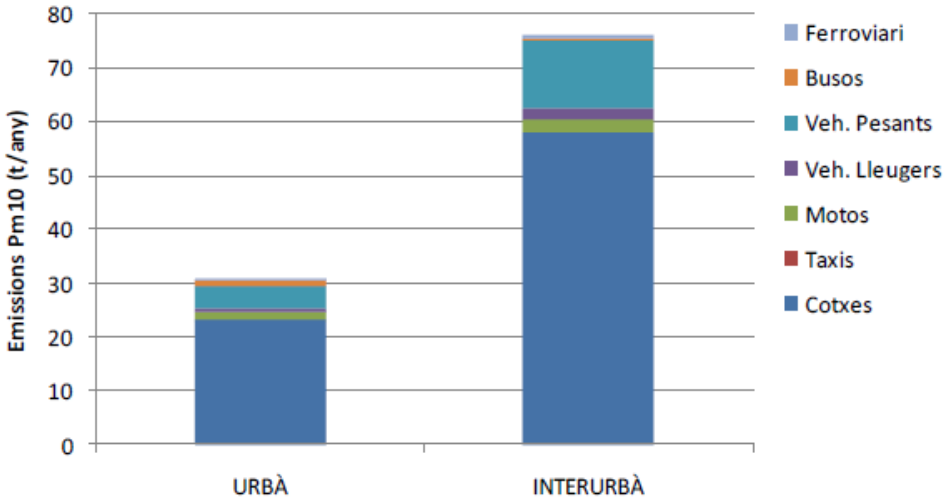
Picture 11: Energy consumption evolution for Sant Cugat transport between 1990 and 2009

Greenhouse gas emissions coming from Sant Cugat transport have been calculated using methodology and data explained above and it was 54.500 T CO_2 in 2009.



Picture 12: GHG emissions evolution due to Sant Cugat transport between 1990 and 2009

In 2009, PM_{10} emissions coming from Sant Cugat transport were 107 T. Internal mobility is responsible for 29 % of generated emissions.



Picture 13: PM_{10} emissions by vehicle type in 2009

In regards to urban noise pollution, Sant Cugat City Council is working to improve acoustic city quality using a municipal ordinance for noise and vibrations (Published on BOPB dated 28/05/2007). This municipal ordinance is applicable, among other areas, on urban and interurban traffic (article 2). Among forecasted prevention and reduction measures are included: traffic organization in general, planning and project of roads with their elements of sound insulation and damping, road network paving plans, urban planning in general, urban and interurban mobility planning, municipal infrastructures design and vehicles acquisition, promoting the use of quiet vehicles, such as bicycles, electric vehicles, etc.

In an urban city different vehicles types coexist: light vehicles, medium trucks and heavy trucks. At 50 km/h, the sound level of a light vehicle reaches **62 dB**, a medium truck reaches 73 dB and a heavy truck reaches 89 dB.

Moreover, vehicles reduction will reduce acoustic pollution levels.

The table below shows the reduction estimation of CO_2, NOx and PM_{10} particles emissions, considering that person using a sustainable mean of transport does not use a conventional diesel or petrol vehicle, thus getting a pollution reduction.

Emission factors used are those included in Level 2.3 of the Pollutant Emission Calculation Guide in the Atmosphere 2013. Currently, the Air Pollution and Monitoring Service is working to update the Calculation Guide with new emission factors based on the Guide edited by the European Environment Agency: EMEP / EEA air pollutant emission inventory guidebook - 2016.

Means of transport	km/year done	CO_2 Reduction	NOx Reduction	PM_{10} Reduction
Bike usage increase	According to MUP, in 2006, 1.200 cycling trips were carried out per day. A 5 % increase was expected for the current year, that is, 60 more journeys per day (21.900 per year). Each bike is estimated to carry 5 km per day, which is 109.500 km/year more	21.900 kg CO_2/year (petrol ≈ diesel)	5,475 kg NOx/year (petrol) 96,36 kg NOx/year (diesel)	1,533 kg PM_{10}/year (petrol) 1,6425 kg PM_{10}/year (diesel)
Private vehicle usage reduction in low emissions zone	Daily external journeys in low emissions area are estimated at 200.000, which 50 % are in private transport. Of these, almost a 30 % do not have the badge to enter to this zone. There are 30.000 displacements less every low emission day. Each vehicle is estimated to make 5 km per day, which is 150.000 km/day less	30.000 kg CO_2/day (petrol ≈ diesel)	7,5 kg NOx/day (petrol) 132 kg NOx/day (diesel)	2,1 kg PM_{10}/day (petrol) 2,25 kg PM_{10}/day (diesel)
Private vehicle usage reduction in green area	Based on green parking area occupancy data shown below, about 900 vehicles less are used daily. Each vehicle is estimated to make 5 km per day, which is 1.350.000 km/any less	270.000 kg CO_2/year (petrol ≈ diesel)	67,5 kg NOx/year (petrol) 1188 g NOx/year (diesel)	18,9 kg PM_{10}/year (petrol) 20,25 kg PM_{10}/year (diesel)

D. Economic impact

The table below shows funding source for each project as well as their total costs:

Project	Funding source	Total costs
Green and blue areas	PROMUSA budget	505.000 €
Can Magí Av. bike lane	municipal budget	220.000 €
Can Graells Av. bike lane	municipal budget	102.160 €
Alcalde Barnils Av. bike lane	municipal budget	26.720 €
Surveillance cameras	municipal budget	80.000 €
Park & Ride	municipal budget	70.000 €
Shuttle bus	municipal budget	334.000 €/year
Low emissions zone	municipal budget	10.000 €
		1.347.880 €

The table below shows private vehicles circulation reduction due to green parking area implementation as well as the economic savings achieved because of fuel consumption reduction:

	GREEN ZONE					
Zone	**Total places**	**Green occupancy before**	**Green occupancy now**	**veh/day reduction**	**km/day reduction**	**Economic savings**
Torreblanca	402	98 %	51 %	190	950	74 €
Eixample	771	94 %	55 %	302	1.510	118 €
Monestir	426	95 %	57 %	162	810	63 €
Centre	192	97 %	49 %	91	455	35,5 €
Can Cabassa	265	90 %	35 %	154	770	60 €
Total	2.056	95 %	49 %	899	4.495	**350,5 €/day** **105.150 €/year**

On high pollution days, according to calculations made in the previous section, there is a reduction of 150.000 km per day, which generate a fuel savings of 11.700 €.

On the other hand, it is soon to know the total income generated by the new parking areas implantation. However, a preliminary estimation study was carried out and calculated 800.000 € per year benefit coming from blue area and 150.000 € coming from the green one.

Shuttle bus service introduction also means a reduction in fuel because users do not have to use their private vehicle and look for parking places.

The table below shows data about first days of shuttle bus implantation:

	SHUTTLE BUS																		
Passengers number	**Hours**																		**Total**
Days	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	
07/05/2018	2	15	8	1	2	0	1	0	23	13	6	0	6	3	1	6	2	0	89
08/05/2018	0	14	0	7	2	2	2	0	37	13	0	1	5	1	1	7	0	0	92
09/05/2018	2	16	4	8	2	2	0	5	32	15	3	2	0	3	3	8	1	0	106
10/05/2018	2	14	7	3	1	0	1	3	32	7	2	0	3	1	1	1	2	0	80
11/05/2018	2	13	8	4	0	3	3	25	3	4	5	1	2	2	1	4	1	3	84
Total	**8**	**72**	**27**	**23**	**7**	**7**	**7**	**33**	**127**	**52**	**16**	**4**	**16**	**10**	**7**	**26**	**6**	**3**	**451**
Mean																			**91**

It is important to know the costs reduction derived from externalities, such as, time spent, pollution reduction and accident rate and noise reduction.

E. Sustainable mobility systems promotion

The combination of all implemented measures contributes to sustainable means of transport promotion as follows:

- **Sustainable mobility systems promotion:**
    - **Discourage the use of private vehicle.** Due to green and blue area, circulation restriction in city center and low emissions zone, sustainable mobility is promoted encouraging people to move without using private vehicle, favoring their welfare, air quality and improving life quality.
    - **Bike usage promotion.** Thanks to bike lanes implementation, it is possible to promote the use of bicycles as a mean of transport to move around the city because bike lanes connect city center to nearby neighborhoods. This initiative achieves a better air quality, avoiding both acoustic and atmospheric pollution.
    - **Public transport usage promotion.** The creation of the new parking (*Park & Ride*) and the new bus line, has promoted public transport as a sustainable mean of transport, thus avoiding pollution emitted by private vehicles in areas close to the city center. In the same way, the use of public transport ensures a lower accident rate and circulation at controlled speed without exceeding the limits marked by signals.
- **Intermodality:** the entire public transport network is connected to each other by promoting accessibility throughout the city. At the same time, the aim of new bike lanes creation is to get them connected and allow accessibility to the city center. This ones, not are only connected to each other but also connect city center to places where public transport such as bus or FGC can be used.

  On the other hand, shuttle bus implementation has connected the new parking to the city center decreasing private transport usage.

F. Project development

In order to guarantee the correct implantation and be able to follow up each initiative carried out during last months, the following reference indicators have been used:

- **Green and blue parking areas occupancy (%):** consists of the total number of vehicles parked in green and blue areas divided by the parking places for each one. Green zone occupancy is 49 % while blue zone occupancy is 64 %.
- ***Park & Ride* parking occupancy (%):** consists of the total number of vehicles parked divided by the total number of parking places. Its current value is 53,3 %.
- ***Bike box* and bike parking places occupancy (%):** consists of the total number of parked bikes divided by the total number of parking places. The total number of parked bikes in the first week of May is 1.501 in 133 places, which means an 11 bikes per place rotation.
- **Air pollution index:** consists of the total CO_2, particles PM_{10} and particles NOx kg existing in the atmosphere.
- **Number of accesses to the city center:** consists of the total number of vehicles that access city center area regulated by surveillance cameras.
- **Shuttle bus occupancy index:** consists of the total number of people using this transport per day. The average number of people using this service is 91 people/day.
- **DMI:** consist of the daily mean intensity of circulation in some streets to compare the reduction gotten.

Therefore, these indicators and their value are used to make decisions when making changes or improvements in any of the initiatives carried out.