2016 Management Report

July 2017

Transports Metropolitans de Barcelona

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1 Introduction

The Transports Metropolitans de Barcelona Group comprises:
—**The parent company, Ferrocarril Metropolità de Barcelona, SA,** which prepares the consolidated financial statements.
Fully consolidated group companies:
—**Transports de Barcelona, SA**
—**Projectes i Serveis de Mobilitat, SA** (formerly Telefèric de Montjuïc, SA)
—**Transports Metropolitans de Barcelona, SL**: this company began operating on 1 July 2015. Associated company consolidated using the equity method:
— Transports Ciutat Comtal, SA.

Ferrocarril Metropolità de Barcelona, SA provides passenger transport services in complete coordination with Transports de Barcelona, SA, under the collective name of Transports Metropolitans de Barcelona (TMB). The former company operates the metro network and the latter operates surface services, with common management of the business.
The companies Projectes i Serveis de Mobilitat, SA and Transports Metropolitans de Barcelona, SL also form part of the TMB Group for which the consolidated financial statements are prepared by Ferrocarril Metropolità de Barcelona, SA, for the following reasons:
—The Group's transport strategy is developed around this company.
—The activities of Transports de Barcelona, SA, are complementary to those of Ferrocarril Metropolità de Barcelona, SA.
—As a consequence of the foregoing points, Ferrocarril Metropolità de Barcelona, SA, leads the group's transport policy.

This company is also the largest in terms of passenger numbers, turnover and asset values.

This **Management Report** of the Consolidated Transports Metropolitans de Barcelona Group for 2016 includes the Group's Income Statement and Statement of Financial Position at 31 December 2016, together with the main operating figures of the companies Ferrocarril Metropolità de Barcelona, SA, Transports de Barcelona, SA. and Projectes i Serveis de Mobilitat, SA. This information is provided in greater detail in the respective management reports of each of these companies for 2016. It also includes a summary of the activity of the company Transports Metropolitans de Barcelona, S.L., for the year 2016.

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TMB Strategic Lines

TMB Strategic Lines

As the operator of Barcelona's bus and metro networks, the mission of Transports Metropolitans de Barcelona (TMB) is to provide a quality public transport network which improves citizen mobility and also contributes to the sustainable development of the metropolitan area, ensuring that customers receive the best service and implementing socially responsible policies as part of an operation which is efficient and financially viable. TMB also aims to be one of Europe's leading public transport companies, emphasising its international profile and competitiveness. TMB's frame of reference will thus depend increasingly on the model developed through compliance with European regulations on passenger transport

.The efficient use of technology over recent years has allowed us to make great leaps forward in terms of improving service and efficiency. This will continue to be important in the future. To ensure the success of this strategic vision, the Balanced Scorecard (or integral control panel) management model was implemented, a strategic management system which allows an overview of the entire business. This system measures business performance from four key strategic perspectives: 1) user/ public satisfaction, 2) process performance and innovation, 3) human resource development and growth, and 4) financial results.

1. User/public perspective

The ultimate strategic goal must be user satisfaction. Bus continues with restructuring its network with the introduction of new lines and high performance initiatives while Metro will start on internal tasks related to the future introduction of Line 10. Meanwhile, there are measures planned for lines L1, L2 and L5 aimed at improving the service on these busiest midweek routes.

2. Outlook for Processes

As processes are key to obtaining the desired outcomes, this year TMB will focus its efforts on optimisation, sustainability, efficiency and quality.

Moreover, TMB took part in the SocMobilitat Project, the aim of which is to introduce a new T-Mobilitat card. It is a ground-breaking and innovative project that will introduce *Contactless* technology to Transport de Catalunya leaving fare development for a second phase. Thirteen work groups have been created for this project co-led by ATM, AMB, FGC and TMB, with the participation of transport operators, local administrations and SocMobilitat.

3. Outloook for People

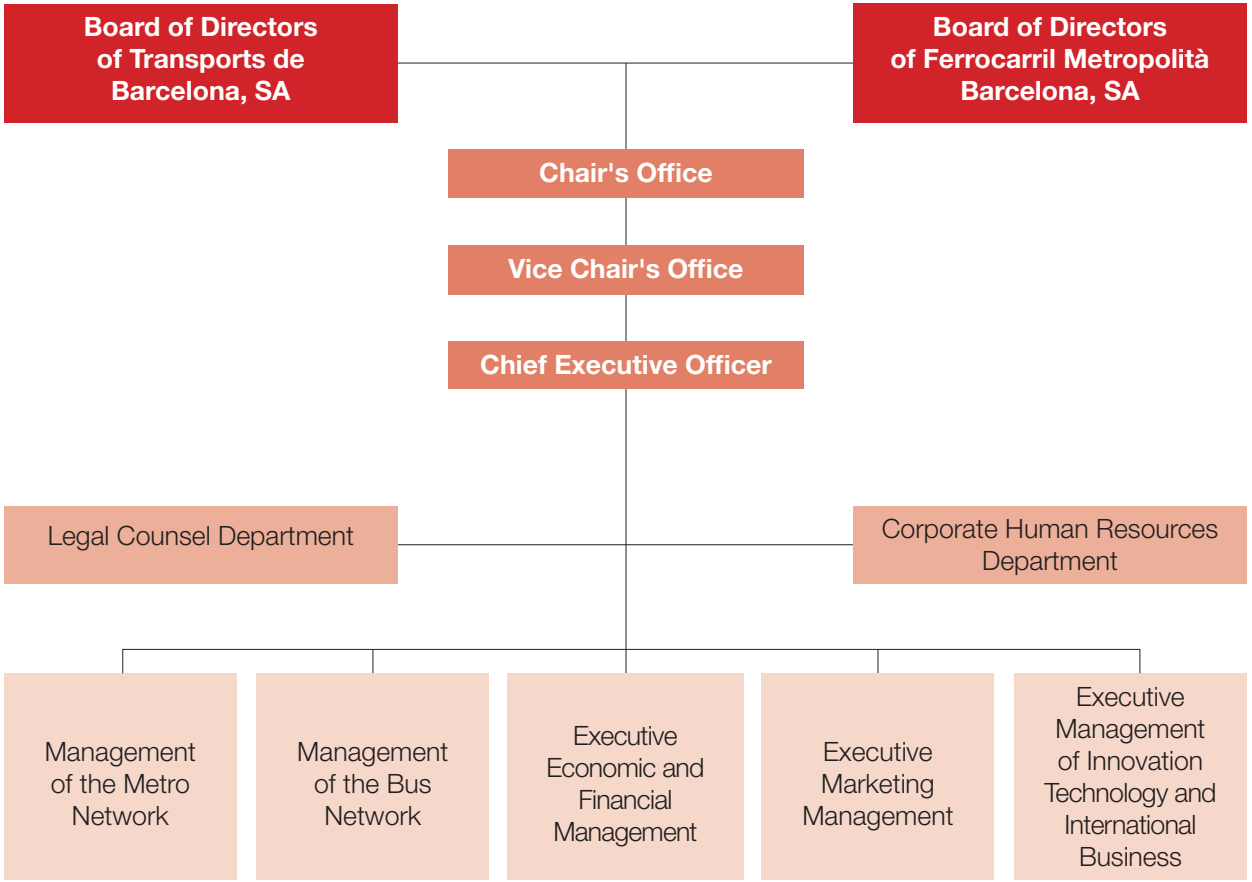
Without people, excellence cannot be achieved in other areas. Our human resources strategy includes consolidating good industrial relations based on dialogue and competitiveness with a view to developing commitment and engagement. This requires a gradual shift in the culture of the company, in order to improve productivity.4.

4. Financial outlook

Our financial strategy is the mechanism necessary to achieve the ultimate objective of increasing user satisfaction. It is based on the following guiding principles: increasing revenues from tickets and additional items and the effective and efficient management of the organisation at all levels.

3 TMB Administration and Management Bodies

TMB Administration and Management Bodies



Board of Directors of TB and FMB

31.12.2016

BUS

Mercedes Vidal Lago / Chair

Antoni Poveda Zapata / Executive Vice Chair

Enric Cañas Alonso / Chief Executive Officer

Antonio Martínez Flor / Vocal
Manel Ferri Tomás / Member
Joaquim Forn i Chiariello /Member
Jordi Mas Herrero / Member
Lluís Cerdà Cuéllar / Member
Anna Casals i Farré / Member
Óscar Ramírez Lara / Member
Joan Torres Carol / Member
Josep Maria García Mompel / Member
Francesc Sutrias i Grau / Member
Koldo Blanco Uzquiano / Member

Oriol Sagarra Trias / Secretary

METRO

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Joaquim Forn i Chiariello / Member
Jordi Mas Herrero / Member
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Martí Prat i Huertas / Member
Joan Torres Carol / Member
Josep Maria García Mompel / Member
Ricard Font i Hereu / Member
Enric Ticó i Buxadós / Member

Oriol Sagarra Trias / Secretary

Executive Commission of TMB

31.12.2016

President:

Chief Executive Officer.
Enric Cañas Alonso

Members:

Executive Chief Officer of Economy and Finance
Dolores Bravo González

Executive Chief Officer of Marketing
Joaquim Balsera García

Executive Chief Officer of Innovation, Technology and International Business
Ramon Bacardí Gascon

Chief Officer of the Metro Network
Marc Grau Mancebo

Chief Officer of the Metro Network
Marta Labata Salvador

Chief Officer of Legal Services and secretary of the Executive Board
Núria Miranda Badia

Chief Officer of Management Control, Budgets and Internal Auditing
Adolfo Céspedes Martín

4

Highlights of the year

The year's milestones for TMB

TMB launched its new corporate website

The guiding principles behind the new website, launched on 5 September, were **usability**, **browsing**, **graphics** and **architecture**. Work was also done to ensure the website was quicker, more technically efficient and structurally more flexible and secure. The new product has a more balanced graphic concept.

As it is responsive, the new space has also led to the phasing out of the mobile device version of the website. **Responsive technology** allows websites to be checked from all different types of mobile devices, and marks the current trend in information consumption. This means that all of the website's content can be accessed via your mobile.

The new portal continues the company's commitment to **universal accessibility**, and provides a space intended for everybody, regardless of their technological skills or resources. At the same time it offers all of the structural and browsing advantages guaranteed by accessible websites. This effort to adapt and all of the measures introduced are in compliance with the web content accessibility guidelines (WCAG 2.0) of the *World Wide Web Consortium(W3C)* and have double A certification.

The **new structure** of the website is designed so that any kind of user can find what they are looking for: Residents of Barcelona that use public transport, tourists and visitors, commercial information for businesses as well as corporate, educational and professional aspects for other audiences.

Finally, it is worth highlighting that, during 2016, the TMB website received 12.5 million visits of which 9.2 were made to the previous website (desktop version plus the mobile phone version) and 3.3 million were to the new website This represents a growth of 2.6 million visits compared to 2015

TMB's auxiliary fleet updated with electronic vehicles

Taking advantage of the fact that a good part of the auxiliary fleet was due for renewal, and being committed to electrical and sustainable mobility, 12 new vehicles with electric engines have been introduced (8 vans and 4 cars). Three of the 8 Nissan NV 200 electric vans acquired have been incorporated into TB's fleet of assistance vehicles, and the four Nissan Leaf cars purchased form part of the TB inspection fleet. Metro has incorporated five of the electronic vans.

TMB was recognised with several awards

—TMB granted certification as a company incorporated into the Spanish Network of Healthy Companies
The National Institute for Safety and Health at Work (INSHT) gave TMB its recognition for "good corporate practices in promoting health and safety in the workplace". The institute certified TMB as company incorporated into the Spanish network of healthy companies.

TMB's has a 25-year track record of promoting healthy habits as well as the progressive implementation of different programmes made available to the workforce such as: preventing injuries and professional illnesses, promoting health and well-being in the workplace, social care and healthcare assistance.

—TMB Educa (TMB Educates) awarded the seal of quality by the Institute of Sciences and Education
The seal of quality of the University of Barcelona's Institute of Education Sciences (ICE) was conferred in recognition of the activities carried out by the educational project TMB Educa. This project was launched in February 2015 as the result of an agreement between the Barcelona Municipal Education Institute (IMEB) and the University of Barcelona's Institute of Education Sciences (ICE), whose objective was to analyse existing best practices, suggest improvements and, in short, to contribute to optimising the city's educational offer.

The final report of the accreditation process, produced by the heads of Educational Promotion at the Barcelona Municipal Education Institute (IMEB), placed positive value on the concern, dedication and professionalism of the work performed for the TMB Educa educational project. Also highlighted was the quality of the educational offer imparted as well as the precision of the teaching in schools institutions and training environments.

—Innova eVIA Award for information accessibility for the bus and metro
“Eliminating barriers in public transport” is the title of the project the TMB Foundation which was granted the Innova eVIA Award 2016, along with the Vodafone Foundation and the ONCE. Specifically, TMB won the Innova eVIA Project Award for its research into improving access to both metro and bus through technological innovation.
The award was given for the technological research and development project to facilitate the use of public transport for blind people or those

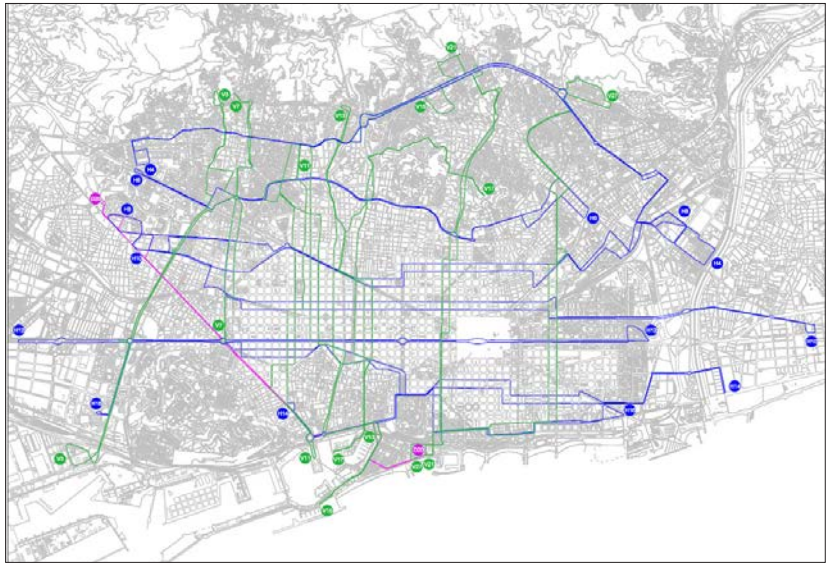
with impaired vision in metro stations and at bus stops using mobile device apps and radio *beacons* In February, the three institutions launched a trial version of this system with a practical demonstration at the Fira station on Line 9 Sud of the metro.

The Innova awards recognise the effort, innovation and scientific excellence of the ICT sector applied to health, accessibility and an active and independent life.

The New Bus Network grew with three new routes (H4, V11 and V13)

. On 29 February the New Bus Network put three new routes into service, one horizontal (H4) and two vertical ones (V11 and V13). With this latest phase, the fourth, there are now 16 high performance routes in service of the 28 that are planned. This phase was preceded by a participative process developed in the autumn of 2015 which included meetings with the entities involved in the Mobility Pact, meetings held at district level, with local people and associations, information points in the areas affected and visits to TMB's Regulation Centre.

The new routes are:
—**H4** (Zona Universitària – Bon Pastor) covering a distance of 14.85 km (half of the sum of the outbound and return routes).
—**V11** (Estació Marítima (WTC) – Bonanova) covering a distance of 6.87 km (half of the sum of the outbound and return routes).
—**V13** (Pla de Palau – Avinguda del Tibidabo) covering a distance of 7.52 km (half of the sum of the outbound and return routes).



New Network with 16 routes

Following the implementation of this fourth phase, a series of actions were taken with respect to infrastructure arrangements culminating in designating 7 km of new bus lanes, expanding the capacity of the Plaça Alfons Comín, installing and reprogramming traffic lights, establishing 49 new bus stops and renovating 8 of the existing ones.

At the same time, as a consequence of implementing this phase, the following modifications were made to the conventional bus route network:
—Elimination of routes 14, 58, 64 and 73.
—Line 20: shortened its route which then became Av. Roma to Pl. Congrés.
—Line 22: shortened its route which then became Pl. Catalunya to Av. del Tibidabo.
—Line 60: shortened its route which then became Besòs/Verneda to Av. d'Esplugues.
—Route 92: shortened its route which then became Passeig Marítim to Av. Tibidabo.

In order to provide users with the maximum possible amount of service information in real time, the most important stops on the three new routes with no technological devices were equipped with 54 illuminated screens housed in shelters, and 10 solar information poles (which do not require a connection to mains power) using an improved model, all able to give estimates of bus arrival times and to advise of any changes.

The launch of this phase was accompanied by an information campaign about the the 3 new routes going into service using the slogan "Més xarxa, més ciutat" (More network, more city). The objective of this action was to inform the general public about the new routes and the changes their implementation would entail (consequences, new stops, etc.); at the same time as pointing out the benefits they had for the city.

This, the Barcelona City Council and TMB installed and distributed: Banners and posters using the advertising platforms of the city, TMB and on buses, posters in the entrance halls to buildings, information at bus shelters, Citizen Service Centres and public facilities as well as leaflets aimed at the elderly distributed in community centres and libraries. Also, from 22 February onwards, information personnel were deployed at changeover points and bus stops to deal with user queries in person and to distribute leaflets. There were more than 150 people involved, relying on TMB employees coming up for retirement who were specially trained for this informative role.

The general public were also given information via the 010 telephone information line, the website www.novaxarxabus.bcn.cat and the social networks (*Twitter*, *Facebook*).

—Next phases:
July 2016 saw the start of joint work by the management of the City Council's Mobility department, TMB and the districts to come up with a proposal, modulated in collaboration with the bodies that make up the Mobility Pact public transport group.

Later on, in mid-January 2017, the final process of information and debate will begin in the local neighbourhoods, comprising 14 sessions with local residents, bodies and groups, held over two months.

The proposal to be debated is the introduction of 12 more routes to the new bus network - one horizontal, two diagonal and nine vertical— the technical aspects of which will be dealt with jointly and then implemented at two different times: autumn 2017 and autumn 2018. This will complete the most important remodelling of the city's surface public transport system in recent years.

The Neighbourhood Bus routes came back into service on Sundays and public holidays

From 18 September all of the Bus del Barri (Neighbourhood Bus) routes began operating seven days a week, including Sundays and public holidays. Recuperating this local service was made possible thanks to a special annual contribution from Barcelona City Council of 1.3 million euros.

Thus the Neighbourhood Bus returns to the type of permanent service that was in place between 2006 and January 2012 when, due to lack of finance for the public transport system and together with other savings measures, TMB was obliged to remove holiday services from 20 routes (all of them except the 111-Tibidabo and the 116-La Salut, where the there were higher indicators of coverage and demand). There were 19 routes that came back into service on Sundays and public holidays (one less, because the 112 route stopped operating in July 2013 and was absorbed into the 185 route).

To coincide with the extension of the Neighbourhood Bus to cover public holidays, TMB implemented a campaign to publicise the routes and timetables using posters, leaflets and the company's own channels using the slogan “The Neighbourhood Bus carries on”.

Fleet renovation plan 2016

Throughout 2016, there was major investment in order to continue work on improving and expanding the net stock of environmentally-friendly buses in TMB's fleet. Furthermore, some of the vehicles bought in 2015 have been put into service following a trial phase. The following are the new vehicles acquired this year:

—Hybrid articulated buses for regular routes:
This year 25 new Solaris Urbinos and 15 new Volvo 7900s have been bought. These 40 new hybrid articulated buses will be operating from the beginning of 2017. These vehicles incorporate the same features as the 27 buses purchased last year.

These two models were the first articulated hybrids to operate in Spain and their main characteristic features are: 4 lateral doors (two entrances and two exits), USB connectors to recharge mobile devices, smart passenger counters, etc.

—Open topped double-deckers for the Barcelona Bus Turístic:
Barcelona Bus Turístic is being modernised (the new image will be launched in January 2017). This year 6 of the units bought in 2015 have been delivered and put into service. These new vehicles are 14 metres long, have three axles and two decks. They are manufactured by Sercar based on a Volvo chassis and mechanics. Powered by diesel, they have a Euro 6 environmental rating. These new double-decker vehicles have a higher capacity than the current ones and have a very innovative new look.

Meanwhile, in 2016, 10 new double-decker vehicles by Ayats were purchased that will be put into service during the course of 2017. These new vehicles share similar features to the ones bought in 2015 and represent a continuation of the work on the rejuvenation and environmental improvement of the fleet.

—New standard buses for the regular fleet:
Over the course of the year two consignments of standard vehicles were purchased:
- — 18 MAN buses powered by natural gas (CNG).
- — 10 MAN vehicles with hybrid technology.

These new vehicles will be operative at the beginning of 2017 and will serve to replace standard vehicles being taken out of service because of their age.

Introduction into service for a trial period of two electric articulated buses and a rapid charging station en route

On 21 September two new electric articulated buses were presented that will circulate around the Catalan capital as part of the ZeEUS project (*Zero Emissions Urban Bus System*), financed by the European Union and coordinated by the International Association of Public Transport (UITP). The project consists of a series of intensive trials on new generation plug-in electric and hybrid buses carried out in various cities aimed at giving a decisive boost to research and innovation in clean technologies applied to urban transport. TMB is leading the trials in Barcelona in association with the manufacturers Irizar and Solaris and the energy company Endesa, along with the collaboration of Enide, the Polytechnic University of Catalonia, Idiada and GMV.

The two Solaris Urbino E articulated buses involved are the first purely electric 18-metre long vehicles in Spain and the each have a capacity of 110 passengers. They were built in Poland by the company Solaris. They are powered by 270 kW electric engines equipped with three batteries suitable for slow charging in the garage or rapid charging while en route. In this way, the vehicle can maintain a good operational performance with smaller sized batteries, at
120 kWh, that are also lighter, contributing towards efficiency.

As will all units in the TMB fleet, the Solaris Urbino E18s have been designed to meet the usual operational requirements: 16 hours continuous circulation with a full load and the air-conditioning turned on the in the summer months and the usual features aimed at user comfort (low boarding platform, 37 seats, two spaces for people with reduced mobility (PRM), ramp, on-board information systems, USB sockets to charge mobile devices, etc.). They have four doors, allowing passengers to board through the front two.

The new technological feature is the charging system of the two experimental buses, which is carried out using a retractable pantograph located in the upper part of the bodywork. This system comprises two elements. The charger, which is a 5-metre high pillar located close to the last stop on the bus route where the vehicle makes a regulatory stop before resuming the route. In this case, Endesa built the charging infrastructure on Carrer Cisell, a few metres from one of the terminus stops on the H16 route. Meanwhile, there is the pantograph itself, a retractable mechanical arm installed on the roof of the bus that extends upwards until coming into contact with the hood attached to the pillar with which it couples to start charging the battery while the vehicle is parked.

This system, also called opportunity charging, takes between 5 and 8 minutes to recharge the battery up to 80% of its capacity (it is never allowed to fall bellow 40%) thanks to a charger power of 400 kW. Additionally, the charger is connected to Endesa's Control Centre, from where the data is shared with the Bus Regulation Centre. This information reveals, in real time, which activity the vehicle is involved in and the condition of the connected vehicle.

The bus has sensors at two different points. At the front, there is an approach sensor that advises when the vehicle is coming up to the charging pillar and prepares the system for activation. At the rear is a positional sensor, that confirms to the pantograph arm that it can extend to couple with the hood and thus begin to charge.

In addition to this opportunity charging point, Endesa has installed two nocturnal charging points in TMB's garages that take advantage of the vehicles' down time at night in order to charge the batteries to 100% over a period of approximately two or three hours.

Operational indicators have been implemented to manage the activity required to monitor the electric buses remotely, by means of an application (APOLO), that provides basic necessary operational data such as: battery level, anticipated autonomy in km, state of charge (SOC), alarms, temperature of the physical parts and the ambient temperature, etc.

The new Solaris Urbinos started regular empty runs in November on the H16 route of the new bus network, as a forerunner to tests with passengers. On these dry runs, the two vehicles follow the H16 route (Passeig de la Zona Franca - Fòrum) and stop at the bus stops but they don't accept passengers. On 30 January 2017 the two vehicles will begin their commercial passenger service within route H16. On board the bus, information staff will distribute leaflets with a resume of the environmental advantages of these latest generation buses that do not emit gasses or pollutants of any kind.
It was the first time that Metro de Barcelona had put a section/metro line of this magnitude into service in one go and it represented a huge challenge on both a technical and organisational level. On the one hand, L9 Sud links the two airport terminals with the Fira 2 venue (via the Fira station which connects directly to the foyer without having to emerge onto the street) and on the other hand it connects with the three most important metro lines: get off at Torrassa to change to L1, at Collblanc for L5 and at Zona Universitària for L3.

As was foreseen, the nominal service on this line consists of a loop of 9 trains at intervals of 7’19’’ (this interval was established for the one way route between Collblanc and Zona Universitària) with a constant service between 06:00 and 21:00. The flexibility given by a completely automatic line makes it possible to reinforce the service in response to programmed situations such as events at the Fira, by doubling the number of loops and reducing intervals to three and a half minutes, or by reinforcing the service in response to specific crowded moments as a result of football matches and other situations (automatically introducing one or more trains if required).

The new Línia 9 Sud has a special fare for passengers starting or finishing their journeys at Aeroport T1 and Aeroport T2 and which is why tickets must be validated at the exit to these stations

Reopening of the Montjuïc Funicular Railway after modernisation work on the facilities and trains

The Montjuïc Funicular Railway reopened to the public with its regular schedule on 25 April 2016 after the completion of renovation work and a thorough servicing of the infrastructure and rolling stock which had led to its being closed since 2 November 2015. This renovation was carried out after 23 years of service and 22,500 hours in operation, and the opportunity was taken to bring it into line with current cable transport regulations.

During the period out of service, work was done to update and comprehensively modernise the rolling stock in an external workshop (renovating the bodywork and replacing the hydraulic braking system and the train controls among other improvements). The opportunity was also taken to renovate the installations.
The entire control system was changed and the upper and lower traction cables were replaced along with the counterweight cable. Improvements were also made to the PA system, the signals and the closed circuit video cameras.

During the final phase of the renovation, operational adjustments and tests were carried out on all the new equipment and cable transport system to be able to reopen to the general public with a guaranteed level of service and safety.

Pilot test for the rapid recharging of mobile phones at four metro stations on L2

Four stations on metro Line 2 were equipped with high-powered mobile device chargers enabling users to charge their personal mobile devices for free. This pilot test, promoted by FMB in conjunction with the Catalan company Yupcharge, is also expected to be introduced on some of the trains to able to assess whether it can eventually be extended to the entire Barcelona metro network.

The chargers, equipped with four USB ports, are located on both platforms of the Sagrada Família, on the platforms of the Passeig de Gràcia and Paral·lel stations for trains heading towards Badalona Pompeu Fabra and in the foyer of the Universitat interchange. They are easy to find thanks to the information signage for the charging service.

Finance agreement for extending the metro to the Marina neighbourhoods

On 27 December 2016, the Catalan Government and Barcelona's City Council signed a collaboration agreement to finance the various actions to be carried out on Line 10 Sud during 2017 that will permit the metro to extend to the Marina neighbourhoods.

The two administrations signed the finance agreement that paves the way for Barcelona City Council to purchase a collection of properties owned by the Catalan Government, previously valued at 40 million euros, on the understanding that the whole amount will be spent on Line 10 Sud to open two new stations (Foneria and Foc Cisell) providing service to a potential population of 70,000 inhabitants.


5
Sustainable
mobility, mainstay
of the organisation

Passengers carried by TMB

A key factor for the 2016 financial year was the significant increase in the number of travellers using the ATM integrated fare system (it achieved its historical maximum of 955 million travellers) and also all of the transport networks operated by Transports Metropolitans de Barcelona (TMB). Thus TMB (excluding the Montjuïc cable car) carried 577.3 million passengers which represents 4.5 million more than in the previous year (+ 0.8%).

Travellers carried by TMB

(Figures in millions)	2016	2015	Diff.	%
Total Ferrocarril Metropolità de Barcelona	**381,486**	**385,002**	**-3,516**	**-0.9**
Bus network	190,100	182,255	7,845	4.3
Bus Turístic	5,546	5,361	0.185	3.4
Tramvia Blau	0.151	0.171	-0.020	-11.5
Total Transports de Barcelona	**195,797**	**187,787**	**8,010**	**4.3**
Total TMB	**577,283**	**572,789**	**4,494**	**0.8**

This increase in TMB passenger carrying occurred exclusively in Transports de Barcelona where the number of passengers increased by 8 million (+4.3%) despite the 9 days of strikes affecting the service in the first half of the year. The Metro network experienced a fall of 3.5 million users (-0.9%) mainly due to the industrial dispute that led to 15 days of stoppages in the service over the first half of the year.

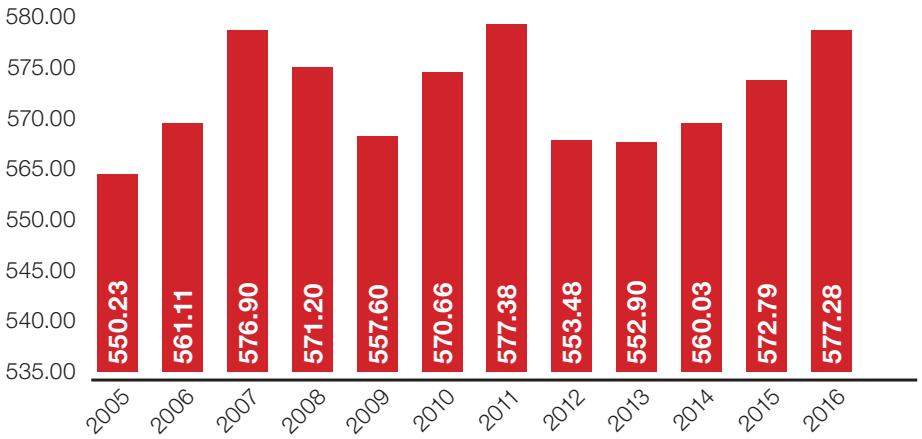
In the case of Transports de Barcelona, which includes the regular bus network, the Bus Turístic and the Tramvia Blau, passenger growth was especially evident in the regular bus network, with 7.8 million more travellers than the previous year (+4.3%). Apart from the general improvement in the economic outlook of the country, the increase can be attributed to a number of reasons. One of them is the improvement to the bus service. Thus, on 18 September the neighbourhood bus service was reintroduced on Sundays and public holidays (which had been withdrawn in 2012), action was taken on a number of routes included within the Service Improvement Plan during the first quarter of 2015 that led to increasing the transport capacity on some routes, and also the 4th phase of the New Bus Network came in to effect on 29 February incorporating the new routes H4, V11 and V13. Also noteworthy was the reinforcement of the beachside routes during the summer of 2016. Along with these actions dealing with the provision of services, work continued throughout the year to improve service quality such as renewing the fleet, introducing technological innovations and improvements to customer information services.

Another reason that contributed to the increase in users was the switch made by some of the Metro passengers affected by the 15 days of strikes which compensated for the 9 days of strikes that hit the bus service. It should also be noted that 2016 had one more day of service as it was a leap year.

With regard to leisure transport, there was a growth of 3.4% in the number of Bus Turístic users which easily compensated for the lower loads on the Tramvia Blau. This latter service was interrupted from 29 August to 9 September 2016 due to work being carried out on the Avinguda del Tibidabo. The growth in demand for the Bus Turístic can be attributed to the increase in the number of tourists visiting Barcelona which was also motivated by the accumulation of an unsettled international situation in some Mediterranean areas.

The graph shows how TMB demand (including the Bus Turístic and the Tramvia Blau) has evolved over the last ten years, where the different fluctuations in demand are clear to see:
—Decline in passenger carrying up to 2009, coinciding with a fall in economic activity and general mobility as a result of the start of the economic crisis.
—The years 2010 and 2011 coincided with the expansion of the metro network (extensions of Lines 2, 3 and 5 and the opening of the first section of L9 Nord/10) which produced two consecutive years of increased passenger carrying culminating in 2011 with Metro de Barcelona registering its historical maximum number of passengers.
—Once again there was a decline in passenger numbers in 2012 and 2013 with the lowest values recorded over recent financial years.

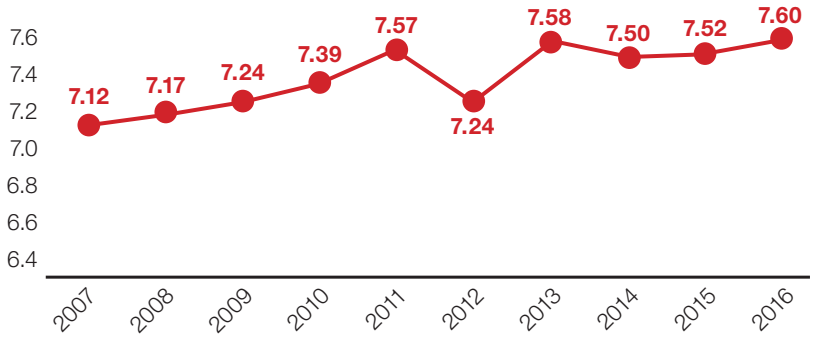
TMB passenger numbers (including leisure transport)



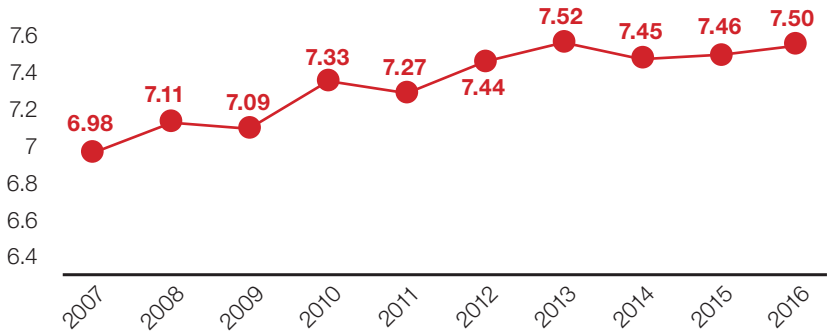
—From 2014 there was a new rise in demand with two consecutive years of passenger number increases (2015 and 2016) which also coincided with an improvement in the country's economic situation. In 2016, despite labour unrest, passenger numbers almost equalled the historic figures of 2011 thanks to the improvement in the provision of bus services and the introduction of Line 9 Sud of the Metro.

Another factor worthy of note is the positive assessment given by the users of Metro and Bus services in the customer satisfaction surveys carried out over recent years. Thus, in 2016 the average score awarded by users of the Bus service was 7.6 (the highest to date) and 7.5 to the Metro service on a scale of 0 to 10 points.

Bus service - overall satisfaction scores



Metro service - overall satisfaction scores



Passengers carried by Transports de Barcelona (TB)

One of the most notable factors for 2016 was the growth in travellers generated as part of the ATM integrated fare system and also within the Transports Metropolitans de Barcelona (TMB) group as a whole, especially in respect of the Bus network. In the case of the integrated transport system, a historical maximum of 955 million passengers was achieved. As for TMB, 577.3 passengers were transported (almost equalling the historical maximum passenger loads of 2011), a figure that represents an increase of 4.5 million passengers compared to the previous year. In the case of the services operated by Transports de Barcelona, SA, despite being affected by 9 days of strikes, users numbers increased by 8 million (+4.3%), reaching 195.8 million passengers.

Passengers carried by Transports de Barcelona (in millions)

	2016	2015	Difference	%
Bus network	190.10	182.26	7.84	4.3
Barcelona Bus Tourístic	5.55	5.36	0.18	3.4
Tramvia Blau	0.15	0.17	-0.02	-11.5
Total TB	**195.80**	**187.79**	**8.01**	**4.3**

Passenger journeys have increased most on the regular bus network (7.84 million travellers) which can be attributed to various factors, notable among which are:

—An improvement in the country's economic situation.

—An improvement in bus services: on 18 September 2016 the neighbourhood bus was reintroduced on Sundays and public holidays, a service that had been withdrawn in 2012. Meanwhile, action was taken on the selection of routes included within the Quality Improvement Plan which started in the first quarter of 2015 and the consolidation of the New Bus Network, whose routes are maintaining an upward trend in attracting passengers. On 29 February, the 4th phase of the New Network will begin (new routes H4, V11 and V13). It is also worth highlighting the reinforcement of beachside routes during the summer of 2016.

—The transfer of some of the passengers affected by the 15 days of Metro strikes which compensated for the 9 days of strikes in the bus service.

—Actions taken to improve service quality such as renewing vehicles, technological innovations and improvements to user information services.

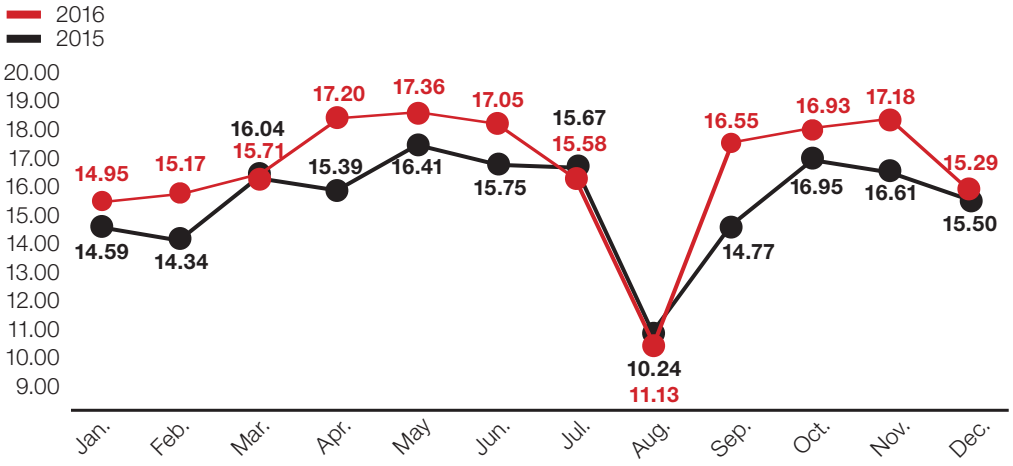
—2016 was a leap year and therefore there was one extra day of service.

—The fare adjustments made by the administrative bodies to promote social tariffs that encouraged the use of public transport by both its regular users and also more disadvantaged groups.

With regard to Leisure Transport, what stands out is the increase in passengers using the Bus Turístic service, representing an increase of 3.4% over the previous year, rising to 5.55 million travellers. This increase in demand is explained by an increase in tourism in the city of Barcelona caused by the accumulation of an unsettled international situation in some areas of the Mediterranean (France, Turkey, North Africa). With regard to the Tramvia Blau, there was a drop in passenger numbers of 11.5%, largely due to the interruption in its service between 29 August and 9 September 2016 due to roadworks on the Avinguda del Tibidabo.

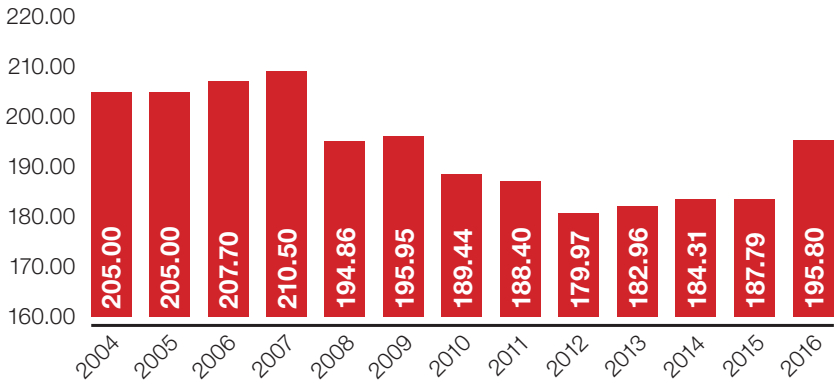
The following graph shows the month on month progress of passengers using the regular bus service over the last two financial years. The annual increase in passenger journeys runs across both semesters, with the first semester being a little higher (5.1%) than the second (3.2%),
while growth in the second semester was lower by exactly 0.62 million passengers (+0.72%).

Monthly passengers on regular bus network (Millions of ticket validations)



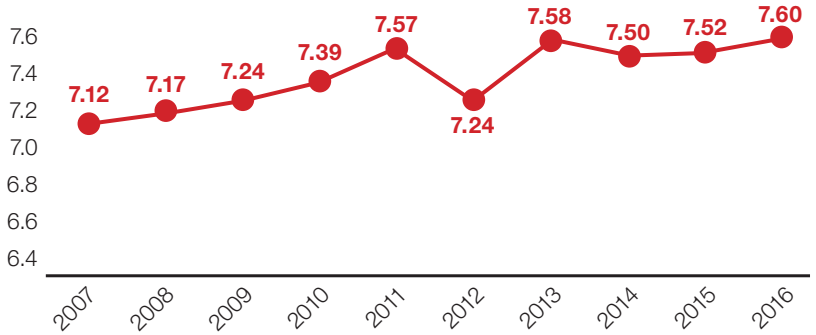
Immediately below is a graphic description of how Transports de Barcelona demand has evolved over the last 10 years.
Two distinct periods are clearly discernible:
—In the years 2007-2012 there was a drop in demand due to the extension of the metro network and the impact of the recession.
—This trend was halted in 2013 following the launch of the New Bus Network in October 2012 together with a slight improvement in the economic climate, leading to consecutive years of growth in passenger numbers ever since.

Bus network passenger numbers (including leisure transport)
(Millions of passengers)



Finally, in addition to the growth produced in passenger numbers, it should be noted that in the 2016 study of the index of customer satisfaction, the average score awarded to the TMB bus service reached 7.6 points out of 10, the highest figure over the last 10 years. The decline in 2012 was due to strikes and service stoppages that affected passengers' perceptions of the service.

Bus service - overall satisfaction scores



Passengers carried by FMB

A key factor for 2016 was the significant increase in the number of travellers using the ATM integrated fare system and also all of the transport networks operated by TMB.The integrated fare system achieved a historic maximum of 955 million passengers. In the case of TMB, the increase in demand represented 4.5 million passengers and was concentrated on the bus network while, in the case of the Metro service, even though the new Line 9 Sud came into service, there was a drop of 3.5 million users compared to the year before (-0.91%). This decrease is the consequence of industrial action that led to 15 days of strikes in the first six months of the year.

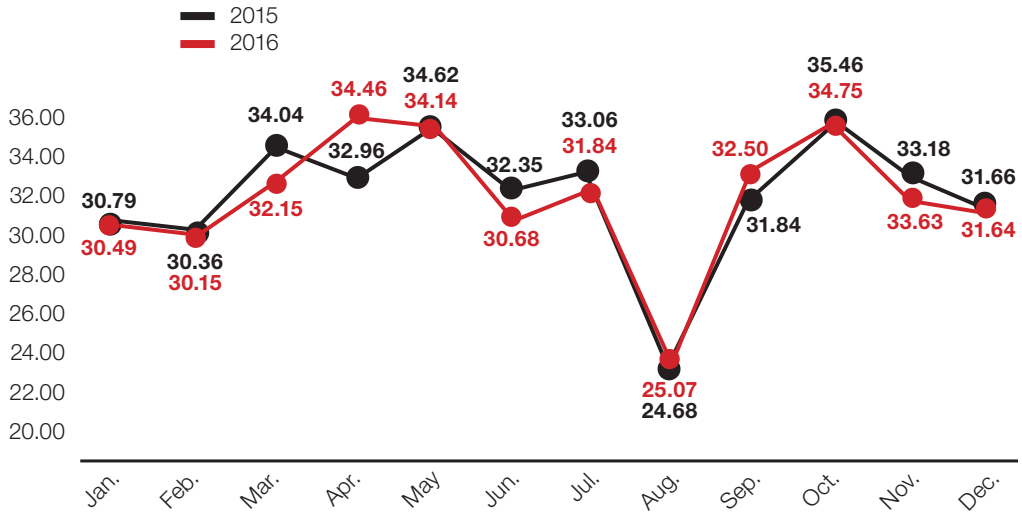
Passenger numbers dropped across all lines with the exception of Line 9 Nord/10, due to it being an automatic line, and the Montjuïc Funicular Railway. In the first case, it should be borne in mind that the line was out of service for a few days in August 2015 for some track maintenance work. In the case of the Funicular, it should be remembered that it was closed for the first quarter of 2015 (until 18 March) because of a land slip that happened on 1 October 2014 which affected the rails. Later on, from 2 November 2015 until 25 April 2016 it also had to be closed down to carry out an in-depth service and updating of its infrastructure and rolling stock.

Passengers carried by Ferrocarril Metropolità de Barcelona (in millions)

Line	2016	2015	Difference	% Diff.
L1	101.735	105.630	-3.894	-3.69%
L2	40.509	41.643	-1.134	-2.72%
L3	80.776	83.809	-3.033	-3.62%
L4	53.054	54.055	-1.000	-1.85%
L5	88.531	89.959	-1.428	-1.59%
L9 Nord/L10	8.261	8.141	0.120	1.47%
L9 Sud:	6.889		6.889	-
L11	1.163	1.216	-0.054	-4.40%
Funicular	0.566	0.549	0.017	3.07%
Total	**381.486**	**385.002**	**-3.516**	**-0.91%**

The following graph shows how monthly passenger figures on the Metro have evolved over the last two financial years. The decline in passenger journeys is mainly concentrated in the first semester of the year and coincides with the months in which days were lost to strikes. Specifically, during the first six months of the year there were 3.06 million fewer people transported than in the same period of the previous year. In contrast, the drop in the second six months was 0.45 million passengers.

Monthly passenger figures for the Metro network (millions of ticket validations)



The following graph shows how demand has evolved over the last ten years. The following facts stand out:

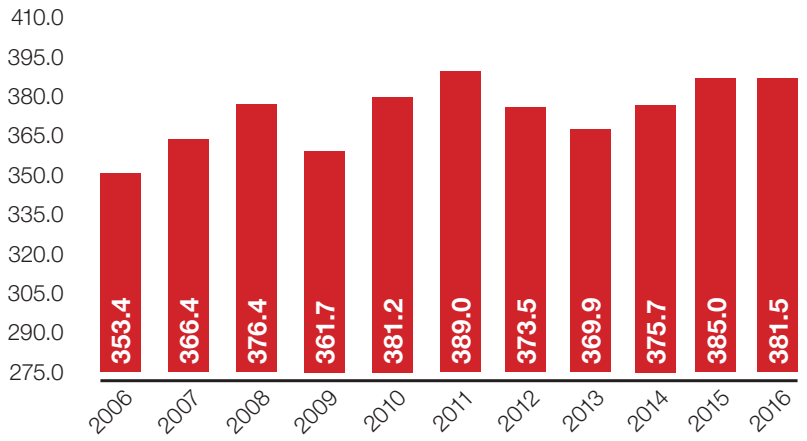
—A growing trend in demand until 2011, with the exception of the 2009 financial year.

—In 2012 and 2013 the numbers dropped.

—Passenger figures recovered strongly in the years 2014-2015.

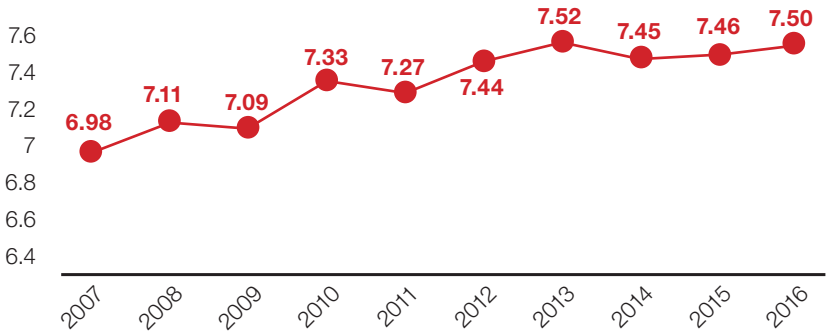
—A new drop in passenger figures in 2016 due to strikes.

Passengers carried on the Metro network (in millions)



It should also be highlighted that, despite all of the labour unrest that took place over the last financial year, Metro customers have a positive attitude towards the service provided. In the annual Customer Satisfaction Index report, it achieved an average score of 7.5 points out of a maximum of 10, which betters the results of the previous two years.

Metro service - overall satisfaction scores



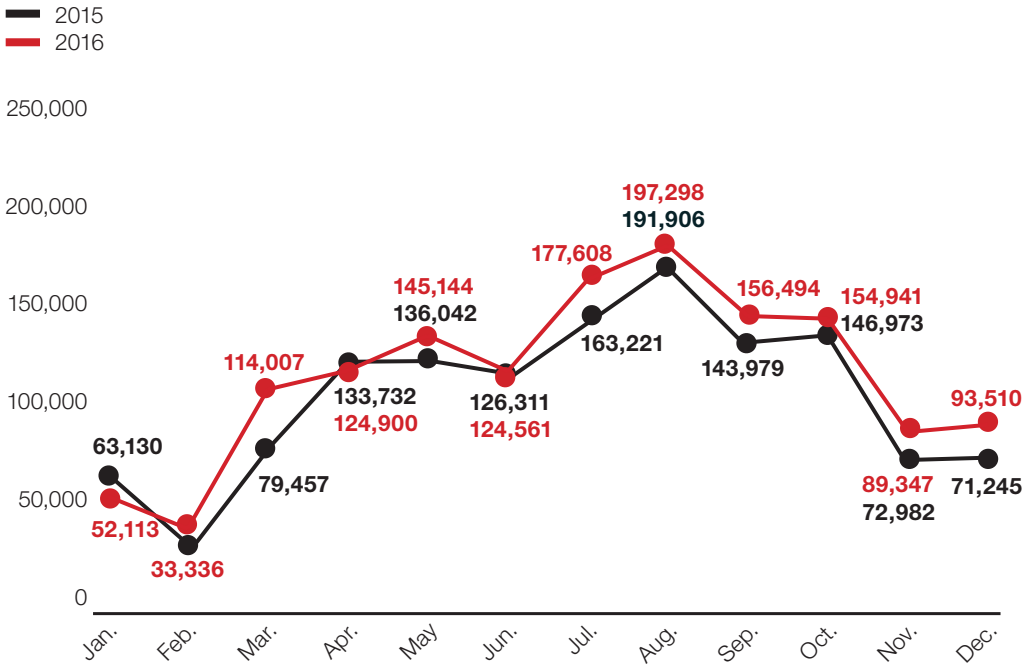
Passengers carried by Projectes i Serveis de Mobilitat, SA

There has been a notable increase in the passengers carried in 2016, specifically a rise of 8.7%, and there were 1.46 million users. There was major growth across both semesters of the financial year: 7.0% in the first and 10.0% in the second.

	2016	2015	Diff.	%
Passengers first semester	594,061	555,315	38,746	7.0%
Passengers second semester	869,198	790,306	78,892	10.0%
Total	**1,463,259**	**1,345,621**	**117,638**	**8.7%**

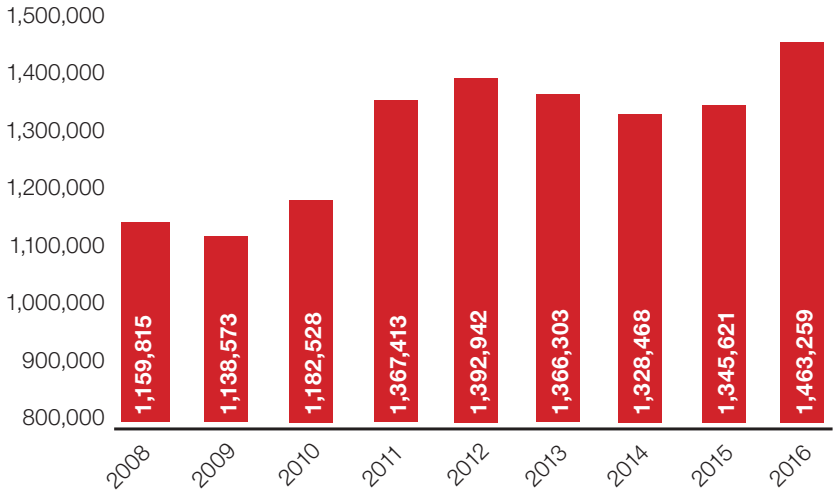
The next graph shows how the demand for the Telefèric de Montjuïc (Montjuïc Cable Car) evolved over the period 2008-2016 and how last year achieved the highest number of passenger journeys since its inauguration on 17 May 2007.

Monthly Montjuïc Cable Car passengers



The following chart shows a particular increase in passenger numbers in the first and fourth quarters of the year.
As opposed to 2015, the interruption to the service in the first quarter of 2016 was longer
due to a compulsory exceptional service for having exceeded 22,500 operational hours.

Monthly Montjuïc cable car passengers



Service provision

TMB service provision

In terms of the Metro, the main development of the year was the introduction into service of the new Line 9 Sud on 12 February. For the bus network there were two notable developments in terms of service provision: the implementation of Phase 4 of the New Network with new routes H4, V11 and V13, and the reintroduction on 18 September of services on Sundays and public holidays by the neighbourhood bus routes. Additionally, over the summer, the beachside routes were reinforced along with other actions including reinforcing the 114 route and a route change for the 165, which also started operating in August.

— Vehicles-km in operation

In 2016, service levels in terms of vehicles-km in operation increased by 4,2% for the Metro network and 1.1% for surface transport.

Vehicle-km in operation (thousands)

	2016	2015	Difference	%
Metro	85,782.75	82,295.51	3,487.24	4.2
TB	40,555.40	40,111.66	443.74	1.1

—Places-km provided

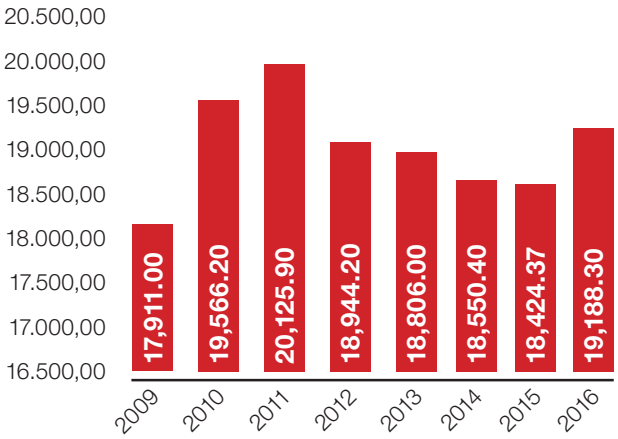
In terms of places-km provided, TMB's joint service provision increased by 4.1%, achieving a total of 19,188 million places-km between the two networks.

Places-km provided (millions)

	2016	2015	Difference	%
Metro	15,833.29	15,086.12	747.17	5.0
TB	3,355.04	3,338.25	16.79	0.5
TMB	**19,188.33**	**18,424.37**	**763.96**	**4.1**

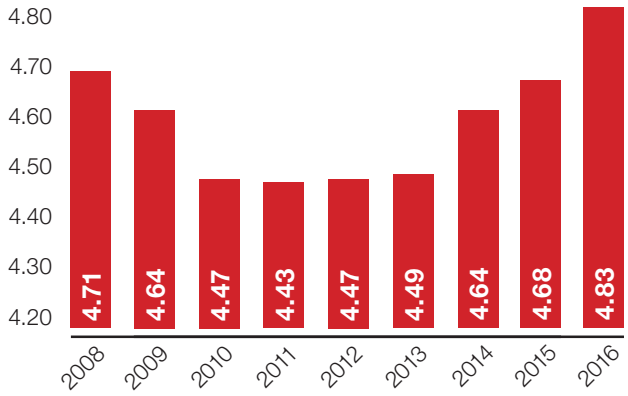
The following chart shows changes in places-km provided on all TMB networks (excluding the Montjuïc Cable Car). There is a noticeable drop in service provision from 2011 onwards due to cost-saving measures that were introduced. It should be remembered that four phases (16 routes) of the New Bus Network were introduced in 2012 in order to rationalise the network, moving from a model of accumulated routes to an integrated network that is more efficient, coherent and useful. The 2016 increase in places-km is mainly due to the introduction into service of Line 9 Sud of the Metro and the 4th phase of the New Bus Network, along with the reinstatement of the neighbourhood bus routes on Sundays and public holidays.

Places-km provided by TMB (excluding Montjuïc cable car)

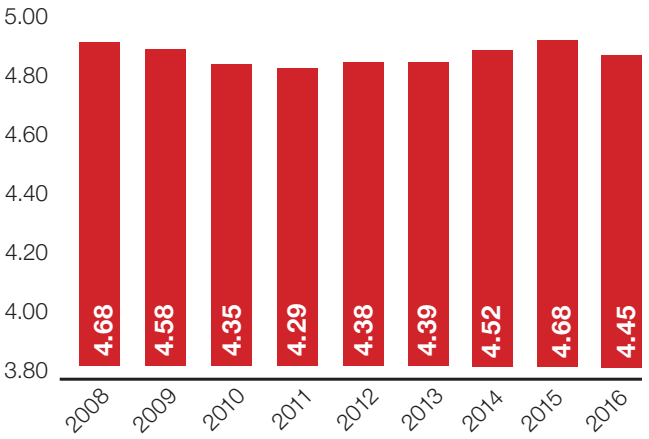


As can be seen in the following graphs, the ratio of passengers per vehicle-km in operation has been increasing every financial year since 2012 as a consequence of the service provision measures introduced that year leading to, in the case of Bus, to its maximum value of 4.83 passengers per km in operation in 2016.

Passengers per vehicle-km in operation for TB



Passengers per vehicle-km in operation on Metro



In the case of the Metro, the growth trend of this indicator, which also began in 2012, was curtailed in 2016 due to the introduction Line 9 Sud into service.

Service provision by Transports de Barcelona

In terms of service, the main development during the financial year was the implementation of the 4th phase of the New Bus Network (new routes H4, V11 and V13) and the new public holiday service provided by neighbourhood buses on 18 September 2016. The public holiday service on these neighbourhood routes had to be cut in 2012 (with the exception of routes 111 and 116) as a cost saving measure due to lack of funding for the public transport system. Also noteworthy was the reinforcement of beachfront routes over the summer of 2016 as well as reinforcing route 114 and changing the 165 route which also ran throughout August among other measures.

Meanwhile, 2016 was the first full year with the Quality Improvement Plan in operation, an initiative that was introduced between February and March 2015. This involved increasing the service frequency on a number of bus route on weekdays, Saturdays and public holidays. It should also be remembered that 9 days of bus strikes were called during the last financial year (8 days in February and 1 in June) which affected the provision of services.

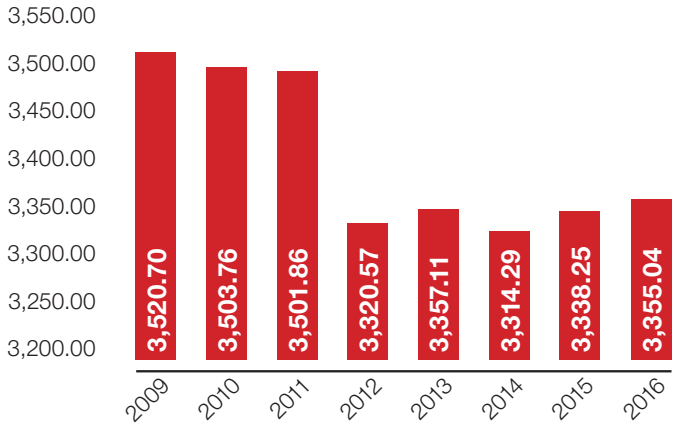
All of the factors combined led to Bus providing a service provision of 3,355 million places-km, which represents a slight increase over the previous year (+0.5%).

Places-km provided by TB (in millions)

	2016	2015	Difference	%
Places-km provided	3,355.04	3,338.25	16.79	0.50

As the graph shows, over recent years the availability of bus services has been adapted to demand, especially with the introduction of metro Line L9/10 and the extension of lines L2 and L5 in the years 2009-2010. The fall in 2012 was due to the days lost to strikes that year, along with the implementation of a service rationalisation plan to better cover
the needs of genuine demand and to save resources due to the lack of finance for the transport system

Places-km provided by TB
(millions of places-km)



—Vehicle-km covered in operation

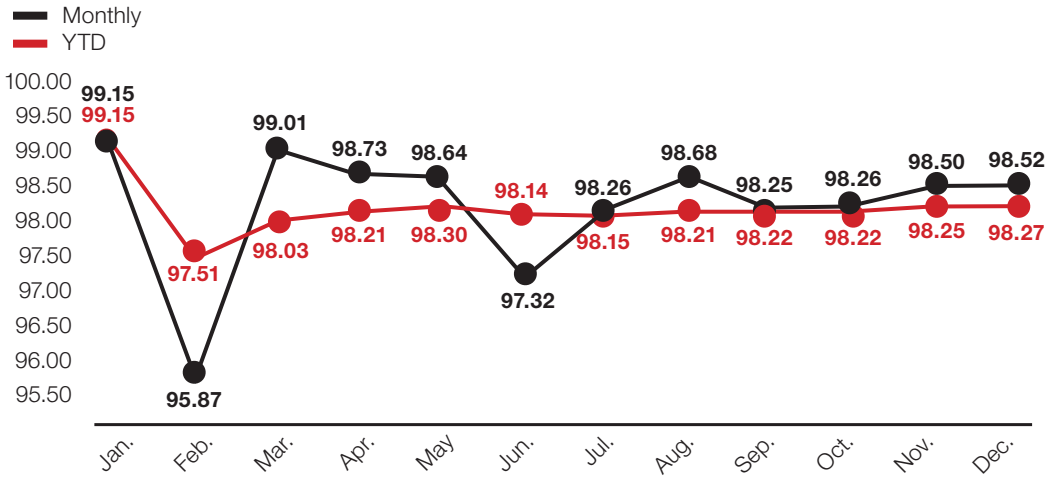
The Bus Improvement Plan, introduced at the start of 2015, and the return into service of the public holiday service of the neighbourhood buses in September 2016 also explain the increase in vehicles-km covered in operation over the last financial year. Specifically, 40.56 million km were covered in operation, an increase of 1.11% on the previous year. The fact that the percentage increase for vehicle-km in operation is higher than the provision of places-km is due to the growth in km covered by smaller capacity vehicles (mini-buses and midi-buses) through having reintroduced the the public holiday service on the neighbourhood bus routes.

Vehicle-km in operation covered by TB (in thousands)

	2016	2015	Diff.	%
Vehicles-km in operation	40,555.40	40,111.66	443.74	1.11

With regard to complying with the scheduled service (% of vehicle-km in operation compared to those scheduled), the annual average came out at 98.27%, slightly below that of the previous year (98.76%) due to the days lost to strikes during the first half of the year.

% compliance with service targets in 2016



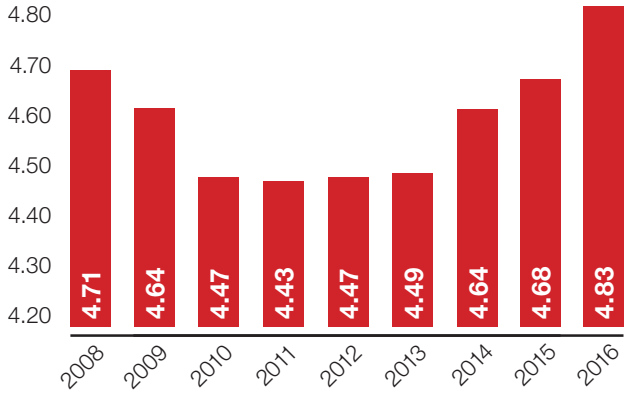
—Passengers per vehicle-km covered in operation

The ratio of passengers carried per vehicle-km in operation grew by 3.1% reaching a figure of 4.83 passengers per vehicle-km in operation, due to an increase in demand (4.3%) that exceeded the service provision of vehicle-km covered in operation (1.1%).

	2016	2015	Diff.	%
Passengers	195.80	187.79	8.01	4.3
Vehicles-km in operation	40.56	40.11	0.44	1.1
Total vehicle-km in operation	**4.83**	**4.68**	**0.15**	**3.1**

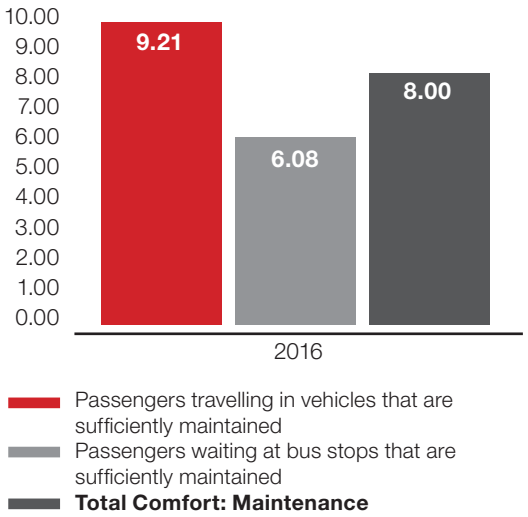
As the graph demonstrates, the ratio of passengers per vehicle-km in operation on the bus network decreased each year until 2011, when it reached a minimum of 4.43 passengers per km in operation. From that year onwards, as a result of actions taken in respect of the service provision, this trend was changed and began to increase each year until reaching its highest level for the last financial year.

Passengers per vehicle-km in operation for TB

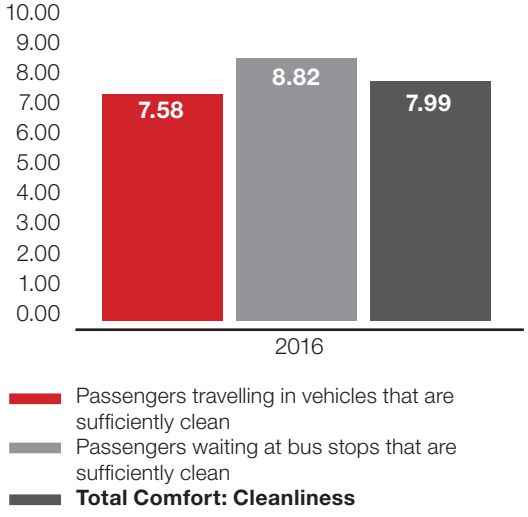


The Service Provision Measurement (MPS) study provides assessments of various qualitative aspects of the bus service. Average scores for 2016 (on a scale of 0 to 10) for fulfilment of service, cleanliness, maintenance, information and customer services were as follows: Comfort score:

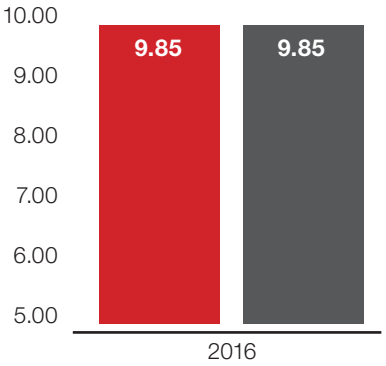
Maintenance 2016



Comfort score: Cleanliness 2016

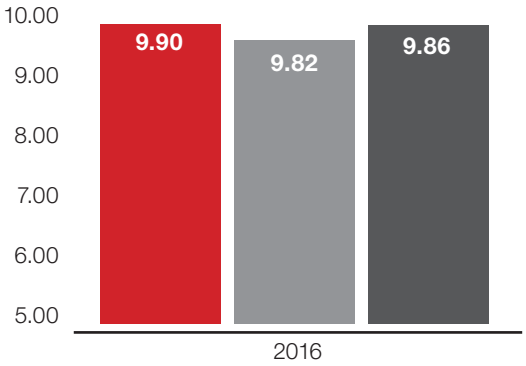


Competence score: 2016



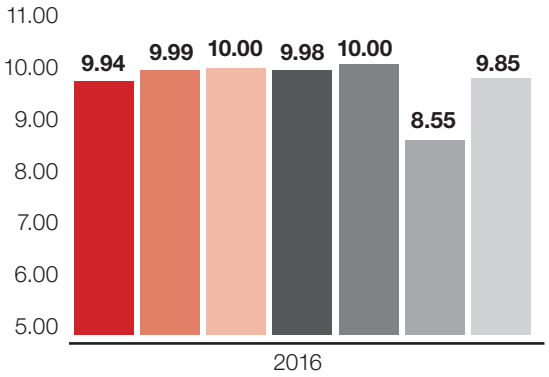
Service Fulfilment
Total Competence

Information Score: 2016



Passengers with sufficient information on board vehicles
Passengers with sufficient information at bus stops
Total Information

Customer service score 2016



Passengers who are treated appropriately
Passengers who get the right answers
Passengers who travel with appropriately dressed staff
Passengers who travel in adequate conditions
Average response time
Responses within the deadline
Total Customer service

Note: * The average response time was 13.93 days (the target is 28 days or less) with 85.5% answered within the deadline.

Ferrocarrils Metropolitans de Barcelona services

—Places-km provided

The year's Metro service was affected by two main events: one was the introduction into service of Line 9 Sud on 12 February 2016 and the other involved the industrial dispute that led to 15 days of stoppages in the service that took place over February, April, May and June.

The launch of the new Line 9 Sud is what explains the growth of almost 5% in places-km provided in 2016; specifically 15,833 million places-km compared with 15,086 millions the previous year.

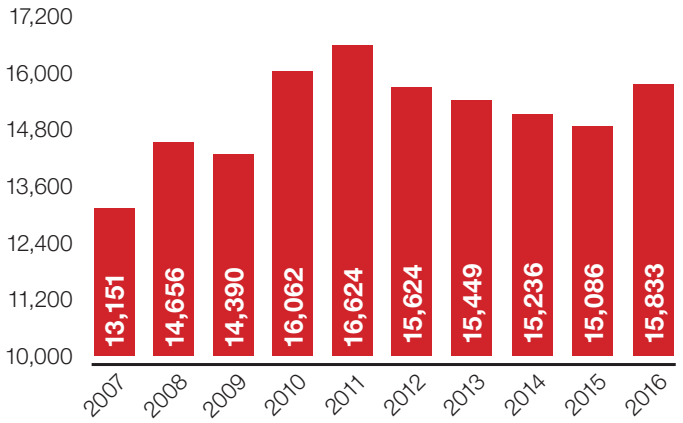
What stands out is the decline in places-km across every line (except the automatic L9 Nord/L10) due to the industrial dispute.

By observing how the provision of services has evolved over the last 10 years then two distinct periods can be identified. There was a significant increase in service provision up to 2011, due to the growth of the network with the introduction into service of L9 Nord/ L10, the extensions of Lines 2, 3 and 5 and improvements in service frequencies. This trend changed from 2012 onwards due to a cost rationalisation plan. Lastly, a new increase in the provision of services is evident in 2016 due to the opening of L9 Sud in February.

Places-km (in millions)

Line	2016	2015	Difference	%
L1	3,232.30	3,540.59	-308.29	-8.71
L2	1,791.86	1,927.53	-135.67	-7.04
L3	2,465.76	2,684.88	-219.12	-8.16
L4	2,134.94	2,336.28	-201.34	-8.62
L5	2,841.61	3,077.28	-235.66	-7.66
L9 Nord/10	1,448.88	1,446.04	2.84	0.20
L9 Sud	1,846.66		1,846.66	-
L11	71.27	73.52	-2.24	-3.05
Total	**15,833.29**	**15,086.12**	**747.17**	**4.95**

Places-km (Millions)



—Vehicle-km covered in operation

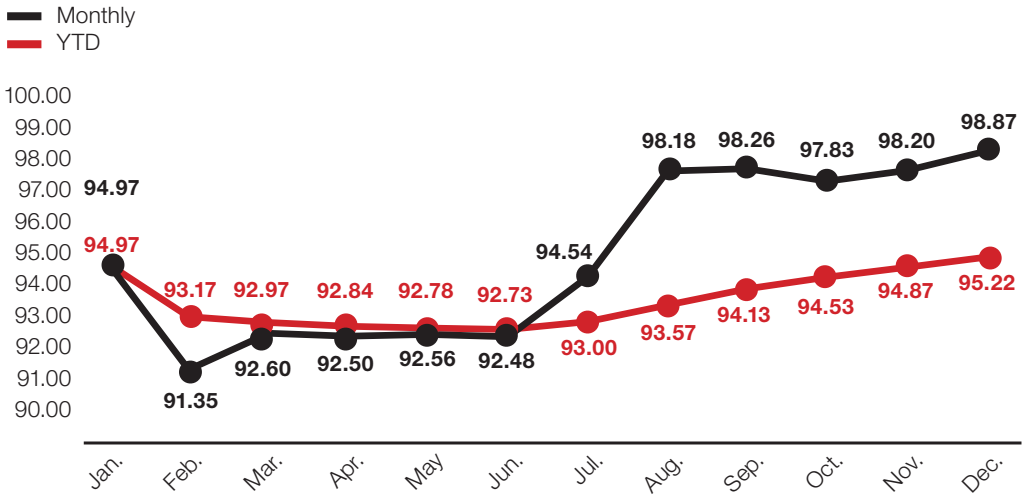
The opening of Line 9 Sud and the labour dispute also explain developments in the number of Vehicle-km covered in operation during 2016, which increased by 4.2% due to the extension of the Metro network with the new L9 Sud.

Vehicle-km covered in operation (in thousands)

Line	2016	2015	Difference	%
L1	16,165.68	17,690.42	-1,524.74	-8.62
L2	9,813.21	10,555.88	-742.67	-7.04
L3	14,972.96	16,290.47	-1,317.51	-8.09
L4	12,118.01	13,239.44	-1,121.43	-8.47
L5	15,410.09	16,688.36	-1,278.27	-7.66
L9 Nord/L10	7,430.15	7,415.60	14.55	0.20
L9 Sud	9,470.07		9,470.07	-
L11	402.57	415.33	-12.76	-3.07
Total	**85,782.74**	**82,295.51**	**3,487.24**	**4.24**

The average fulfilment of scheduled service (Vehicle-km covered in operation as a percentage of the total scheduled) for the year was 95.22%, lower than the figure for the previous year (99.60%). The cause of this decline was the labour dispute that took place in the first half of the year.

% compliance with service targets in 2016



—Number of passengers per Vehicle-km in operation

The introduction into service of Line 9 Sud in February 2016 explains the drop of 4.94% in the passenger per Vehicle-km in operation ration which, for the last financial year, was 4.45 passengers per Vehicle-km in operation.

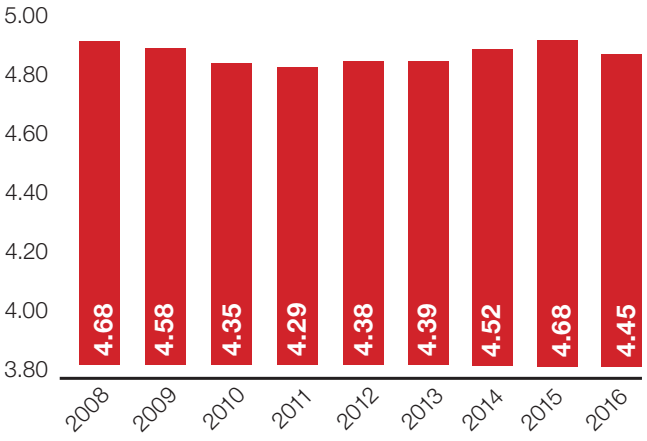
However, if a homogeneous comparison is made between the last two financial years, it can clearly be seen that by excluding the new Line 9 Sud, this indicator would have increased by 4.93% and would have come out at 4.91 passengers per Vehicle-km in operation. The explanation is the the percentage decrease in passenger loads was less than the decrease in Vehicle-km covered in operation because of strikes.

Passengers per Vehicle-km in operation

Line	2016	2015	%	%
L1	6.29	5.97	5.40%	-8.62
L2	4.13	3.95	4.64%	-7.04
L3	5.39	5.14	4.86%	-8.09
L4	4.38	4.08	7.23%	-8.47
L5	5.74	5.39	6.58%	-7.66
L9 Nord/L10	1.11	1.10	1.28%	0.20
L11	2.89	2.93	-1.37%	-
Subtotal	4.91	4.68	4.93%	-3.07
L9 Sud	**0.73**			**4.24**
Total	**4.45**	**4.68**	**-4.94%**	

The chart below shows that this ratio declined from 2007 to its lowest value in 2011 when the metro network was extended and L9/10 was opened. Later, with the implementation of the Service Rationalisation Plan introduced in 2012, the indicator increased every year until 2016 when it went down again due to the opening of the new L9 Sud.

Passengers per Vehicle-km in operation



—Provision of trains in service in winter during peak hours (weekdays)

The number of trains in service during the morning peak hours on a weekday in winter (including the Montjuïc funicular) was 143 by the end of the year, an increase of 9 units due to the introduction of Line 9 Sud.

Trains at peak times (weekdays)

Line	2016	2015	2014	2013	2012
L1	26	26	26	26	26
L2	19	19	19	19	22
L3	26	26	26	26	27
L4	19	19	19	19	19
L5	30	30	30	30	30
L9 Nord	6	6	6	6	6
L9 Sud	9				
L10	4	4	4	4	4
L11	2	2	2	2	2
Funicular	2	2	2	2	2
Total	**143**	**134**	**134**	**134**	**138**

—Commercial speed

The chart below shows the commercial speed on each metro line during peak hours on a weekday in winter.

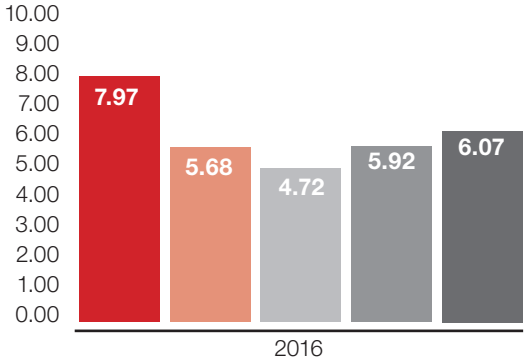
Commercial speed (km/h)

Line	2016	2015
L1	26.8	26.8
L2	25.7	25.7
L3	26.6	26.6
L4	28.4	28.4
L5	26.3	26.3
L9 Nord	29.3	29.3
L9 Sud	38.2	
L10	32.4	32.4
L11	24.0	24.0
Funicular	18.0	18.0

—Other service quality indicators

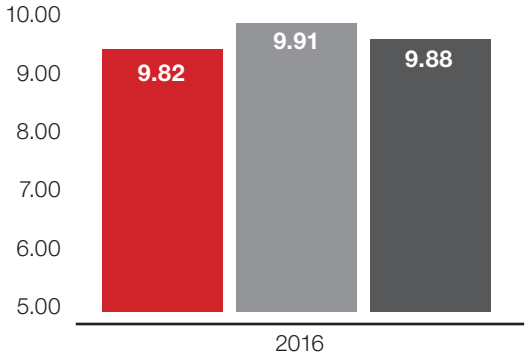
The Service Provision Measurement (MPS) study provides an assessment of different qualitative aspects of the Metro service. Below is a graphic representation of the average scores for the service in 2016 (on a scale of 0 to 10 points), with regard to accessibility, information, safety, maintenance, cleanliness and customer service.

Total Accessibility 2016



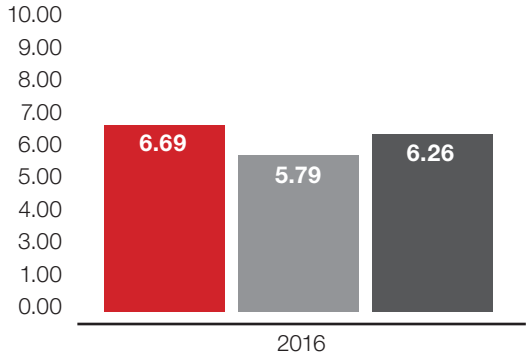
Availability of lifts to customers
Availability of escalators to customers
Availability of lobby areas to customers
Availability of ticket barriers to customers
Total Accessibility

Information Score: 2016



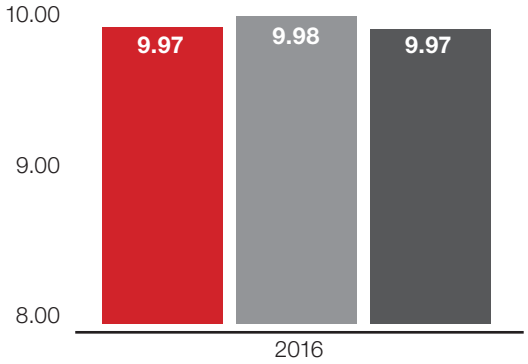
Passengers content with level of train information provided
Passengers content with level of station information provided
Total Information

Safety Score: 2016



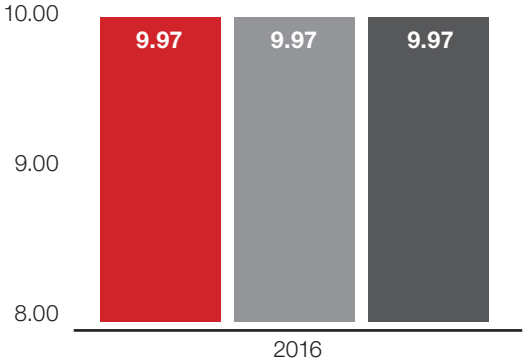
Complaints per million ticket validations
Accidents per million Vehicle-km in operation
Total Safety

Comfort score: Maintenance 2016



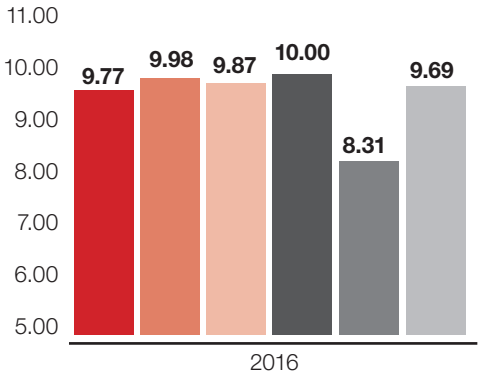
- Passengers who travel through stations with adequate maintenance
- Passengers who travel on trains with adequate maintenance
- **Total Comfort: Maintenance**

Comfort score: Cleanliness 2016



- Passengers who travel through adequately clean stations
- Passengers who expect adequately clean trains
- **Total Comfort:<1> Cleanliness**

Customer service score: 2016



- Passengers who are treated correctly
- Passengers who travel with appropriately dressed staff
- Passengers given correct answers
- Average response time
- Replies given within a deadline
- **Total Customer Service**

Note: Average response time was 13.72 days (the target is 28 days or less) with 83.05% of queries answered within this deadline.

Cost per passenger carried

Cost per passenger carried and per bus hour

—Cost per passenger carried

In 2016, Transports de Barcelona held down running costs which, along with increased passenger loads, meant that the operational cost per passenger reduced by 5.9% compared to the previous year falling to 1.38 euros per passenger as opposed to 1.47 euros per passenger in 2015.

If every other factor is added in, the total percentage cost per passenger reduces still further getting down to 6.5%, to a level of 1.49 euros per passenger as opposed to 1.60 euros per passenger the previous year.

Cost per passenger carried (in euros)

Item		2016	2015	Difference in euro cents	%
Operating costs	Supplies	0.051	0.052	-0.13	-2.6
	Electricity/fuel	0.094	0.110	-1.54	-14.1
	Personnel	1.068	1.104	-3.63	-3.3
	External services	0.177	0.181	-0.35	-1.9
	Changes in provisions	-0.009	0.021	-3.00	-139.8
Total Operating costs		**1.382**	**1.468**	**-8.66**	**-5.9**
Other expenses	Taxes	0.004	0.003	0.09	30.6
	Net amortisation	0.123	0.119	0.45	3.8
	Income from sales of fixed assets	0.002	0.000	0.17	
	IVMDH tax refund	-0.011	0.000	-1.09	
	Pensions	0.001	0.003	-0.14	-48.2
Total other expenses		**0.120**	**0.125**	**-0.51**	**-4.1**
Financial expenses:	Interest paid on AEAT tax refunds	-0.002	0.000	-0.21	
	Structural	-0.008	0.002	-1.02	
Total financial expenses		**-0.010**	**0.002**	**-1.22**	
Total cost per passenger		**1.491**	**1.595**	**-10.39**	**-6.5**
Passengers carried (in thousands)		195,797	187,787	8,010	4.3

All of the factors included in the operating costs per passenger went down, especially the variations in provisions, staff costs and fuel costs per passenger carried.

Regarding the rest of the costs, there were cost per passenger increases in terms of tax, net amortisation and the result of selling fixed assets. On the other hand, the reduction in per passenger finance costs and the 'health cent' refund (IVMHDH) from the tax authorities easily compensated for the increase in these factors.

—Total cost per hour of the Bus service

Unit cost analysis in terms of service provision (cost per hour of service) is similar this year to what has been described with regard to cost per passenger. The operating cost per hour of service also dropped in 2016, specifically by 3.7% compared with the previous year, standing at 70.50 euros per hour of service. This is explained by an increase in hours of service by 1.9% without a consequent increase by the same proportion in operating costs due to economies of scale. The costs that reduced were basically: the cost per hour of fuel, the cost per hour of staff and the per hour of changes in provisions.

When the other factors are added in, there is also a lowering in total costs per hour of service as in the case of costs per passenger. Specifically, there was a drop of 4.4% compared to 2015, standing at 76.12 euros per hour of service in 2016. Total bus service costs per hour (in euros)

Item		2016	Any 2015	Diff. in euros	%
Operating costs	Supplies	2.595	2.603	-0.01	-0.3
	Electricity/fuel	4.818	5.480	-0.66	-12.1
	Personnel	54.492	55.079	-0.59	-1.1
	External services	9.053	9.026	0.03	0.3
	Changes in provisions	-0.436	1.069	-1.51	
Total Operating costs		**70.523**	**73.258**	**-2.73**	**-3.7**
Other expenses	Taxes	0.204	0.153	0.05	33.6
	Net amortisation	6.299	5.934	0.37	6.2
	Income from sales of fixed assets	0.084	-0.002	0.09	
	IVMDH tax refund	-0.555	0.000	-0.55	
	Pensions	0.075	0.141	-0.07	-47.0
Total other expenses		**6.107**	**6.225**	**-0.12**	**-1.9**
Financial expenses:	Interest paid on AEAT tax refunds	-0.106	0.000	-0.11	
	Structural	-0.409	0.107	-0.52	-481.6
Total financial expenses		**-0.515**	**0.107**	**-0.62**	**-580.5**
Total cost per hour		**76.115**	**79.590**	**-3.48**	**-4.4**
Total bus service hours (in thousands)		3,837	3,764	72	1.9

For more detail, in the chapter “2.5 Profit and Loss Account” an explanation is given on the progress of each component of the operational costs and the variation they have had compared to the previous year.

Cost per passenger carried and per Vehicle-total km in operation in FMB

—Cost per passenger carried

The total cost per passenger carried rose by 5,4% in 2016 compared to the previous year and stood at 0.83 euros per passenger. There were two reasons for this increase: firstly, an increase in the company's costs arising from Line 9 Sud going into service and secondly, a decrease in the number of passengers carried due to labour disputes and strikes.

Operating costs per passenger also rose by 7.5% more than the previous year, standing at 0.71 euros per passenger. Except for the cost per passenger in terms of energy and variations in provisions, every other cost item has risen, especially external services and personnel. The reduction in energy expenses is explained by lower electricity consumption (there was a reduction in the total Vehicle-km covered on the conventional lines and on L11). Meanwhile, as will be explained later in this report, work continued during the financial year on implementing measures to save energy consumption on the network and in Metro premises.

With regard to other per passenger costs, there was an overall reduction, especially in relation to structural financial expenses.

Cost per passenger carried (in euros)

Item		2016	2015	Difference in euro cents	%
Operating costs	Supplies	0.021	0.020	0.07	3.2
	Electricity/fuel	0.070	0.073	-0.30	-4.2
	Personnel	0.439	0.420	1.88	4.5
	External services	0.176	0.153	2.31	15.1
	Changes in provisions	0.005	-0.005	0.99	-206.0
Total operating expenses excluding train leases and L9/L10 charges		**0.711**	**0.662**	**4.94**	**7.5**
Other expenses	Taxes	0.000	0.000	0.00	-8.9
	Net amortisation	0.080	0.081	-0.16	-1.9
	Income from sales of fixed assets	-0.001	0.002	-0.28	-123.5
	Pensions	0.001	0.000	0.04	113.0
Total other expenses		**0.080**	**0.084**	**-0.41**	**-4.8**
Financial expenses:	Write-off of contract programme	0.044	0.042	0.21	5.0
	Structural financial expenses	-0.001	0.004	-0.47	-119.6
Total financial expenses		**0.043**	**0.046**	**-0.27**	**-5.9**
Total cost per passenger		**0.834**	**0.792**	**4.26**	**5.4**
Passengers carried (in thousands)		381,486	385,002	-3,516	-0.9

Note: Train leases and charges for L9 Nord/10 and L9 Sud are not included.

—Cost per Vehicle-total km covered

When total FMB costs are related to total Vehicle-km covered, the analysis is a different one from the cost per passenger carried. Thus, the cost per Vehicle-km covered (excluding train leasing and charges for L9 Nord/L10 and Line 9 Sud) did not vary compared to the previous year and once again came out at 3.64 euros per km in 2016. The explanation is that while in the case of demand, the number of passengers dropped by 0.9%, in the case of service provision, the number of Vehicle-km covered increased by 4.4% as a consequence of Line 9 Sud coming into service in mid-February 2016.

Operating costs per Vehicle-km covered totalled 3.11 euros per km, an increase of 2% compared to the previous financial year. This increase is mainly explained by the increase in cost per km of external services and variations in provisions. On the other hand, when the cost per km of other items are added, the 2016 cost per km is the same as the previous financial year, as mentioned before.

Cost per Vehicle-total km covered (in euros)

Item		2016	2015	Diff. in euros	%
Operating costs	Supplies	0.092	0.094	-0.19	-2.0
	Electricity/fuel	0.305	0.335	-3.02	-9.0
	Personnel	1.917	1.933	-1.58	-0.8
	External services	0.769	0.704	6.52	9.3
	Changes in provisions	0.022	-0.022	4.44	-200.7
Total operating expenses excluding train leases and L9/L10 charges		**3.106**	**3.044**	**6.18**	**2.0**
Other expenses	Taxes	0.002	0.002	-0.03	-13.5
	Net amortisation	0.347	0.373	-2.57	-6.9
	Income from sales of fixed assets	-0.002	0.011	-1.29	-122.3
	Pensions	0.003	0.002	0.16	102.3
Total other expenses		**0.350**	**0.387**	**-3.73**	**-9.6**
Financial expenses:	Write-off of contract programme	0.191	0.191	-0.06	-0.3
	Structural	-0.003	0.018	-2.16	-118.7
Total financial expenses		**0.187**	**0.210**	**-2.23**	**-10.6**
Total cost per hour		**3.643**	**3.641**	**0.22**	**0.1**
Total train service hours (in thousands)		87,346	83,695	3,651	4.4

Note: Train leases and charges for L9 Nord/10 and L9 Sud are not included.

Developments in revenue

Bus revenues

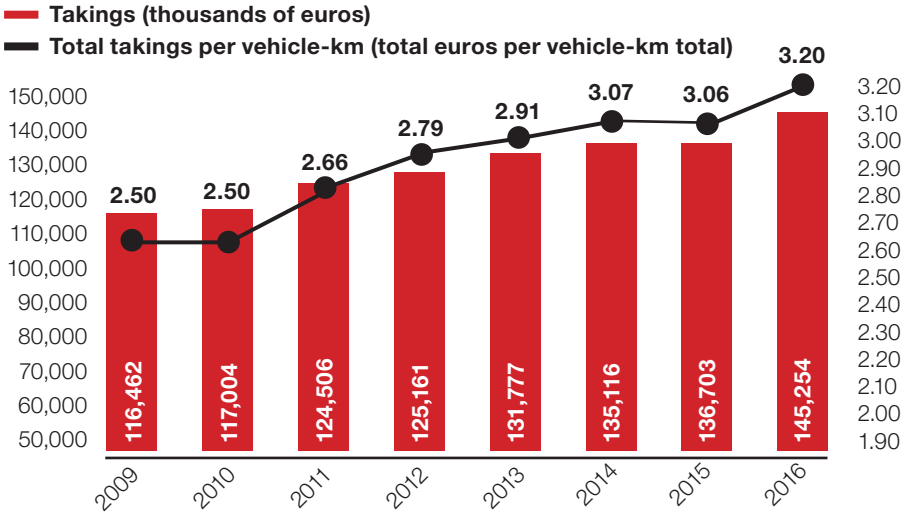
Last year's increase in passenger carrying is the main reason behind the significant increase in income from transport ticket sales (before commissions, rebates and discounts). Thus, despite the fare freeze, the increase in revenues was 8.55 million euros (+6.3%) compared to the previous year.

Revenue per total vehicle-km travelled (euros)

	2016	2015	% Diff.
Revenue (thousands of euros)	145,254	136,703	6.26
Total vehicle-km covered (thousands)	45,407	44,638	1.72
Revenue/total vehicle-km	**3.199**	**3.062**	**4.46**

The indicator linking sales revenue to service provision, the takings per vehicle-km in operation, has grown by 4.5% reaching a total of 3,20 euros per vehicle-km

Development of income through takings



Looking at revenue progress over recent years, what stands out is the continuous growth in ticket sales every year since 2009. With regard to total revenue per vehicle-km, that has also increased every year (except 2015) before reaching its maximum level in the last financial year.

Metro revenues

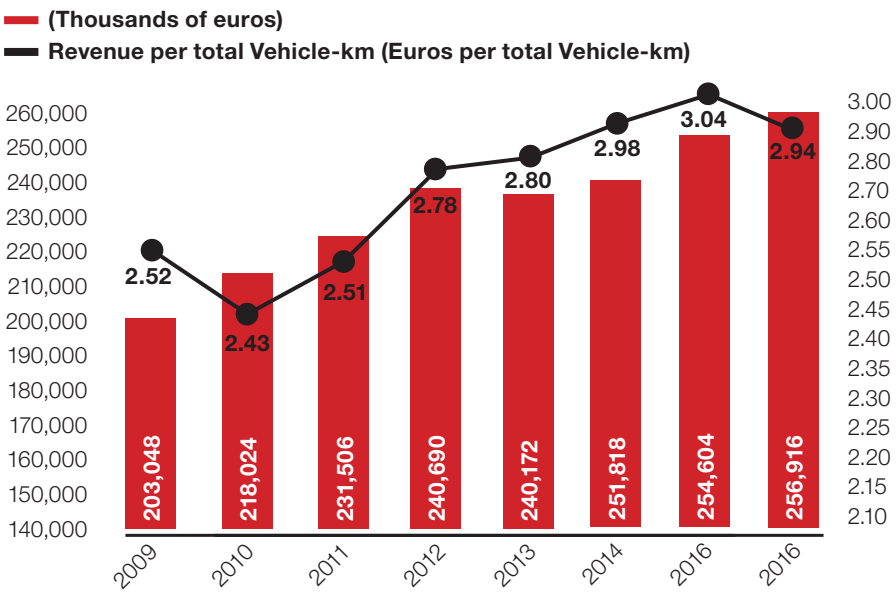
Despite the fall in passenger numbers due to labour disputes and the 2016 fare freeze, FMB's transport ticket sales (before commissions, discounts and volume discounts) grew by 2.3 million euros compared to the previous year (+0.9%), thanks to a greater use of tickets exclusive to them (Hola BCN and the introduction of a one way ticket to the airport with L9 Sud coming into service, which increased average revenue by 1.8% per passenger. It should be remembered that the price of the one way ticket to the airport is 4.50 euros, of which €3 goes towards the paying the maintenance charge fees for the stations on the line.

On the other hand, the ratio of the revenue per total Vehicle-km has reduced by 3.3% compared to the previous year, standing at 2.94 euros per total Vehicle-km, due to a higher percentage increase in the kilometres covered (with the incorporation of L9 Sud) with regard to revenue.

Revenue per total Vehicle-km covered(euros)

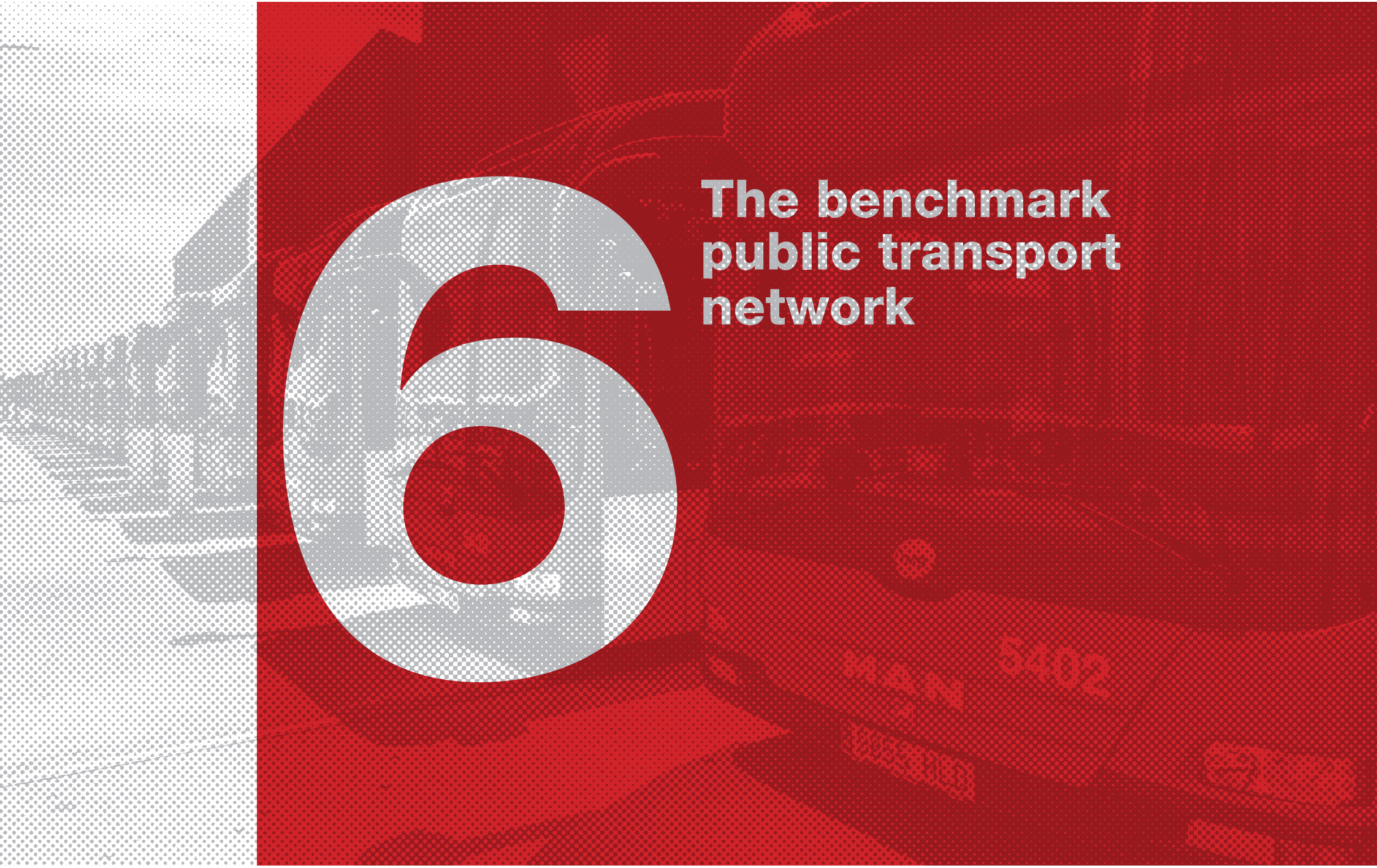
	2016	2015	% Diff.
Revenue (thousands of euros)	256,916	254,604	1.11%
Total Vehicle-km covered (thousands)	87,346	83,695	-1.04%
Revenue/total Vehicle-km	**2.94**	**3.04**	**-3.31%**

Revenue from ticket sales



The chart shows that revenues from ticket sales have increased every year, reaching 256.9 million euros in 2016. Since 2009, these revenues have increased by 53.9 million euros, a cumulative increase of 26.5% over the whole period.

With regard to the ratio of takings per Vehicle-km covered, this experienced annual growth from 2011 until reaching its maximum in 2015. In 2016 it went down for the aforementioned reasons.


6
The benchmark
public transport
network

Changes to TMB rolling stock and service

A number of projects were carried out in respect of the bus network in 2016 include the following:

1. Seeking improvements in efficiency and environmental protection: Commitment to electrical mobility:
—Continuation of the ZeEus project. Promoting zero emissions buses.
—Opportunity charging points (electric buses).
—European project ELIPTIC for a new ultra-fast charging station for the electrification of urban transport. Proposed electric minibus project
—SORT (standardised on-road test) cycle procedure for plug-in CNG hybrid vehicles aimed at measuring and comparing the consumption of these kinds of vehicles.
—EBSF-2, the design of the bus of the future.

2. Commitment to technology. Key technological projects being undertaken:
—Improvements relating to the SAE Fleet Management Support System SAE Central – Integration of regulatory measures.
—Planning and Service Provision Project (PPS).
—Renewal of obsolete cash machines.
—Bus lane patrol car project.

3. Projects to coordinate fleet programming and maintenance:
—Plan for predictive maintenance inspections, Plan to train for and optimise preventative maintenance plans for the fleet.
—Development of a new cost analysis model for maintenance.
—Plan for technological improvements to the ROMMI project. Technical improvement projects aimed at improving maintenance.
—Renewal of PDSa in shops and approval of the SAP MOVILISER platform.
—Energy audit RD 56/2016.
—Development of analysis tools for ISO 50001 certification.
—Project to analyse improvements in the management of materials.

4. Infrastructure development projects.

5. Key measures in Business Operations Centres (CON).

6. Key measures in Network Support Centre (CSX).

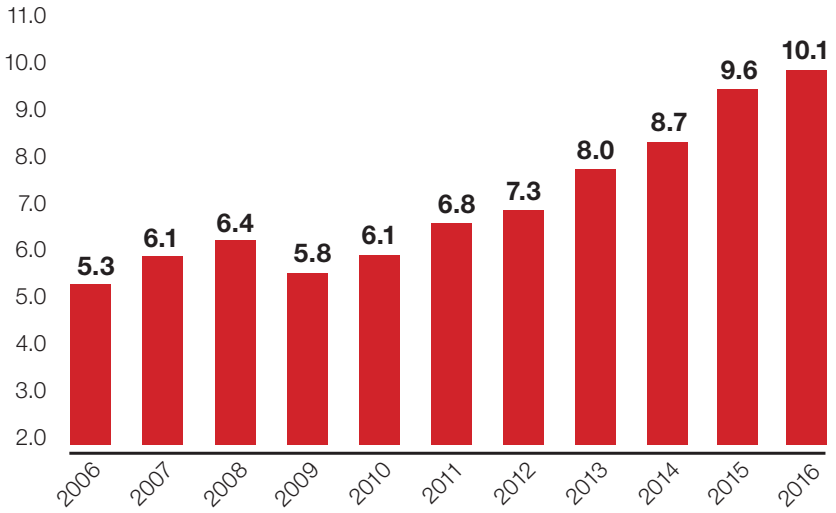
—Changes to TB rolling stock and fuel consumption

Average age of the fleet

The operational stock of buses as at 31 December 2016 comprised 1,060 vehicles, made up of the following types: 603 standard buses, 301 articulated vehicles, 25 midibuses 52 minibuses, 3 bi-articulated buses, 72 double-decker buses (for the Barcelona Bus Turístic) and 4 single-deck open-top buses (for the Barcelona Bus Turístic)

The average age of the operational fleet, as at 31 December 2016, stood at 10.05 years i.e. it has increased by half a year instead of a whole year thanks to new buses being introduced into service throughout 2016. This figure does not include the incorporation of 78 new vehicles (10 double-deckers, 40 articulated hybrids, 10 standard hybrids and 18 standard CNG vehicles), bought in 2016 that will be introduced into the operational fleet at the beginning of 2017

Average age of the bus fleet (Years)



A progressive ageing of the fleet can be seen from 2009, coinciding with the onset of the economic crisis and the consequent introduction of cost saving plans that also impacted on the investment policy for renewing buses. Although the current fleet is older the 10 years ago, this trend will change over the coming financial years thanks to a increase in investments dedicated to renewing the oldest stock. Thus, for example, 83 new buses will be acquired in 2017 that will cost around 37.7 million euros, and which will comprise 54 articulated hybrids, 14 standard CNG vehicles, 8 double deckers for the Bus Turístic and 7 articulated ones with electric engines. All of them will come into service during 2017 and 2018.

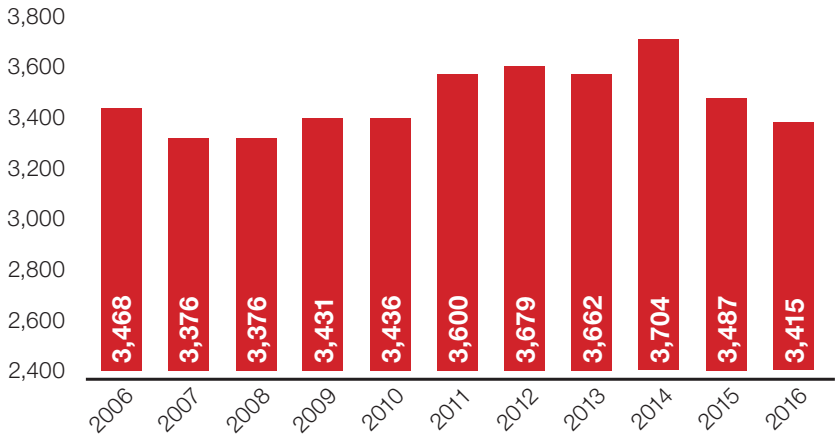
—Fleet reliability

The indicator that measures fleet reliability (average kilometres covered without breakdown) has reduced for the second consecutive year, (it is specifically 2.1% lower than the previous year) and stands at 3,415 km covered without breakdowns, below the objective set for this year which was 3,500 km without breakdowns. This reduction is due to an increase of 3.9% in the number of breakdowns compared with the previous year, a consequence of the aforementioned ageing of the fleet.

	2016	2015	Diff.	%
Average km without breakdowns	3,415	3,487	-72	-2.1

The chart shows how fleet reliability has evolved over the last 10 years. After several years of growth, from 2015 the indicator started to go down. On the other hand, with the increase in investments destined to renew the fleet over the coming financial years, the indicator is predicted to rise again in the coming years, at the same time as improving customer comfort levels.

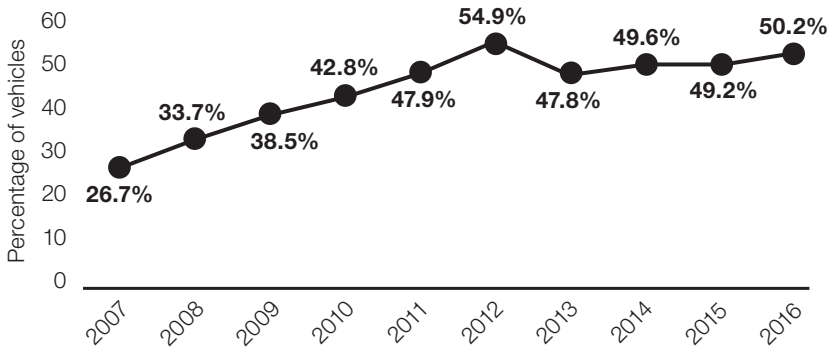
Kilometres covered without breakdowns



—Fuel consumption

Caring for the environment has been part of TMB's approach to its business for many years, positioning Barcelona as a leading city for research and innovation for zero emissions urban transport.

Percentage of CNG, hybrid and electric-powered vehicles



Note: Up to 2012 includes vehicles powered by biodiesel.

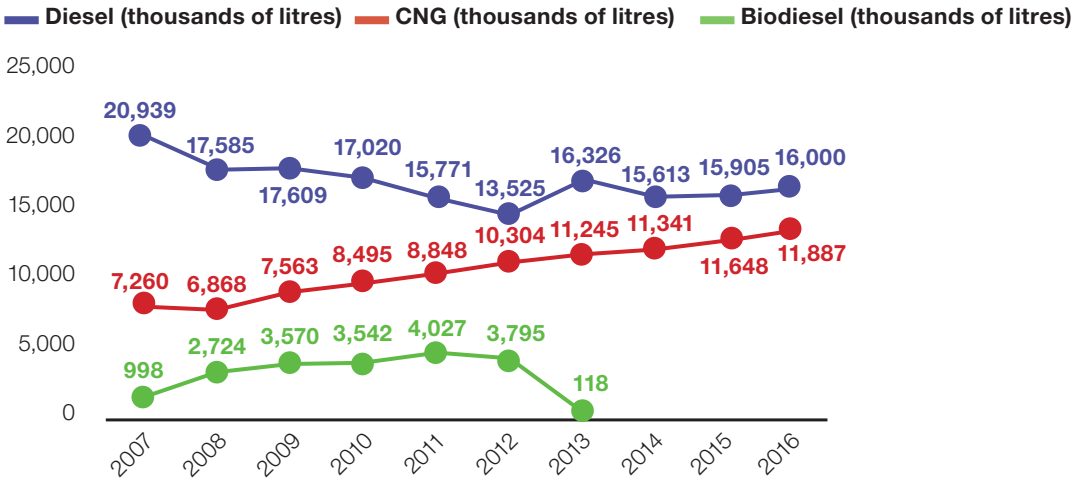
The graph shows that, over recent years, TMB has progressively increased its fleet of more environmentally friendly vehicles (including CNG, biodiesel, hybrid and electric vehicles). While in 2007 only 26.7% of buses were powered by more eco-friendly fuels (CNG and biodiesel), last year half the fleet was made up with environmentally more sustainable buses (hybrids, CNG powered and purely electric) thanks to the introduction of more hybrid vehicles. The dip in 2013 occurred because biodiesel was no longer used as fuel, mainly due to the withdrawal of the government subsidy it benefited from. Vehicles powered by biodiesel also used more fuel than those using diesel, making them less efficient.

Consumption of different types of fuel during the last financial year was as follows:

1. Diesel consumption: the bus fleet fuelled by diesel consumed a total of 16 million litres, a growth of 0.6% over the previous year. This rise is due to an increase of 31% in the kilometres covered by buses with hybrid diesel engines. Meanwhile, the consumption of diesel per 100 km travelled went down by 1,1% to stand at 59.01 litres for every 100 km travelled, thanks to the higher proportion of hybrid vehicles in 2016.

2. Natural gas consumption: CNG-powered vehicles consumed a total of 11.89 million kg, 2.1% higher than in the previous year. This increase was due to the higher number of kilometres covered by CNG buses in 2016 (1.8% more than the previous year) and a small increase in unit consumption. The latter figure was 65.27 kg for every 100 km travelled, a slightly higher figure than the previous year (65.09 kg/100 km).

Fuel consumption by fuel type



Developments, improvements and projects. Bus

Seeking efficiency and environmental improvement: Commitment to electric mobility:

—Work continues as part of the ZeEUS Project. Support for zero emission buses

The two new Solaris Urbinos, the first 100% electric 18 metre long buses in Spain, have been in a trial phase since November 2016 covering the H16 route without passengers Thus the city is expanding the trials with zero emission buses within the ZeEUS project that started in 2014 with two standard vehicles..

—Opportunity charging

A new technological development is the charging system for the two experimental articulated electric buses, achieved via a retractable pantograph located on the upper part of the bodywork, The pantograph charging station in Carrer Cisell also forms part of the ZeEUS project and is undergoing trials to go into service on route H16 with two articulated electric vehicles manufactured by Solaris.
It is anticipated that the two charging stations will be located one at each end of the H16 route (C/Cisell – Zona Fòrum). Work to install the first station in Carrer del Cisell was carried out in partnership with Barcelona City Council.

—European project ELIPTIC and the new ultra-rapid charging station for the electrification of urban transport

The Fòrum terminal station is in the process of receiving tenders in a bidding process that will form part of the European ELIPTIC project, taking electrical energy from the metro network itself.

The project focusses on using existing electric public transport systems (including light railways, metro, trams and trolleybuses) for the electrification of multimodal mobility in an urban and suburban context. By integrating the existing electric public transport systems for multiple purposes, it demonstrates that adopting addition electrical vehicles can be done in a profitable way.

ELIPTIC is developing 23 business projects in 11 European cities, and is also contributing towards achieving EU objectives to halve the use of conventional cars in cities by 2030 and to reduce emissions by 60% by 2050.

—Electric minibus project proposal

With regard to the call to apply for RIS3CAT grants, funds are now being received and an electric minibus is being developed to provide service to urban districts. The prototype is planned to be ready sometime during 2017.

—SORT cycle procedure for plug-in hybrid CNG vehicles and coaches

As part of its activities with the International Association of Public Transport (UITP), the engineering department is working on developing a procedure to measure and compare the consumption of these types of vehicle. This procedure, which is already partially developed, will have Europe-wide applications and is intended to become a European standard. It is a project which ran throughout 2016 and is due for completion in 2017.

—EBSF-2, the design of the bus of the future

This is a research and innovation project being run by the International Association of Public Transport (UITP). As part of EBSF 2, the TMB testing team is working on reducing the consumption of auxiliary energy in electric buses through a number of different technological solutions.

Commitment to technology.
Key technological projects in progress:

—Improvements relating to the SAE Fleet Management Support System SAE central – Integration of regulatory measures

This year, the project intended to integrate the rest of the internal channels and information systems has been implemented and is being expanded to include the regulatory measures required to operate a public bus service. In this way, online information about the state of the service can be provided in real time, both at an internal and external level, through the existing information channels (SIC, PIU, SIU, MouTV, i-Bus, TMB App).

In addition to facilitating the input of data into the information systems and avoiding notes on pieces of paper, this development is able to inform the system about buses that cannot be counted on for the calculation of service forecasts, thereby preventing external customers from receiving erroneous information.

In the second quarter of the year, the new tool was successfully introduced at the Ponent Business Operations Centre (CON). Advantage was taken of this first use of the tool as part of the internal processes of the Traffic Regulation Centre (CRT) to identify and assemble a series of improvements to be made and shortcomings presented by the application.

At the end of the year, use of the tool was incorporated into the Triangle Business Operations Centre, with the focus on putting it into production in the Operations Centres of Zona Franca and Horta during the first quarter of 2017.

— Service Planning and Provision (PPS) Project

This is a far-reaching project started in 2015. The Service Planning and Provision (PPS) Project is a new application run on an SAP platform with the aim of handling three main blocks of information:

— PHASE 1: Timetable information and management, currently managed via the Timetable Database (BDH).
— PHASE 2: Service control panels for drivers and support staff (supervisors, Business Operations Centre staff, etc.), currently managed via HASTUS and tools such as Excel.
— Phase 3: Dynamic vehicle management, replacing the current TBKC computer application.

Phase 1 completed during 2016: halfway through the year the migration to PPS was carried out and the new tool is now fully up and running successfully, replacing the old timetable database. Phases 2 and 3 are currently in the analysis phase.

— Renewal of obsolete cash machines

The gradual renewal of employee's cash machines is scheduled at each Business Operations Centres.

The aim of the project is that the features of the new machines are superior to the current ones (also taking advantage of the implementation of the T-Mobilitat project), both on the level of the new technologies anticipated for the System for Payment and Sales (SPV) as well as for staff information.

— Infomobility: User Information System

— Improvements to the User Information System (SIU)
Changes have been made in the parameterisation of the broadcast times and repetition of messages sent to user information systems, permitting an increase in the number of broadcasts thus reinforcing their efficiency.
— Development of the User Information (SIU) channel
The Improvement Project for the Management of the SIU Channel is being undertaken, which provides the following enhancements:

— It enables the programming of content 'x' days in advance.
— It automates the content validation process.
— It reduces the number of versions that need publishing on the channel.
— It prepares the channel for an *online* scenario.

— User information system audio audit
In 2016 staff at the Network Support Centre audited the SIU audio system on a total of 1,592 buses covering 85 routes. This audit provided precise knowledge of how the system works from the perspective of the customer, bearing in mind that this is a crucial system for people with visual impairments.

—Wi-Fi on board the bus project

New onboard equipment (CPU30) has been distributed to enable the provision of a Wi-Fi service during the journey as well as mobile data coverage, thereby giving internet connectivity to the bus fleet.

At the end of last year, the installation process entered its final phase, with 85% of the fleet completed and the remainder due to be finished in January 2017. The *Wi-Fi* service, property of the Barcelona City Council was not in service at the end of the year due to problems with their supplier. It is anticipated that a general *Wi-Fi* service can be provided at the beginning of 2017.

—Improvement work on the New Bus Network

New traffic light crossings have been installed controlled by *tag* for the 4th phase.

—Bus lane patrol car project

A new project to equip a car with registration number recognition system that can be used to generate reports resulting in fines (through the Guàrdia Urbana police force) for non-authorised vehicles that enter the bus lane.

Projects to coordinate fleet programming and maintenance

—Plan for predictive maintenance inspections, Plan to train for and optimise
preventative maintenance plans for the bus fleet.

There were 2,672 inspections carried out over the year, representing 87.75% of the 3,045 initially planned.

Predictive inspections have been identified as a key process prior to carrying out the tasks detailed in the maintenance plan by which, apart from the tasks that need carrying out systematically (by kilometres or time), other anomalies are identified that need to be corrected. This permits the time spent working on vehicles to be optimised by carrying out these additional tasks during regular inspections, thereby making a significant contribution to reducing the number of incidents while improving reliability indicators.

Preventive maintenance plans continued to be implemented for the new vehicles that use hybrid/electric technology.
As for training, a total of eight training programmes were carried out during the year, involving 24 sessions attended by 136 people.

—Development of a new model to analyse maintenance costs

— Allocation of materials to work orders
In 2016, 68% of the cost of materials used in fleet maintenance was allocated to works orders, against an approximate forecast allocation limit of 70%. These figures confirm that the processes for allocating materials to work orders are fully consolidated. The technical analysis of maintenance costs for 2016 will be issued during the fist quarter of 2017.

— Allocation of time to work orders
In 2016, the following improvements were implemented in SAP to enable the time devoted to maintenance operations to be registered against work orders:

— Implementation of a new integrated interface for managing maintenance orders. Vehicle availability and the introduction and/or modification of operations and materials used and the time spent on the job.
— Implementation of the possibility for maintenance workers to be able to enter operating times spent on maintenance orders using touch screens.

Finally, 13 December 2016 saw the introduction of entering operating times on maintenance orders by workers in the Rolling Stock Workshops. This second step, which is essential for knowing the costs associated with maintenance activities, will shortly make it possible to analyse them from a technical perspective aimed principally at optimising the resources employed.

—ROMMI technological improvement plan. Technical improvement projects aimed at improving maintenance

— Improvements in the reclassification of notifications (T2) and the introduction of new breakdown cause logs: A project that began at the end of 2014 as a result of the need to adapt vehicle structure and breakdown cause logs for SAP according to the new technological changes incorporated in new vehicles (hybrid, electric and CNG). It envisages the introduction of a new cataloguing system for the causes of breakdown in order to improve the identification of these causes when it comes to reclassifying T2 notifications.

The last phase of this project was completed during the financial year and consists of introducing the following improvement measures:

— Introduction of a new breakdown log.
— Introduction of filters for breakdowns that cannot be attributed to defects in the vehicle or its components (problems recorded in Circle Q).
— Introduction of a new interface for reclassifying T2 notifications.

—Renovation of PDAs in warehouses and ratification of the SAP MOBILISER platform

As a result of the conclusions of the Technology Master Plan completed in 2014 and the recognition that the PDAs used for managing material in the warehouses of the Business Operations Centre were obsolete, these devices were replaced by new ones throughout 2016.

In collaboration with the Technology Department, validation tests were carried out on these devices to which functionalities were introduced that are implemented on the new *MOBILISER* platform. Using this platform provides mobility in managing the recording of information and consulting technical data through mobile devices, without depending on a fixed point of access.

—Energy audit RD 56/2016

Carrying out of an audit by a qualified company, in compliance with Royal Decree 56/2016 of 12 February 2016, published in the BOE on 13 February 2016, which reflects the EU Directive 2012/27 of the European Parliament and Council, of 25 October 2012 regarding energy efficiency insofar as it affects energy audits, accreditation of service suppliers and promoting the efficiency of energy supplies.

Finally, on 11 November 2016 a favourable report was obtained certifying that TB complies with all the requirements of the Royal Decree.

—Development of analytical tools for ISO 50001 certification

This collaboration with the Ministry of the Environment and the Technology Department, to develop monitoring indicators and graphs, uses the *SAP BUSINESS* tool to produce a monthly presentation (graphs and tables) of the consumption data of the fleet and the premises. Over the course of the year, the necessary queries were programmed into *SAP BUSINESS* to be able to monitor the progress of monthly energy consumption for the current financial year, the previous three years and the energy baseline. The Business Operation Centre teams responsible for this monitoring have also been given requisite training in the field of processes affecting ISO 50001 certification.

—Project to analyse improvements in managing materials

There was collaboration in the 2nd phase, together with the Operations Department and the external consultancy entrusted with this project, which covers the implementation of the potential improvements relating to the management of material identified in the 1st phase.

Infrastructure projects

In 2016 a total of 5,294 measures were taken in the following areas: 64 TB infrastructure projects, 516 procurement requests, 3,754 corrective measures and 960 preventive measures related to TB infrastructure (60 of them to external suppliers) The total cost of these measures was 7.25 million euros (investment and operating expenses).

Key investments included the following:

—Infrastructure for a roadside rapid-recharge opportunity charging point, carried out by Endesa, as part of the European ZeEUS project for purely electric powered Solaris articulated buses, specifically at Carrer Cisell in Zona Franca, to provide service to route H16 from this terminal.

—Within the same ZeEUS project, and with regard to the other terminal on route H16 at Fòrum Diagonal, a last minute change of location to Carrer E. Maristany - UPC, delayed the awarding of the construction contract, making it necessary to restart the project which is now in the public information phase.

—Adaptation of the liquid refrigerant facility at Zona Fanca 1 in order to comply with the applicable regulation APQ6.

—Having available the documentation and necessary requisites prior to being assessed for ISO-14001 and ISO-50001 certification at the Business Operations Centres of Horta and Zona Franca 1, putting the required measures into practice at the different bus depots to obtain the ISOs.

—Start of the updating of the refuelling facility at the Triangle Business Operations Centre with a major reorganisation of the industrial installations and adapting spaces for the tasks of vehicle cleaning and refuelling.

—Installation of a new biological water treatment plant at the Ponent Business Operations Centre, finishing off updating process of all the biological water treatment plants within Transports de Barcelona's infrastructures.

—Work to provide new epoxy resin flooring for four working lines (two already finished and two under way), at the main Rolling Stock workshop at Zona Franca.

—Renovation of the work station lighting installations in the workshop annex at Zona Franca.

—Start of the 1st installation phase of the renovated air conditioning system at the building in the Llobregat sector of Zona Franca.

—Start of work on the refurbishment of the Traffic Regulation Centre room to accommodate the new Bus at the Triangle Operational Control Centre.

—Start of the work required to improve the security infrastructure at Horta Operational Control Centre.

—Refurbishment work in the refuelling shed at Zona Franca.

—Adjudication of contracts to start work on the 1st phase of the Rolling Stock Workshops at the Zona Franca Port centre as part of the Executive Project.

Key measures in Business Operations Centres

1. Horta Business Operations Centre:
The projects carried out or in progress at the Horta Business Operations Centre in 2016 included the following:
—Implementation of the new process of reclassifying breakdowns working together with the Technical Department.
—An action plan was undertaken to reduce traffic accidents, revising and updating the Accident Prevention for drivers with the most number of accidents.
—Plan to reduce absenteeism across the whole workforce.
—Finalisation of the reform of the Central Office.
—Preliminary work on the implementation of ISO 14001 and 50001 at the Business Operations Centre anticipated for 2017.

2. Ponent Business Operations Centre:
The projects carried out or in progress during the year at the Ponent Business Operations Centre included the following:
—Adjustment in the service provided by routes 65 and 165 due to the introduction into service of Line 9 Sud of the Metro.
—Start of the implementation into the warehouses of a operational management system.
—Installation and implementation of an system to control access to the subsidiary offices of the Business Operations Centre.
—Improvements in applying the 5”S” project top the Business Operations Centre.
—Implementation of tools to improve the process of reclassifying breakdowns.
—Installation and commissioning of a water chlorination station at the Business Operations Centre.

3. Triangle Business Operations Centre:
The projects carried out or in progress during the year at the Triangle Business Operations Centre included the following:
—Completion of the comprehensive refurbishment of the workshop facility, applying the 5"S" philosophy and applying this methodology to the filing system of the Business Operation Centre's Office.
—Observations on the Accident Prevention Programme: an agent was deployed to the centre part-time with the aim of improving the number of driver observations carried out under the Accident Prevention Plan.
Electric vehicles:
— Introduction into service of articulated electric vehicles, with an ultra-rapid roadside electric recharging station and night time recharging at the Business Operations Centre.
—Participation in the process of gathering together specifications for the gradual renewal of màquines de liquidació, due to the existing stock being obsolete.

4. Zona Franca Business Operations Centre:
The projects carried out or in progress at the Horta Business Operations Centre during the year included the following:
—Renewal of the system of complaints and claims as a key element for continuous improvement.
—Monitoring, development and consolidation of the RETROFIT project (vehicles with internal combustion engines converted to CNG-electric hybrids). The improvement in consumption is confirmed.
—Remodelling and reconditioning of the Zona Franca Business Operations Centre
(Carrer A area) and the continuing the new bus depot project in the Zona Franca Port area.

—With a view to obtaining certification for the entire Network Operations Department, the book of procedures common to all Business Operations Centres is being reviewed and updated.
—Preliminary work to implement ISO 14001 (environmental) and 50001 (energy) certification at the Zona Franca Business Operations Centre, anticipated for 2017.<1>

Key measures in the Network Support Centre

The main projects and activities carried out during the year by the various departments of the Network Support Centre were as follows:

—Urban furniture: Barcelona City Council awarded the concession for the maintenance, supply, installation and selling of advertising of the city's urban furniture to the company *Clear Channel* .
The relevant contacts have been made to guarantee that the functioning and maintenance of the current Passenger Information Screens as well as the other types of urban furniture (bus shelters, *smart bus shelters*, MUPI information signs, street WCs). Similarly, corporate information systems have been updated to communicate any incidents to maintenance staff.

—In February a new automatic distributor machine was installed next to the 0450-Pg. Zona Franca/Foneria bus stop.

—Development of the GeoPortal: In May, version 1.12 went into operation which includes new features such as: a spatial filter (permits the filtering of data according to the selected geometry to the geometric clipboard) and a transport line filter (allowing the list of routes and lines to be filtered depending on the operator).

—Alteration manager: This is tool is being developed with a view to integrating the management of content from different channels (SIU, PIU, Intranet, etc.), working mainly this year on the Passenger Information Screen channel. It also introduces new features such as the creation of historic records and generating summaries of queries from the messaging service.

—Two audits have been carried out over the course of the year on support signposting at interchange areas: horizontal signposts and support MUPIs.

—Over the course of the year, all of the route maps have been updated so that this information can be added to the drivers' timetable cards. These maps will shortly be included in the driver's information system.

—Labels in *Braille* have been have been produced and installed across the entire bus fleet. These labels have been positioned next to the ticket validators and allow blind people to know the route of the vehicle they are travelling in.

—The different operators in the Traffic Regulation Centre room have been repositioned to achieve a more efficient layout, which facilitates the communication and management of breakdowns and incidents.

Developments, improvements and projects. Metro

Key Improvement Targets for the Metro in 2016:

The year started with various work sessions and discussions in which, based on the course marked out in the previous year and on some initial strategic lines, work was done on reviewing them and coming up with a set of 6 lines that define the global framework for action designed to move the Metro team forward.

ASPIRATIONAL:
Leaders in quality, service, image and safety

COMMERCIAL

1. Increase customer knowledge and their mobility patterns
2. Develop actions to attract new customers, particularly through widening the range of value-added services

EFFICIENCY

3. Development of efficiency improvement policy evaluated by OEE
4. Develop the organisational model

MOTIVATION

5. Development of people and the organization in an effective communication environment

PRODUCT

6. Design solutions to adapt supply to demand

This strategic review led to working on 4 major lines of progress: commercial, efficiency, motivation and product. The defined objectives are those listed below:

Based on these premises, work began at the heart of the metro network on implementing a new project development methodology, known as Key Improvement Targets.

The targets selected for 2016 were chosen in agreement with the entire Metro team.

Multidisciplinary, autonomous groups were created to work on defining and implementing measures to bring about effective improvements. The new targets worked on throughout the year were:

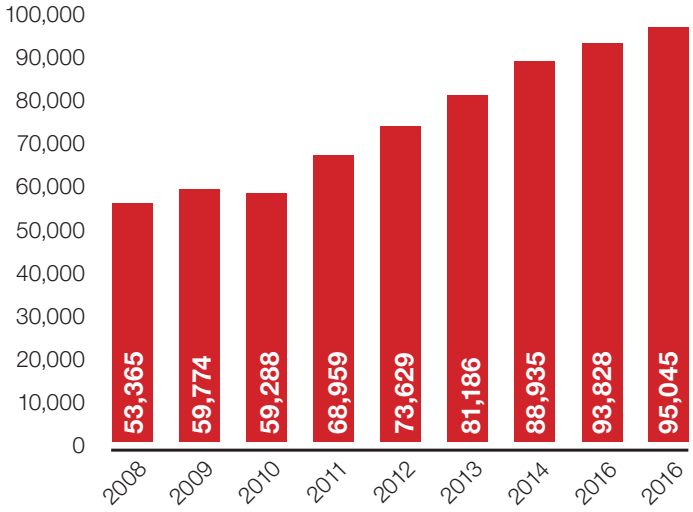
1. Improving the efficiency of Maintenance and Operations.
2. Reducing absenteeism.
3. Encouraging self-protection.
4. Commitment to Safety (Prevention of occupational risks, procedures, railway security).
5. Darwin Project.
6. Review of planning process.
7. Maintenance 2020.
8. Line 9 section Sud.
9. Adapting service to demand.
10. Metro Labour Agreement.
11. Analysis, design and implementation of processes in the Personnel Department.
12. New circulation rules.

Metro operational reliability

The average number of kilometres travelled without a breakdown is the indicator that measures the operational reliability of the train fleet. Once again, in 2016, the figure was better than the previous year's, achieving a new maximum level in a run of 10 years. Specifically, the average number of km covered without a breakdown in the last financial year was 95,045 Vehicle-km, representing a growth of 1.3% compared to the previous year.

This positive outcome is the result of measures aimed at improving the organisational processes of maintenance tasks.

Fleet reliability (Vehicle-km without breakdowns)



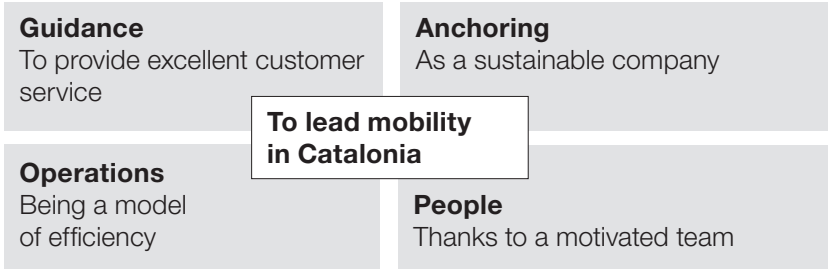
Energy consumption for traction

The electrical power consumed by the train fleet in service in 2016 (excluding L9 Nord/L10 and L9 Sud) was 160.11 million kWh, a reduction of 10.77 million kWh compared to the previous year. This drop is due to the decline in service provision of total Vehicle-km covered on conventional lines and L11 (-7.8%), as previously mentioned.

On the other hand, average consumption was 227.62 kWh per 100 Vehicle-km covered in total as opposed to 224.06 kWh the year before; this increase of 1.6% is explained by a greater percentage drop in total Vehicle-km (-7.8%) compared to the drop in traction energy consumption (-6.3%) on these lines.

Key Improvement Targets for the Metro in 2016

The year started with various work sessions and discussions in which, based on the course marked out in 2015 some initial strategic lines, work was done on reviewing them, thereby obtaining 6 lines that define the global framework for action designed to move the Metro team forward.



Improving the efficiency of maintenance and operations

The aim is to develop a global indicator which brings together all the different indicators used to measure efficiency (to replicate the kind of index known as *Overall Equipment Efficiency(OEE)*), and to continue monitoring measures aimed at improving efficiency in line with those contained in the efficiency plan defined in 2015. With regard to the index, work has been undertaken to incorporate new sub-indicators, with exhaustive documentation on their definition and formulation to make it possible to automate their calculation and visualisation. Cost information has also been incorporated to give an idea of the two sides of the efficiency balance (results and cost).

The seven families of indicators that were finally identified are as follows:
1. Stations, 2. Train circulation, 3. Customer service and information, 4. Security and civil protection, 5. Intervention (fighting against fraud), 6. Planning systems and 7. Energy consumption.

1. Classification of stations:

This project established to prioritise the importance of each station according to different criteria (ticket validations, sales, exchanges, tourism, connections, etc.) by time and type of day. The result of this task applies to a number of procedures: cover on behalf of station staff, the prioritisation of work orders, commercial aspects, etc.

2. Project Venus

A procedure has been established to improve the handling of incidents with automatic ticket machines in the physical absence of an employee in the station affected; the new procedure makes it easier for the customer affected to be attended to at another station on their journey.

1. Energy efficiency

The following tasks have been developed in this field:

—Allocation of the project to reconfigure the velocity curves in the ATO system on L1 and L3. This is predicted to provide traction consumption savings on these two lines and it will be implemented in 2017.

—Allocation of two braking energy recovery groups currently in the manufacturing phase: one will be installed at the sub-station of Verdaguer on L4 and the other at the sub-station of Canyelles on L3.

—Tender for the project to renovate and reinforce the lighting at the Santa Eulàlia, Sant Genís, Roquetes and Vilapicina workshops, where LED technology and light regulation will be employed to take advantage of the contribution of sunlight.

—Implementation of a pilot scheme for LED lighting on the platforms at the stations of: Clot, Navas, Sant Antoni, Urgell and Rocafort.

—Installation of five electric vehicle recharging points for the new 100% electric vans: Three points at the Can Boixeres base and two at the Santa Eulàlia base.

—Drawing up the project to supply electricity to the first ultra-rapid electric bus charger using the Metro's electric network.

—Remote monitoring of disaggregated consumption by trains on one train per new series (S-5000, S-6000 and S-9000) and line, and on one of the S-3000s (old series) fitted with sensors in advance.

—Definition of the energy efficiency indicators for the Metro network, traction and stations.

—Identification of the main savings opportunities involving either no or minimal investment.

—Analysis of the features to incorporate into the Traffic Regulation System so that energy efficiency aspects can be included.

—Methodology to measure the savings achieved by energy recovery equipment.

—Road Map for obtaining ISO 50001 for the Metro, following the methodology applied to Transports de Barcelona, SA.
—Performing an energy audit on the Metro, in accordance with Royal Decree 56/2016.
—The substitution of intensity transformers was finalised as a fiscal measure, allowing the power contracted on invoices to be adjusted with the consequent reduction in billing for this item.

2. Project for positioning people

Work has been done within maintenance on the positioning of the figure of track maintenance staff (doing away with the need for them to work in pairs). The action taken was to position some Active Track tags at each end of each platform where the track maintenance worker is close to a terminal/telephone. This new system incorporates some additional safety measures, such as detecting falls.

As part of the operation, work was done on the positioning of operational personnel in train depots (for each train there is a card that needs to be matched up with a mobile device to locate the train in the appropriate depot). Both cases incorporate the possibility to make an emergency call.

3. Mobility project

The goal is to reduce the time that passes between detecting an incident and solving it. The prototype for customer service agents has been defined that will allow them to move around the entire station to inspect items and equipment and also to check, by means of a mobile device, if an incident has been reported in SAP should any item require it. The device has to allow maintenance staff not to be obliged to go back to their maintenance base to be able to close incidents in SAP. At the moment prototypes have been developed by the Technology Department for checking and closing incidents; in the case of operations they are already in a position to start trial and for maintenance, they will complete its development once the type of device suitable for each group and profile is determined.

Information content for customers is also being developed (for example, service notifications from operation technicians on automatic lines –TOLA-).

4. Project to automate the opening and closing of station gates remotely

During the last quarter of 2016 work started with a view to installing security devices on the 49 gates that are currently motorised and incorporating them into the Remote Control of Stations (CCIF), a preliminary step to them being automatically controlled from the Metro Control Centre (CMM) Additionally, the drafting of a project has been commissioned for replacing 51 further gates, currently opened manually, with gates that are motorised and remote controlled, with work scheduled to start in 2017.

With regard to index values, these experienced a slight decline in 2016 compared to the previous year due mainly to the social conflict that persisted throughout the year. The following action plan has been established to improve this result:

—Circulation: An analysis of delays was undertaken and proposals made to increase training as there is a lack of trainers.
—The integration of the speed setting system (WATO) with the interval regulation system (RDT) has been disconnected on L1 .
—Intercom response time: the department to which this task falls (CDIU) will be restructured .
—Number of incidents involving uncivil behaviour and percentage solved: work will be done on analysing the distribution of security resources to improve these results.
—Number of fraud inspections per hour: this indicator will be changed in the OEE efficiency index to reflect the number of sanctions per inspection, which is more indicative of the efficiency of the process in that the current indicator penalises the inspectors' travelling time when tackling cases of fraud.

3. Reducing absenteeism

The numerical objective was to achieve a maximum of 8% for the index of absenteeism due to temporary incapacity, illness or accident. The measures taken were encapsulated under three broad areas: Internal procedures, indicators (culture), and communication and motivation. The following actions were taken:

—A procedural guideline was drawn up to manage temporary incapacity with details of the possible measures to apply in cases where fraudulent absenteeism is suspected.
—Following the policy adopted in 2015, monthly absenteeism figures are distributed detailed by department and work has been carried out on a new grouping system that should come into effect in January 2017.
—The corporate absenteeism index has been made more available, with the provision of information on the current month based on weekly uploads, with more flexibility of access and detailed knowledge of all the reasons and their aggregate value in terms of working days.
—Work was done on the automatic extraction of the Bradford indicator (which seeks to identify the number of episodes and total number of days off work) and automating queries that extract cases of employees that would comply with article 52 of the Workers' Statute.
—The communication model was established (by letter) that employees receive in which they are advised of the information data relating to their personal absenteeism record (sent by Personnel Management and Administration department).

—Monthly meetings have been officially approved between the Maintenance Department and the Medical Health Unit to monitor absenteeism.
—Work is under way to design three new publications on absentee figures, appropriate to the area of work, to raise employee awareness.

Finally, despite all of the measures carried out in this field, this year's objective was not achieved because the absentee figures were directly affected by the labour dispute that started at the beginning of February.

4. Fostering self-protection

The aim is to provide individuals with the best possible conflict management tools to give them more confidence in their professional dealings with customers. The most important element of this project is containing and reducing the number of attacks, particularly those considered to be avoidable. To achieve this, the target for 2016 was set at no more than nine attacks considered as avoidable per year on metro workers throughout 2016 (an average of 0.75 attacks per month). The success rate was satisfactory, with a total of seven attacks, compared to the nine attacks considered as avoidable recorded in 2015.

This year an effort was made give priority to improving communication, especially from the point of view of transparency in terms of procedures and organisation. Once the results in this field are consolidated, it is necessary to improve aspects of training. Therefore, work was done on a procedure to deal with the analysis and integration of all the available information in respect of serious security incidents, with the aim of guaranteeing personalised treatment for the worker affected and applying the appropriate measures to avoid being exposed to the same risks. It is essential that the direct lines managers of those affected take part in this process, with the obligation to have the necessary information and the support of services such as Occupational Health, Risk Prevention in the Workplace and the Security and Civil Protection Unit (USPC).

Following the same line as the guide written to deal with incidents of vandalism, other guides have been produced about the official action to take when confronted with different common security situations in the Metro.

5. Commitment to Safety

There were three strands of work:

1. Prevention of Occupational Risks (POR)

The objective set was to reduce the accident rate index (frequency rate) by strictly following the measures compiled in the Annual Plan for Managing Accident Prevention.

—*Risk assessment activities:*
— Updating of risk assessments in the workplace through modifications in workplace conditions and work centres. Permanent review of each workplace registering any changes that take place. Risk assessment of the technical units of the network.
— Undertaking of Ergonomic Studies: Analysis of ergonomic working conditions of staff working in rolling stock workshops.Study of health conditions:
— Analysis of exposure to noise in the rolling stock workshops, exposure to noxious fumes and gases (auxiliary vehicles on the tracks), exposure to dust during track maintenance.
— Solitary and isolated work: Identification of exposed groups and proposal for preventive measures. Extend its implementation to track maintenance personnel (organisational and technological).

—*Training activities:*
— Monitoring of indicators for training units in prevention of occupational risks in the workplace: Indicators to demonstrate compliance and the scope of training.
— Updates to preventive resources: Putting preventative resource in place and appropriate updates in the scope of training.
— Review of the training model for occupational risk prevention: Training proposals for specific risks (operating machinery, working in confined spaces, working at heights, etc.).
— Definition of training in the prevention of occupational risks for new staff and those changing their place of work.

—*Emergency and self-protection plans:*
— Review and update of centres' plans: update of documentation, descriptive material and personnel forming part of emergency teams.Evacuation drills:
— Practical training of team members on the activation and implementation of emergency plans.
— Procedure for emergency plans - Head of emergencies: Adaptation of emergency equipment in the centres to comply with regulations, criteria for the coverage of the equipment and appointment of the person responsible for the plan.
— Special treatment for the centre at Can Boixeres where different units work alongside each other with different characteristics and schedules.

—*Work processes and instructions:*
— Drawing up of a procedure/set of instructions dealing with serious safety incidents affecting employees, with the aim of reducing the number of attacks on workers.
— Updating of the list of machinery (Royal Decrees 1215 and 1644). Maintenance of the inventory and start of periodic review cycle.
— Technical instructions for maintenance in the Maintenance and Projects Division (preventive and corrective). Definition of a model to include risks and the preventive measures to be taken when performing maintenance tasks.

— Standard signage guidelines for work centres: Implementation of the signage procedure in workshops, initiated at Can Zam.
— Monitoring of the implementation of the new model for certified safe drivers in Maintenance and Projects. Application of the new categories for certified safe drivers (external staff).
— Drafting of the procedure for monitoring the annual Plan for Accident Prevention Measures in the Operations Area, incorporating governing bodies and unit heads.

—*Business activity coordination:*
— Monitoring of activity with the technical assistance provider and coordination of health and safety while work is in progress, according to Royal Decrees 171 and 1627.
— Review/update of the model for contractor activity (TMB contractor): Compilation and identification of tasks carried out by FMB together with contractors, analysis of situations and determination of measures to be applied or changed in the contractual relationship.

—*Machinery and equipment certification:*
— Certification of machinery in accordance with Royal Decrees 1215 and 1644: Regular reviews of machines and equipment to ensure compliance with safety requirements.
— Ensuring that machines and similar equipment comply with Royal Decree 1644: Upgrading equipment manufactured internally and other equipment that does not have the required documentation.
— Annual certification of life-lines, harnesses, slings, anchor points: Regular reviews of auxiliary equipment for work at height, auxiliary equipment for lifting loads and personal protective equipment (PPE).

—*Prevention of accidents at work:*
— Health surveillance: Monitoring performance of scheduled health surveillance protocols.
— Logging of accidents: Monitoring of the “frequency rate” indicator and accident analysis.

—*Safety inspections in work centres:*
— Planned joint visits to work centres with accident prevention representatives and the Accident Prevention Service.

—*Monitoring and tracking the plan for accident prevention activities:* Holding various meetings with the different work areas to monitor prevention of occupational risk.

—*Audits of the accident prevention management system:*
— Internal audit of the accident prevention system in the work units (documentation check). Internal audit of the system for prevention of occupational risks in the presence of the risk management service contact person and representatives of the work unit

—*Health and Safety Committee:* Follow-up in group meetings of Metro representatives of the topics dealt with in the Health and Safety Committee .

At the same time, work was carried out in respect of investments destined to improve safety with respect to preventing occupational risk among other topics:
—Updating the fire protection system at the Santa Eulàlia workshop to solve the non-conformities that emerged from the fire drill carried out in October 2015.

—Installation of warning lights and acoustic alarms on the tracks of the Santa Eulàlia workshop to reinforce the alerts for trains entering and leaving.
—Updating the systems at the Zona Franca ZAL workshop such as the fire protection system, air-conditioning and sanitary hot water heaters.
—Installation of new fans on the platforms and temperature control probes at the 31 stations classified as especially at risk due to high temperatures.
—Renovation of the lighting in the car park of – c/Hondures to increase the levels of light in the loading and unloading areas of High Voltage Power Maintenance.
—Tender for the project to work on renovating and reinforcing the lighting at the workshops of Santa Eulàlia, Sant Genís, Roquetes and Vilapicina.
—Updating the safety area of the overhead power lines between the general L2 track and the Triangle workshop.
—Updating the compressor testing area with overhead power lines at the Sagrera workshop. The second phase of the renovation project is being planned according to the requirements of the staff.
—Renovation of of the ground wells at 31 stations to comply with the current regulation. This is work that started in previous years that will be carried on over the coming years.
—It was continued with renovating access to the ventilation shafts (without access to the tunnel) and the replacement of ventilation grilles. The overhead walkway above the tracks at Can Boixeres was completed and work was started on signposting and painting all of the workshops (following the criteria of risk prevention and railway safety).

2. Procedures

The main action taken during 2016 was to adapt the 11 current procedures in the field of maintenance to the new records management model in line with the proposal made by the company Altran. As a result of this review, 40 documents have been created broken down into 11 directives, 15 procedures and 14 technical instructions.
This task was undertaken with the aim of updating the information, providing coherence to the structure, improving the verification and approval cycle, improving job safety, standardising and training the target audience.

3. Railway Safety

Measures carried out within the framework of Railway Safety can be divided into three areas: human, technical and organisational.

—*The main activities regarding the human factor:*
— Update of the process for obtaining driving certification in the operational areas of conventional, automatic and train depot lines.
— Definition of the process for obtaining driving certification for operational control technicians on conventional lines.
— Update of the standard driving qualification framework.
— Establishment of the training model for downgraded driving (driving that is different from the established norm) according to the State Agency for Railway Safety.
— Audit of the centres for external training in collaboration with the Training Department.

— Safety *Criteria*: work has been done to establish criteria for the number of tests for drugs and alcohol that need to be carried out to give them statistical significance and to comply with the law. These criteria will be submitted to the Catalan Government for their approval.

— *Main activities regarding technical issues:*
— Implementation of the process of classifying whether changes to the FMB railway system are significant or not.
— Action Plans resulting from the audit of unique features.
— Technical study for a new support system ("Tren Stop") for FMB.
— Implementation of a regulation for the type of operation in the case of a downgraded version of the ATP system (with and without support system).
— Manual (catalogue) of track equipment relating to safety.
— Updating of the inspection and auditing processes of Railway Safety on FMB.
— Establishment of action plans for signposting in the workshops, following the observations made in their audit.
— Finalisation of the Safety Dossier in respect of the commissioning of sections I-II of L9-10 of the Metro.

—*Main activities regarding organisational issues:*
— Implementation of process for obtaining and distributing information from the black box of the train.
— Design of the process and test protocol for rolling stock after incidents with doors.
— Implementation of the guide for the Safety Management System regarding.
— Design of the process and protocol for service shut-downs due to work scheduled by FMB.
— Coordination protocol for FMB's railway safety activities with the railway authority (Directorate-General for Transport and Mobility - DGTM).
— In collaboration for the risk prevention department, design the process and protocol for train access and manoeuvres at depots.
— Design of the data extraction process for a safety event and the distribution of this information, in compliance with the Law on the Protection of Data.
— Design and implement an internal FMB "pilot"/"agent" procedure.

At the same time there was a monthly follow-up of the railway safety indicator that consists of a weighting of various indicators (authorised and non-authorised overtaking, avoidance of safety devices, damage to lines, etc. per total km covered). In 2016 the annual average obtained was 31.61, which means it grew by 1.07 points compared to the previous year.

The main investments made to improve safety with regard to signalling and telemonitoring at the Metro Control Centre were:
—Provide the technical link tunnel at L3/L4 track derailment devices.
—Implement the new signal functions at the station of La Pau L4.
—Ensure that the simultaneous movement of trains between the stations of Penitents and Vall d'Hebron is made incompatible with movements within the Sant Genís depot-workshop.
—Implementation of new functional conditions to establish automatic turnarounds for the return of trains to intermediate stations on L4.
—Introduction into service of piece of track equipment (double points) at Santa Eulàlia to improve the process of removing trains.

Security Measures

The Security Department, in close collaboration with the Security Forces responsible for maintaining public safety, (Organic Law 2/86 on security forces and bodies), are responsible for implementing dissuasive and reactive measures aimed at protecting people, goods and services with the objective of minimising the frequency and the impact of any criminal action, guaranteeing passengers the comfortable and civic use of the transport service, facilitating the work of the employees and preserving the physical integrity of facilities as well as controlling the access to premises. The tools that make this possible are provided by managing various security systems and the functional management of security teams contracted by FMB.

—Ratios of stations to monitor per security team:

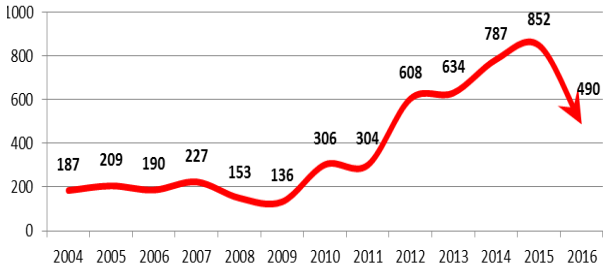
The increase in security resources introduced at the beginning of the year and that produced by the *Non Stop* service nights (June 2016), slightly improved the ratios at the start of the year on the morning and afternoon shifts, with a significant drop on the *Non Stop* night shift services, ending the year with ratios on those nights below 2.6 stations to cover by each security team. These indicators incorporate the increase in resources corresponding to the increase in the number of stations due to the opening of Line 9 Sud in February.

	2010	2011	2012	2013	2014	2016	2016 Dec-16
Morning - Afternoon	1.94	2.03	2.43	2.76	2.82	2.82	2.67
Night Sun-Thu	4.81	4.67	5.88	9.4	10.07	10.07	6.24	6.2
Night Fri	4.48	4.67	4.7	5.88	5.88	5.88	4.46	4.43
Non-Stop	2.5	2.22	2.52	3.71	4.03	4.03	3.39	2.58

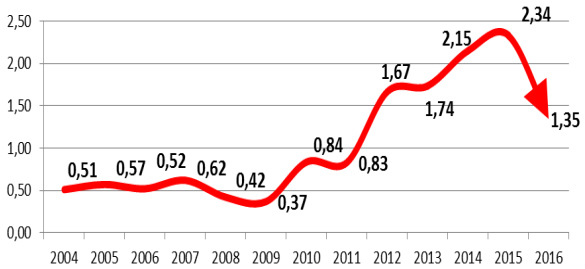
—Graffiti:

The fact that security teams contracted at the end of 2015 to watch over workshops and train depots continued into 2016, the rapid response of the Station Maintenance Unit in carrying out repair work and the improvement in recovering data from on site video surveillance cameras as vandals are preparing to act have all allowed a reduction in the total amount of mural graffiti this year. Nevertheless, the number of incidents resulting in graffiti remains above one per day, increasing towards the end of the year as a consequence of the way in which this serious problem constantly adapts and evolves.

No. incidents of train vandalism 2014-2016



No. of daily incidents of vandalism on trains



—Cooperation with security forces:

The state of international alert as a result of terrorist actions occurring in a variety of European cities has led to the increase in police presence, not only on the public highway but also in the stations of the different railway operators and on other means of transport.

Actions aimed at raising the awareness of this situation among all groups and personnel involved in working on the Metro have been carried out by the Security and Civil Protection Unit. There is continuous collaboration in undertaking specific security operations and police force initiatives in Metro facilities working together with the Mossos d'Esquadra and the Guàrdia Urbana police forces of Barcelona. This collaboration was evident with the presence of uniformed police officers as part of Operation Network, training and coordination with the Mossos d'Esquadra's TEDAX group (explosive device deactivation technicians) dealing with the realities of our railway system, as well as police presence from a variety of Mossos d'Esquadra units to research information about crimes committed on the Metro.

—Security incidents:

In 2016 there was a drop of 14.09% in the total number of security incidents, mainly in those related to theft (a drop of 37.68%), with a decrease of 38.82% in the reporting of pickpockets. With regard to the handing in of objects, there was a 13.68% increase over the previous year.

	2012	2013	2014	2016	2016
Security incidents:	48,054	43,326	47,118	52,537	45,134

Police activity in 2016, together with the issuing of restraining orders served on perpetrators of crimes, represent some of the most important factors in this decrease. Even so, the problem of the presence of pickpockets both on the streets and in the Metro requires further cross-cutting measures to guarantee a more effective and stable reduction.

With the incorporation of Line 9 Sud, in terms of both stations and trains, the total stock of video surveillance cameras increased to over 8,000 units.

Regarding compliance with the "General Conditions and Rules of the use of the Ferrocarril Metropolità de Barcelona S.A" (DOGC no. 5,770 dated 7.12.2010), the security guards contracted lodged a total of 6,475 administrative reports, an increase of 11.79% over the previous year.

—Civil Protection:

The Civil Defence Department of the Metro continued to promote the prevention, detection and proper management of risk situations by internal employees and external associates. This year, work has been done on the latest proposals for improvements as indicated by the Directorate-General for Civil Protection with regard to updating the Self-Protection Plan (including the new stations on L9 Sud), which is expected to be delivered during the first quarter of 2017 for approval by the end of the year.

The Self-Protection Plan for automatic lines has also been updated to include the new L9 stations. It is scheduled to be presented during the first quarter of 2017.

A coordination and communication simulation was carried out on how to act in the event of a chemical alert affecting stations in Zona Franca (Mercabarna station), taking advantage of the opportunity to test the chemical alarms installed by CECAT (Operations Coordination Centre of Catalonia). There was also participation in a communications simulation with AENA to analyse the the performance and coordination between AENA control centres and the Security and Civil Protection Centre of the Metro.

—Intervention Activities:

With regard to the evolution of fraud and its associated indicators (efficiency, productivity, hours of intervention and takings), it should be mentioned that throughout the financial year the working dynamics of the Intervention Department have changed, which has had a direct impact on data relating to fraud. The previous model implied a more dissuasive system of working, with the goal of convincing customers to change their approach to the subject of fraud. The current model combines both the dissuasive aspect, although to a lesser extent, with punitive action, attacking the points in the network where the highest index of fraud is detected.

The punitive approach is implemented through a programme of ordinary interventions, taking action on the black spots where most fraud and uncivil antisocial behaviour is detected. To this end, a study was done to classify stations according to number of ticket validations, volumes of fraud and the index of unrest, making it possible to adjust operational systems to cover this requirement. This way of working has allowed the amount of additional revenue to be increased, notably improving its efficiency.

Darwin Project

The work undertaken throughout the year as part of the Darwin Project meant carrying out 21 activities that can be grouped into four main lines of action:

1) Provide the middle management level with an effective leadership role over their teams.

2) Define, plan and implement technical and competency improvement plans for management.

3) Design initiatives to increase managers commitment to and connection with development policies directed towards proximity management.

4) Define indicators that can objectivise the impact of Darwin actions introduced in 2015 and 2016.

As part of the first line of action:
—An analysis was done on the functional content of responsibilities between the different management positions in order to determine their areas of competence. An analysis was also made of “pseudo-administrative” tasks of managers in the Maintenance and Projects Department to enable workloads to be determined, processes to be optimised and to facilitate genuine proximity management.
—The criteria and procedures for minor punishments, rewards and permissions were reviewed as well as continuing training for managers on these subjects.
—It is recognised that communication is one of the essential tools for proximity management, organisational transformation and improving the working environment, and for this reason the most appropriate content and channels have been identified in order to apply proximity policies. A model for standard meetings has also been defined to encourage their rationalisation.
—Work was done to define a model that reinforces managers as the “natural and main interlocutors” between their colleagues and the rest of the support units.
—Lastly, a model was put forward to optimise the “overlap” time of partially retired employees (currently or in 2017) with the future new occupants of their positions to encourage the transfer of knowledge.

As part of the line of technical development and competences:
—Training initiatives were begun in the field of competences such as: communication, managing resources and decision-making, leadership and bringing on colleagues. This line of training and the implementation of the support plan for new managers will continue into 2017.
—To determine the target audience, the results of the annual appraisals of managers' performances were analysed, among other factors. Also, as part of this subject, the Darwin team reviewed the performance appraisal model, identifying functional and conceptual improvements.

As part of the performance line (commitment and connection), work was undertaken on:
—improvement of communication with management and reviewing, updating and putting forward concepts, principles and values to incorporate into TMB's future ethical code. And, lastly the design of a “management seminar”.

The last line of action consisted in identifying a series of activity indicators able to measure or estimate the impact that the implementation of Darwin initiatives might have on this group, including those introduced in 2015 as well as those in 2016.

Together with the Intervention Department, intensive work was done in the field of improving the working environment (encouraging teamwork, developing plans for internal communication and engaging in motivational activities). This department also became involved in the TMB Educa (TMB Educates) project, with the aim of conducting guided visits of the Metro network with school groups.

At the same time, a whole range of actions were carried out directly related to the people who make up the Metro team, among which were:

—*Legal field:*

In terms of the Metro's Labour Relations Counsel, 32 conciliation orders were received from the Centre for Mediation, Arbitration and Conciliation (CMAC) and 34 conciliation procedures were undertaken.

Fifty legal claims were received over the course of the year. In terms of legal counsel management, of the 25 cases tried this year, 8 (32%) were won but conversely, on 10 occasions (40%) the complaint was upheld. As of today, there are seven cases awaiting sentence.

There were 15 claims that were resolved out of court, 3 were settled in court and in another 12 cases the plaintiffs did not pursue the process. Of all of the trials held, five were collective conflicts.

—*Workplace inspections*
38 complaints were submitted to the Work Inspectorate and 25 cases were resolved. 36% of the rulings were in favour of the the company. In the other 64% of cases, the company was required to make an improvement or was subject to an administrative sanction.

–In the field of labour relations, a total of 92 disciplinary cases were processed as a result of transgressions committed in the workplace, ranging from minor offences (46), serious offences (29) and very serious offences (14), apart from 3 cases resolved through being dismissed.

31 meetings were held with the Works Committee (excluding meetings to negotiate the Labour Agreement) dealing with a total of 140 written submissions of which 61 came from the Works Committee and 79 from the various union groups.

–With regard to collective bargaining, work was carried out, among other tasks, on giving regular information to Workers' Representatives to monitor milestones on the L9 section and also on actions relating to the requirements of APDCAT (The Catalan Authority for Data Protection).

–A total of 78 requests for cover were made to the Metro Network as a result of partial retirements, the introduction into service of the L9 Sud section, cover for customer service agents and motorcycle instructors in the summer as well as a potential massive anti-fraud initiative. In the field of Administration and Personnel Management, a total of 1,136 contracts have been drawn up and processed. Of these, 746 were of a temporary nature, primarily to maintain customer service activity during that team's holiday period. Meanwhile, 80 relief contracts (mainly customer service and operational staff), and 55 partial retirement contracts were issued for Network Management employees. Lastly, 255 permanent contracts were issued (mainly, operational staff from different areas and converting temporary relief staff into being permanent). Also, with regard to partial retirement, the annual work percentage recuperation periods have been processed (in conjunction with the employees and their work areas) for 199 partial retirements associated with the business departments of the Metro.

–A total of 6,265 passes have been issued (for new entrants, regular re-entrants, new family passes and the reissue of defective or deteriorated passes).

–The annual distribution of clothing has been processed for 2,764 uniformed personnel (2,012 in Operations and 752 in Maintenance).

Over the course of the year, work continued to arrive at a universal training model for the Metro that guarantees the quality of training activities aimed at enabling and providing skills to people who have to fulfil tasks and functions in the operational areas of FMB. In pursuance of this and on a monthly basis, monitoring was carried out on the degree of compliance with the Metro Network's Training Plan based on three indicators (number of training activities, number of participants and number of teaching hours).

— With regard to employee training activities ascribed to Metro Network Management, 262 courses were run attended by 12,590 people with a total of 65,720 teaching hours. Permission was given for a total of 11 individuals to receive authorised training in the areas of Operations, Maintenance and Projects.

— In the field of civil protection a total of 322 hours were devoted to training 1,331 people, 255 of them external and 1,106 internal staff. Training in the Self-Protection Plan was the most numerous with 110 hours and 702 students with a monthly average of 27 hours and 109 students.

— The Security Department programmed a total of 31 training sessions to give advice on self-protection, attended by a total of 252 employees.

— Once again this year, five training sessions were given on employment law, attended by management personnel from the areas of Operations, Maintenance and Projects.

Review of the participation process

The objective was to review the service planning processes in order to optimise the results obtained in its provision and to increase flexibility in the current environment to be able to adapt to new scenarios. The expected benefits of the actions carried out are the following:
—To make the planning process more flexible.
—To create new service offering scenarios.
—To achieve a means of simulating scenarios in order to anticipate potential problems in service coverage.
—To improving current planning processes and establish output measurement indicators for each of them.
—To create dynamic contexts for establishing the size of the workforce.
—To improve the management of operational indicators.

Four main lines of work were undertaken:

1. Creating the service offering

Definition of a new philosophy for creating timetables, with variable running times appropriate to the time of day. In this way the theoretical creation of timetables is adjusted to reflect observed reality. An analysis was carried out in 2016 that allowed this information to be updated and this means that the new timetables for Lines 1 and 5 in 2017 will use this methodology.

2. Aperiodic

Aperiodic refers to a process that usually happens once a year or when there is a significant change in the provision of services. The core staff request different things: services, holidays, sabbaticals, reduction in working hours and, once requested, according to the established criteria, such as length of service, the appropriate allocations are made.

One of the jobs undertaken was the process of aperiodic allocations, with the aim of improving it. Modifications were introduced to automate the most manual part of the process thereby improving its reliability and efficiency.

3. Workforce distributor

Work was done on a new tool for adjusting the distribution of the workforce according to the workload represented by the current number of trains and stations in the network, improving the efficiency of the services carried out by employees and their productivity. The extension of the contracts of 60 people during the period was based on the criteria and results if the workforce distributor.

4. Short term (CPLEX)

Project for the technological migration from the *Hastus* optimisation engine (tool for programming timetables) for a new IBM optimisation engine (CPLEX).

A document describing the project has been written, explaining the main features of the new optimisation engine (substantial improvement in execution times, four times faster than the current speed).

Throughout the year, all of the necessary trials were carried out with different key users of the process (line planners and zone managers). It will be put into service on L5 in January 2017 according to the agreed plan and will spread to the rest of the network during the second and third quarters of the year.

Maintenance 2020

The objective was to identify the best method of maintaining the Metro and the steps needed to get there by 2020 through the successful achievement of the goals set:

— A significant increase in demand.

— Maintaining quality indicators despite having premises that have aged over recent years due to constrained investment.

— Efficiency and cost control.
With the definition of new lines of action and consequent associated actions, the scope and objective of work was specified as follows:

— *Benchmarking* (find out how other organisations do it):
  — Seven previous studies dealing with organisation and maintenance were analysed: on the Barcelona Metro (two), on the Madrid Metro (two), on RATP, UITP and various industries.
  — Based on information already known about various operators through existing relationships and a review of a number of organigrams, a questionnaire was generated of the most relevant points to explore in more depth and two work sessions were held: one with the Hamburg Metro and another with the Madrid Metro.

— The requirements for the field of maintenance in 2020 were analysed by Operations:

— The classification of stations was updated according to various influencing factors and by type and time of day. Maintenance requirements were defined.

— Twelve activities were identified (to be carried by operations staff) for first level diagnosis and corrective action in 10 different facilities. Sixteen improvements were identified to implement in the management and closure of SAP notifications, to improve efficiency.

— The management process was laid out for dealing with incidents communicated through *Twitter*.

— A description was produced of the high level functional requirements of the tool that enables the control and logging of work being carried out in a station to respond to current needs.

— The advisability of having technical specialists available at the various premises of the Metro Control Centre was analysed. A SWOT analysis was made of the Madrid Metro's COMITT model.

1. Current imperfections, identification and resolution:
— A total of 24 common improvement points were identified and prioritised (with a proposal for 15 action points) for the majority of units within the Area, mainly in technical and economic areas.
— Legal issues were studied in the field of activity coordination. Jobs were identified, both for projects as well as maintenance across all areas, where FMB could be considered as the main contractor. Resolution scenarios were produced for each case.

2. Zoning:
An study was made of the best geographical distribution of maintenance resources, analysing the activities of teams that usually work together and making proposals for improvements, as well as putting forward a proposal for where to locate new maintenance bases.

3. Tools and processes:
Work was carried out in the fields of telemaintenance in terms of the state of signalling installations, the particularisation of maintenance (which allows maintenance for each installation to be adjusted according to its use, age, etc.), mechanisation and processes.

4. Legal matters and regulations that need to be taken into account in the new design of the organisation and the approach to maintenance.

5. Subcontracting policy:
The subcontracting policy was defined with the aim of retaining the maximum possible amount of knowledge about facilities and equipment not used in other sectors or that are subject to very little standardisation or interchangeability in the marketplace, or else with a very long life cycle.

6. People:
An analysis was done on people management, with suggestions for improvements in line with TMB values and the ISO quality process in order to get to 2020 in an ideal situation.

7. Organisational model:
A proposal was made for the organisation of maintenance in 2020 and a schedule of actions to take to get there. A SWOT analysis was done (strengths, weaknesses, opportunities and threats) on the current organigram.

Line 9 Sud section

Following a trial period, the new southern section of Line 9 was opened on 12 February, linking the Airport Terminal 1 and Zona Universitària stations, with 15 stations over a distance of 19.7 km

As part of the M8 improvement objective (L9 Sud) work was undertaken on 21 actions covering the following areas:
— Management of pending projects.
— Consolidation of Operations on L9 Sud.
— Consolidation of Maintenance on the line.
— Preparation for the introduction into service of the L10 Sud section.

The undertaking of the following defined actions should be noted:
— Pending projects on L9: Compilation of all the pending actions to be taken on L9 Nord-L9 Sud and L10. Road map agreed with Infraestructures Ferroviàries de Catalunya (Railway Infrastructures of Catalonia), identifying actions, responsibilities, dates etc. to resolve them. Among others: the debugging of station and circulation remote control systems, actions pending on the functionality of tunnel sector gates, those pending on engineering work at the ZAL workshop and others.
— Review of service provision on Line 9 Sud (types of service, interval, service timetable, etc.).
— Measures to consolidate the operational model of automatic lines (training, work organisation, etc).
— Definition of limits with regard to the maintenance of Sections 1-2 (TMB, Ifercat, Concessionaires and others).
— New indicator of the average time taken to solve incidents on automatic lines (define, identify the time involved, actions to implement a solution, etc.).

—Production of a road map towards introducing the future Line 10 into service.

In order to take the next steps, the required studies were initiated in 2016 to begin preparing for the introduction into service of the southern section of L10 planned for the first half of 2018.
The work was based on a number of hypotheses because accurate data on this section are not yet confirmed and all of the documentation produced will need to be updated as accurate information on the line to be opened becomes available. Several service alternatives have been drafted taking into account potential limitations of the infrastructure, the number of stations that will be opened and the number of trains available at the time. An evaluation was also made of the resources required to operate the line.

With regard to the central section of L9/10, albeit in a very preliminary way, there is already talk of its possible progressive introduction into service from 2021 onwards, based on the hypothesis of a completely finished tunnel that will connect L9/L10 Sud and L9/10 Nord and the opening of a minimum number of stations (hypothetically three or four stations) to guarantee a minimum level of operating conditions.

Adapting service provision to demand.

A solution to the level of congestion on non-automatic lines was put forward as an essential objective, drawing up a series of medium- to long-term measures that enable the available capacity to be assigned to empirically measured patterns of demand in the most effective way.

The second objective defined consisted in improving the operational management of mass events, unifying a set of best practices across the whole network during the life cycle of such events, thereby covering preparation, decision-making during the event and post-event analysis.

To be able to give a concrete response to these two objectives, the working team broke the activity into five different lines of action:

1. Defining the type of demand.
2. Defining capacity assignment processes: Identifying limitations.
3. Measures to implement in the short-term to adapt service to demand.
4. Developing short- to long-term scenarios to adapt service to demand.
5. Strengthening the operational management of mass events.

1. Definition of the demand

The team felt it necessary to start the analysis with an objective review of the premises on which assigning services had been based in previous years. As a result of this first exercise it was clear that, essentially, decisions were based on counting ticket validations and the surveys that TMB carry out periodically. This model, albeit quite robust, has some weaknesses, especially when it comes to identifying transfers between lines, and therefore the effect on the network, due to the fact that the Metro system does not have barriers at its exits.

To get over these limitations, the team suggested integrating the preliminary results from measuring loads transported that came out of a pilot test initiated in the autumn of 2015. This consisted of equipping two trains on each of the conventional lines with devices that were able to transmit the load of each carriage of the train in real time (at the departure from each station). Based on this decision, they defined the following points for development:
— Application of improvements in characterising on-board demand.
— Definition of the results required from the demand characterisation process to be able to adapt it to the provision of service.
— Future scenarios for characterising demand (stations, origin, flows, origin-destination).

These resulted in the definition of a new indicator to measure the supply-demand adjustment, that provides a standardised measure and allows the assignment of capacity between different lines to be compared, which is not affected by the limitations presented by ticket validations. On the other hand, it is an indicator that provides an objective measure of the comfort parameter directly perceived by the customer, also making it very valuable in operational terms.

Based on the integration of all the data, a tool was developed that permits analysis of the level of occupation (density) at different levels of depth (network, line, track, day of the week, quarter of an hour, train, carriage), which has been crucial for producing reports that give an objective analysis of the saturation of L5 during the rush hour, congestion phenomena at the stations near the beach area on L4 and, overall, it has allowed different levels of saturation during peak and off-peak times to be compared on the rest of the lines.

Finally, forming part of the result of work undertaken in the area of "future scenarios...", other mechanisms for measuring demand were analysed, ordered according to operational reaction times, with consideration given, among many others, to innovations in the traceability of mobile devices presented at the Innotrans and SmartCity Expo trade fairs in 2016.

2. Defining capacity assignment processes: identifying limitations

The results produced were broken down into:
—Categorisation of limiting factors in the assignment of capacity to the Metro: Technology / Work Organisational / Infrastructure.
—Particularisation of the conditioning factors for assigning the provision of service for each line.

As a result of this study the theoretical maximum capacity was identified for each line which, beyond the number of trains, was conditioned by assessing energy distribution and workshop capacity. This exercise was performed for each and every line. It was stressed that the current regulation system (RDT) represents a significant limitation for implementing other service concepts that differ from the end to end carousel system and which enable service to be provided where more demand is concentrated.

3. Measures to implement in the short-term to adapt service supply to demand

Through having instant data on the occupation levels of trains, and having inventoried and defined the limits of the Metro system, it was possible to put forward a set of short- and long-term alternatives according to the investment and operational efforts involved. The two following results were put forward:
—Lessons learnt from the past implementations of measures to adapt supply to demand.
—Service provision alternatives to adapt supply to demand (proposals for each line).

Based on these options, two concrete proposals were put forward for the most congested lines i.e. Lines 5 and 1. On the central section of L5, on platform 2, during the morning rush hour, between the stations of Sagrera and Diagonal, during the last week of October, different service injection tests were carried out with two special trains, putting into service all available trains between 07:30 and 09:00. The result these tests showed a 14% reduction in carriage occupation and an improvement in waiting times for trains. In the case of L1, the circuit times were reviewed. These tests will run until February 2017.

4. Development of short- and long-term scenarios to adapt service provision to demand

To complement the short-term measures, the team put forward a set of short- and long-term proposals designed to have a greater impact on operational and/or investment requirements if they are to be carried out. The result has been broken down into a subset of proposals and analyses.

Alternative scenarios were also assessed with the preparation of a preliminary cost study for automating L1 in order to improve its service and to cope with a marked increase in demand, also bearing in mind the project to renew the fleet in the not-too-distant future. Similarly, new technologies were assessed to automate end-of-line turnrounds, for which a proof of concept test has been proposed for L5 using vertically closing platform doors.

One of the conclusions common to all of these proposals aimed at allocating capacity to where there is most demand concentrates on the importance of having a new system of service regulation and the

development of customer information systems that provide the flexibility implicit in all of these alternatives. Therefore, work was undertaken in parallel to define different functionalities that could provide a simulator for predicting how the service loop reacts in different situations, using video footage to analyse historical examples and adapting service regulation by having more then one loop available.

5. Strengthen the operational management of mass events

For this area of work, the team relied fully on staff directly involved in the management and coordination of mass events. Two lines of work were identified:
—Proposal for improvements in each phase of managing the operation over the life cycle of the event.
—Drawing up of a protocol for managing mass events.

A description was produced of the management and action systems for events, enabling an evaluation to be made of the human resources and and materials needed to provide a quality service when faced with the specific casuistry of mass events. This allows the required resources to be planned in an integrated and more balances way.

In respect of the next steps, a number of lines of work continue open, especially consolidating the new indicator for occupation levels, reinforced by the project to introduce equipment into all new series trains that will provide instant information on load factors. It will also be necessary to decide on medium-term measures and their viability after having compared the impact of the service needed against investment required.

Collective agreement

The FMB agreement was rejected by the employees on 23 September 2015. From October 2015 onwards there were 48 meetings at the negotiating table, out of which came the signed approval for nearly all of the procedures, with information on their progress being published instantly in Infometro.

On 7 July, a pre-agreement was signed on the subject of salary increases and ongoing recruitment.

On 14 October, faced with the refusal of the workers to accept any proposal, the management presented the workforce with the general conditions of the collective agreement which, in subsequent meetings with some of the trade union groups, were expanded on and defined, until getting to a proposal that included the majority of the aspects put forward by the workers' representatives platform.

In economic terms, the company made an effort to get as close as possible to the expectations of the union representatives.
Even so, from mid-September, they interrupted and paralysed negotiations on some of the issues put forward by the workforce that had nothing to do with the content of the agreement, resulting in there being no negotiation meetings between 6 and 24 October, and once again from 24 November to the end of 2016.

The main justifications put forward by the workforce concerned the announcement by the company in June that it would legally challenge the minimum level of services dictated by the Catalan Government to cover the strikes that took place between 17 and 22 June, as it

considered them insufficient to cope with demand. Finally, and in order to create a climate more favourable for negotiation, on 18 November the company withdrew its appeal to the High Court of Justice of Catalonia.

During the course of 2016, nine Workers' Assemblies were held. Over the year, the two parties were summoned 12 times to the Directorate-General for Labour Relations. The workforce called and carried out 15 strikes throughout 2016. These calls to strike came about as a result out of the negotiation process for the Collective Agreement, of which two affected total working hours and 13 were partial over different time slots.

The current situation is the result of the last Assembly of 29 November where a vote was taken that approved the suspension of negotiations on the agreement until the company withdrew proceedings resulting from the current conflict, and which ratified the development of the workers' platform.

Analysis, design and implementation of processes in the Personnel Department of the Metro

The objective of this project was to clarify, put into order and communicate all the activities carried out within the Personnel Department of the Metro, from the perspective of key, strategic processes and with the support of each of the departments involved in them.

Over the year, detailed work was carried out and finalised on the processes identified, establishing for each of them a matrix of responsibilities and sequence of actions in line with the concepts “plan – do – check – improve”. These processes for personnel management and administration were:

—That of “recruitment”, which gave rise to the drawing up of two specific procedures: “hiring” staff, and “contracting summer customer service agents”, in which the assigned representatives from the Operations Department participated in a hands on and noteworthy way.
—The process of “managing the budget of the workforce”, which resulted in a specific procedure in which the usual interlocutors from each of the business areas took part.
—And in the “activity preparation” process, with an instruction regarding the generation of timetable regulations.

Advances were also made in the process and procedures relating to “data maintenance” and to the “management of staff benefits and also the analysis of the main processes in the Labour Relations/Legal Counsel and Personnel Development departments”.
Looking to 2017, one of the challenges is to continue with the analysis and development of all these processes and to establish tracking indicators that facilitate the measurement of activity and the incorporation of improvement factors, also taking into account the perspective of our customers and internal suppliers.

New circulation rules

The the new circulation rules project was begun during the year. The methodology used was for a number of micro working groups to draft the regulation in sections, with the involvement of specialists from the subject areas. Once the different sections were written, they were reviewed by members of the other groups involved in the project. Apart from the work of writing and revising, a total of 10 meetings were held for the groups to monitor and update each other on the state of the project, the last of which was in December, at which the process of revision and integration of the various sections was agreed to be complete.

At the start of January 2017 a meeting will be held with legal counsel to integrate the necessary legal contributions and amendments, a process that needs to be completed between January and February in order for the resulting regulation to be handed over to the departmental committees so that those responsible can review it (a process that will be carried out over April and May). Following this last review, procedures will be instigated with the Directorate-General of Transport and Mobility (DGTM) for its formal approval and the training strategy will be set out, that will begin in the following months of 2017.

Other actions

—Measures to improve accessibility

Over the year the stations of Poblenou (L4), Collblanc (L5) and Zona Universitària (L3) were adapted for PRM, the two latter ones as part of the actions for putting L9 Sud into service. The opening of the southern section of L9 required the incorporation of 15 new adapted stations meaning that the percentage of the network's adapted stations rose to 91%.

In addition, the following interchange stations are in the project phase: Plaça de Sants (L1/L5), Espanya (L1/L3), Urquinaona (L1/L4), Maragall (L4/L5) and Verdaguer (L4/L5) as well as the stations of: Clot (L1), Vallcarca (L3), Jaume I (L4) and Ciutadella – Vila Olímpica (L4).

Adaptation for PRM in 2016 is summarised in the following table:

Service provision 2016
Situation regarding adaptation for People with Reduced Mobility (PRM)

	L1	L2	L3	L4	L5	L9 Nord / L10	L9 Sud (*)	L11	
Total number of stations of the line	**30**	**18**	**26**	**22**	**26**	**12**	**15**	**5**	**154**
Number of adapted stations	26	18	24	17	23	12	15	5	**140**
Number of stations in the works phase									
Number of stations in project drafting phase	4		2	5	3				**14**

- Throughout 2016:
  - The Poble Nou L4 station was adapted in April.
  - The L9South section was opened on 12 February 2016 with 15 stations (Zona Universitària, Collblanc, Torrassa, <2>Can Tries/Gornal, Europa/Fira, Parc Logístic, Mercabarna, Les Moreres, El Prat Estació, Cèntric, Parc Nou, Mas Blau, Aeroport T2 and Aeroport T1). The following stations were also adapted during these works: Collblanc L5 and Zona Universitària L3.

- 91% of stations are adapted to PRM:
  - 140 stations adapted with lifts.
  - 14 stations in the project phase: Plaça de Sants (L1/L5), Espanya (L1/L3), Urquinaona (L1/L4), Clot (L1), Vallcarca (L3), Maragall (L4/L5), Verdaguer (L4/L5), Jaume I (L4) and Ciutadella - Vila Olímpica (L4).

—Actions to maintain the standard of infrastructure

With regard to stations and associated premises, the most relevant actions have been: the start of renovation work at the stations of Passeig de Gràcia (L3), Paral·lel (L2-L3), Besòs Mar (L4) and the platforms at Universitat and Fondo (L1). In addition, work has been started on legalising and remodelling part of the Santa Eulàlia building, and also enlarging the access to the Barceloneta station.
Other significant actions undertaken included: the application of the 5S methodology in the track stores at Can Boixeres, platform improvements at the stations of Barceloneta and Passeig de Gràcia (L4), and also the drawing up of an installation project for a train-wash tunnel at the end of the track 4 manoeuvre siding at the Hospital de Bellvitge terminus.

Action has been taken to prevent or delay the deterioration of functional and structural features of the infrastructure. Numerous repairs were carried out in stations, workshops, bridges and tunnels. Over the year, a total of 28 stations and 55 sections of tunnel were inspected. This represents the completion of the first round of inspections for stations, tunnels and bridges, that will be finished off next year with inspections of workshops and depots.

A whole series of of actions were carried out over the financial year to maintain track quality that went beyond the usual maintenance measures (renovation of points, installation of anti-vibration fastenings, renewal of sleepers) and actions were undertaken that resulted in service cuts:
—Renovation of the La Pau L4 end-of-line crossover with service cut over Easter.
—Renovation of 440 metres of the track on Line 11 with service cut over Easter.
—Renovation of 3,500 metres of track and a crossover to Line 2 with service cut during August.
—Substitution of fastenings at the crossover of Collblanc to L9 Sud, at the request of the DGTM, after complaints received about vibrations leading to changes to the weekend service.

—Actions taken in the field of maintenance and cleaning

The specifications calling for new tenders for cleaning services, which began in 2016, was based on using the Collective Agreement on Railway Contracts as its benchmark, requiring that the conditions of the agreement would have to be met progressively between 01/06/2017 and 01/01/2020.

From February, it included assuming the maintenance of all the sub-systems of cleaning and image arising from the opening of Line 9 Sud, with an annex to the contracts, as foreseen, of cleaning services for trains and associated premises, anti-vandalism maintenance, signal maintenance, anti-legionella maintenance, semi-armoured box maintenance and maintenance of the train-washing tunnel at the ZAL depot. Previously, all of the required actions and zeroing of all those subsystems was carried for the start of the service.

— Improvement plan for cleaning and image

The state of cleanliness of the facilities and trains of the network as well as the appearance of graffiti and other types of slight damage and small acts of vandalism are factors that erode customer confidence and need to be avoided as far as is possible. The objectives for cleaning were focussed on:

— Maintaining quality with a reduced service.
— Continuity in the cleaning management system.
— Drawing up of Master Plan for Production.

The quantitative and qualitative results provided for in the maintenance plan were also achieved in the section dealing with subcontracted train-wash tunnels on L2, L4 and L9, as well as compliance with the Preventative Maintenance Plan for cleaning, with 12,840 actions carried out in 2016.

A plan for improving the image of stations and trains was undertaken, starting in September 2016 and running until the end of the current contract in May 2017. It consists of:

— Expanding the Non Stop service on Saturday nights by two people. Reinforcing cleaning and resolving incidents.
— Machine scrubbing of station platforms. One cleaning machine per line.
— Thorough cleaning of stations: A team of two people per line to carry out specific cleaning jobs in spots where, due to leaks, dirt has accumulated.
— Mechanised cleaning of the steps of station escalators.
— Comprehensive cleaning of the interiors of all of the network's trains.

Improvements provided for in the Action Plan for Washing Installations, carried out in 2016:

— *Improvements to the wash tunnel at the Triangle Ferroviari depot:*
  — Structural renovation of the two wash modules that had many components in bad condition.
  — Replacement of various elements of the electrical installation and complete overhaul of the control and safety systems of the washing bridge.

— *Improvements in the wash tunnel at Roquetes.*
  — Replacement of various elements of the electrical installation and complete overhaul of the control and safety system of the washing bridge, improvements to the wash tunnel at ZAL and Can Zam (L9) (in both cases by introducing a system of backwashing that uses pumped treated water thus avoiding any possible contact between the treated water system and the network's water system).
  — Studies and action plans, coordinated with the Projects department, to make improvements to the washers at Can Boixeres, Sant Genís and Hospital de Bellvitge anticipated for implementation in 2017.

Improvements in the areas of image and signage for the public: graphic representation of signs for extinguishers and emergency exits, regulated definition of the characteristics of signs inside tunnels, improvement to buttons in lifts, implementation of signage in the new ZAL workshop and on L9 Sud.

In the field of anti-vandalism the main measures were centred on:
—Implementing the new continuous maintenance plan.
—Minimising the effect of the new service on qualitative results.
—Increased flexibility in the way teams act based on the new system of detecting incidents themselves, paving the way for new planning and schedules according to the level and type of incident.
—Maintaining the response time for emergencies, the cleaning of mural graffiti on walls and fixing video surveillance cameras and adjust the response time for non-urgent incidents.
—Continuous monitoring of the impact level of vandalism and establishing priorities to deal with it.
—Implementing an action plan to achieve the objectives set in terms of cycles, urgent requirements and general criteria for protection, materials and products to use.
—Implementing continuous assessment of the maintenance service based on quality control and monthly monitoring of the defined measurement parameters and indicators.

Over the year the amount of mural graffiti on trains reduced by 51% compared to the previous year and by 43% in the number of square metres cleaned. This has mainly been as a result of work carried out together with the Security Department aimed at implementing other dissuasive measures such as:

—Improving the technical aspect of security systems across all the installations.
—Review of the control of access to the centres most prone to vandalism.
—Continuous surveillance of the black spots, drawing up a map of the most affected areas of the network with the highest number of incidents, and carrying out specific security operations.
—Coordination with security forces in terms of prevention and action. Monitoring, assessment and reporting of damage.
—Resource support during the weekends to remove and clean mural graffiti from trains.

The main anti-vandalism measures carried out in 2016 were:

Cleaning graffiti:
—Cleaning was carried out on 1,230 of the Metro network's carriages with mural graffiti painted on the sides, cleaning over 36,092 m^2 of the trains' exteriors.
—Anti-graffiti maintenance teams removed over 4,188 *tags* from the interior of trains, cleaning a total of 8,928 m^2.
—At stations, 23,151 tags and small painted graffiti were removed, with 55,864 m^2 being cleaned.

Anti-scratching **maintenance and stainless steel wall coverings:**
—A total of 5,967 m^2 of vandal-proof laminate was replaced on train interiors.
—Maintenance teams replaced a total of 4,962 m^2 protective glass panels in stations. A total of 157 m^2 of stainless steel surfaces were cleaned, 227 m^2 of polished glass on trains and in stations and 120 m^2 of dirt stains were treated.

Collaboration with Transports de Barcelona for the electric bus

In the Development Plan for the electric bus network, the High Traction Energy Unit collaborated in the supply of power to the recharging points of the buses; specifically, a call for tenders is under way for the recharging point at UPC – Fòrum on the H6 route. The preliminary project for power supply to the Triangle Depot has been drafted.

A study will begin shortly for an Electric Supply Master Plan to establish requirements over the coming 5 to 10 years and the viability of the connection to the Metro network, bearing in mind the possibility of interconnecting with the 220 KV network of L9.

T-Mobilitat Project

Work continues on the T-Mobilitat project. This has been reformulated further to an agreement between administrations and operators. At the end of the year, work was continuing based on this new focus.

7 Environmental protection

Management of quality and the environment in TMB, TB and FMB

In 2016 the Quality Department continued to work on developing a quality management model whose main aim is to ensure processes are managed in accordance with the ISO 9001 standard, enabling the organisation to focus at all times on satisfying customer' needs in accordance with the
UNE 13816 model.

On a corporate level, internal and external audits were carried out on the following certified units: the Remote Support Centre (CST), the Punt TMB information and customer service centres and the Training Department. Training in quality was also given to employees in the Network Operations Divisions of Metro (customer service agents) and Bus (drivers), as well as all staff promoted internally to ISO/UNE certified units. New training manuals were produced to better reflect the current reality of TMB.

Work was also carried out with the units affected, in a cross-cutting and coordinated manner, to define the functionalities of a new corporate application that enables complaints, claims and suggestions (QRS) and non-conformities to be managed in a more efficient way. Linked to this definition of functionalities, appropriate training was carried out in certified units to explain the main changes introduced.

Quality in Transports de Barcelona

Work was carried out jointly by the Quality Department and the Bus Network Operations Department on standardising management models which focus on customer services and improvement, thereby achieving the 2016 objective of consolidating ISO 9001:2008 and UNE 13816:2003 certification for TB's Network Operations Department. A range of measures were taken to move towards this goal:

1. Preparation/revision of the TB Network Operations Division process map.
2. The redefinition and creation of new operational procedures (TB Network Operations Department).
3. The setting up of an indicator scorecard.
4. Definition of the methodology to monitor indicators, objectives and compliance with procedures.
5. Preparation of a draft of a TB List of Services.

At the same time, all of the support/advisory tasks relevant to maintaining current certifications was completed.

Environmental sustainability

1. Processing and maintenance of environmental permits and authorisations

This refers to all of the administrative and technical processes established by law that need submitting to the various environmental administrations (Metropolitan Area of Barcelona, City Council and the Catalan Government).

The Environment Department centralises the processing and maintenance for all TB work centres: Zona Franca Port complex and the four Business Operations Centres of Zona Franca 1, Ponent, Triangle Ferroviari and Horta.

The maintenance of TB records involves the initial processing and its regular renovation according to the following table:

Communication:	Material	Aimed at	Renovation period	Centres affected	Comments
Study to minimise waste products	Waste	Catalan Waste Agency	4 years	4	All those exceeding 10 t of waste per year
Preliminary Report on soil	Soil	Catalan Waste Agency	6 years	4	All centres that, according to RD 9/2005, are considered as engaged in Potentially Contaminating Activities (PCA)
Dumping Permit or Affidavit	Water	Activities regulated by the City Council	5 or 8 years	4	Every workshop that consumes more than 6000 m3 of water
Emissions log books	Emissions	Environmental Quality Management	**	4	All workshops focussed on emissions into the atmosphere

**When there are amendments

This year saw the presentation of waste minimisation studies and emissions log books from Horta and Zona Franca 1. The permits for dumping and the preliminary reports from Horta and Zona Franca 1 are currently being processed. Renewing the administrative processes for Ponent and Triangle is scheduled for 2017.

2. Environmental and Energy Management System in compliance with ISO14001/50001

Work continued in 2016 on the process of implementing the Environmental and Energy Management System into TB that will culminate with the certification of Horta and ZF1 in 2017 and of Ponent and Triangle in 2018.

As of January 2017, the current situation is as follows:
– The design of the Management System documentation is finalised: Manuals and environmental management procedures have been produced that define TMB's level of responsibilities.
– Assessment of environmental aspects of ZF1 and Horta finalised. Triangle and Ponent pending.
– Annual energy review completed at Horta and ZF1. Triangle and Ponent pending.
– Extraction and assessment of environmental legal requirements for ZF1 and Horta finalised. Triangle and Ponent pending.
– Action Plans established for adapting ZF1 and Horta to the regulation. Triangle and Ponent pending.
– Environmental indicators and objectives established for Horta and ZF1. Triangle and Ponent pending.
– Regular monitoring by the ZF1 and Horta Committee of the indicators, objectives and action plans. Triangle and Ponent pending.
– Training at ZF1 and Horta finalised in 2016. Triangle and Ponent pending (scheduled for 2018).
– Various work sessions, visits and audits undertaken at ZF1 and Horta to check the level of implementation (June-November 2016).
– Internal and external audit at ZF1 and Horta in April and June 2017. Triangle and Ponent in June 2018.

3. Optimisation of energy management at TB

On the subject of energy management by Transports de Barcelona, what stands out is how energy consumption evolved between 2010 and 2015 submitted to annual verification by an accredited environmental agency.

This year the TMB Energy Audit was presented in compliance with Royal Decree 56/2016, analysing more than 85% of TMB's energy consumption and putting forward proposals for improvement that the company will introduce over the coming years. The implementation of the Environmental and Energy Management System will help in the continuous improvement of the environmental aspect.

4. Selective collection and 'Punts Verds' (recycling storage facility)

There was a slight increase in the amount of waste generated by TMB in the period 2013 – 2015 (1.5%). On the other hand, the amount spent on waste treatment between 2013 and 2015 suffered a sharp increase (>200%). The amount of transport carried out between 2013 and 2015 fell by 3.5% and spending on transport plus waste treatment suffered a large increase (> 150%), rising from 105,578 euros in 2013 to 265,213 euros in 2015.

For TMB overall, the types of waste that generate most revenue are: metro tracks, metal, lead batteries, out-of-commission vehicles and aluminium. On the other hand, the types of waste that generate most transport and treatment costs are: liquid waste generated in the cleaning process of trains and buses and managed with a water tanker truck, waste from hydrocarbon separators and septic tanks (water used to clean graffiti, water containing hydrocarbons and water with dangerous substances), banal waste (not collected selectively – grey container-), cloths and absorbent fabrics, wood and liquid coolant.

By way of illustration, 2014 saw a reduction in expenditure on waste management that was 43.5% lower than in 2010, 45.42% lower than in 2011, 31.88% lower than in 2012 and 14.8% lower than in 2013.

5. Bus network emissions map

In 2014 an agreement was reached with the Directorate-General for Environmental Quality on the methodology for calculating emissions from the bus fleet and a guide to calculating PM and NOx emissions was published.
In the same year, maps of emissions were also completed for the European 3iBS project (*intelligent, innovative, integrated Bus Systems)*: maps of consumption and emissions scenarios for 2012, 2014 and 2017 to quantify the reduction in atmospheric emissions achieved with the incorporation of the new fleet and the configuration of the new network. The emissions maps allow us to visualise the contribution of the new fleet and the new bus network to improving air quality in the metropolitan area now and in the future:
– 2011-2014: 857 kg per day reduction in NOx emissions.
– 2011-2017: 1,091 kg per day reduction in NOx emissions

Currently the environmental programme for the Bus fleet is still in force and this should enable a reduction in atmospheric emissions from the surface network.

Work was carried out on establishing a programme of objectives for an energy management system in line with ISO 50001 at Horta and Zona Franca 1 as a pilot centre for reducing TB energy consumption and atmospheric emissions.

6. Implementation of environmental criteria in the purchasing of products and services

In 2016, to give impetus to the policy of Environmentally Responsible Purchasing, work was done to incorporate environmental criteria to procurement processes for products and services. Specifically, the following actions were taken:

– Environmental and/or energy criteria were defined for compulsory inclusion in specifications or orders along with the methodology for guaranteeing the criteria are applied.
– A process for the Environmental Control of Business Activities (AQUILES) was established to advise sub-contractors working at our facilities about the environmental requirements they have to comply with.
– Criteria were defined for assessing suppliers (PROTRANS).
– Work procedure P716 was produced on the design and purchase of TMB products and services according to established criteria.
– The technical instructions were written for introducing sustainability criteria into the contracting process using those established by the European Commission and Barcelona City Council.
– Procedure 360 of the Contracting Committee was revised to comply with the criteria laid down.
– On November 21 the executive board approved Procedure P716, which gathers together the criteria established for environmental criteria, environmental control of business activities (CAAE) and assessing suppliers.

7. Table of indicators on TMB's environmental behaviour in line with ISO 14001/EMAS

In 2016, work was undertaken on the construction and implementation of the TMB environmental balanced scorecard.

Its purpose is to provide the company with a tool that enables the different TMB management levels to:
– Monitor the environment and energy management system.
– Monitor objectives and action plans.
– Monitor the Sustainability Master Plan

Using the balanced scorecard it is possible to monitor TMB's environmental behaviour by means of the following indicators:

Indicator name	Indicator description
Energy consumption	Monthly energy consumption per km, per total passengers, per m^2
Emissions produced	Monthly CO_2, NOx and PM emissions produced per km, per total passengers, per m^2
Improvements in air quality / Emission savings produced	Savings in the emission of pollutants (NOx and PM) produced by transporting passengers
Environmentalisation of the fleet / Technology	Total no. of vehicles per technology (Euro I, II, III, Euro I-III with SCRT filters, IV, V, VEM, Hybrids, Electrical) by total number of vehicles
Environmentalisation of the fleet / Energy sources	Total no. of vehicles per fuel type or energy source (diesel, natural gas, hybrid diesel, hybrid CNG, electricity) by total number of vehicles
Generation of waste	Monthly total tonnes of waste generated by type and classification
Water consumption	Monthly total m^3 of water consumed (network and installations)
Consumption of materials	Monthly total in t, kg or UN of materials consumed (network and installations)

The milestones achieved over the last year with regard to the design, construction and implementation of the balanced scorecard were:
—Functional design of the environmental balanced scorecard for the TMB group to comply with the requisites of ISO 14001 and ISO 50001.
—Finalisation of the construction of the balanced scorecard.

—Implementation by Transports de Barcelona SA.

The objectives for 2017 in respect of improving the design, loading data and establishing procedures are the following:
—Presentation to management of the Bus network balanced scorecard.
—Design, construction and implementation of the executive summary of the balanced scorecard (monthly summary of situation across all indicators).
—Implementation of QC for the Metro: incorporate energy and water data for the Metro.
—Automate the input of data and eliminate manual input. Plan to monitor consumption in TB and Metro installations.
—Obtain reports expressed in €, € per km and € per ticket validation. Integration of SAP BO with the blauEnergy computer application.
—Review and authorisation of procedure P744: Establish responsibilities for the supply and ratification of data and those responsible for monitoring and analysing indicators.

Management of quality and the environment in TMB, TB and FMB

In 2016 the Quality Department continued to concentrate their work on developing a quality management model whose main aim is to ensure processes are managed in accordance with the ISO 9001 standard, enabling the organisation to focus at all times on customer needs in accordance with the UNE 13816 model, which is the one that determines TMB's corporate quality policy.

At corporate level, internal and external audits were carried out on the following certified units: the Remote Support Centre (CST), the Punt TMB information and customer service centres, Training Unit and the Unit for Managing Citizens' Complaints, Claims and Suggestions (QRS). Training in quality was also given to employees in the Network Operations Divisions of Metro (customer service agents) and Bus (drivers), as well as all staff promoted internally to ISO/UNE certified units. New training manuals were produced to better reflect the current reality of TMB.

Work was also carried out with the units affected, in a cross-cutting and coordinated manner, to define the functionalities of a new corporate application that enables complaints, claims and suggestions (QRS) and non-conformities to be managed in a more efficient way. Linked to this definition of functionalities, appropriate training was carried out in certified units to explain the main changes introduced.

—**Quality at FMB**

1. Maintenance and Projects Division (AMP):

The Quality Department together with the Maintenance and Projects Department, carried out the first follow-up of the ISO 9001 certification of the management model in the maintenance area.

Various measures were taken to help achieve this goal in 2016:
1. Internal audits by the Quality Department in every department of the Maintenance and Projects Division.
2. Completion of a certification audit by a company accredited by the *Spanish National Accreditation Body* (ENAC).
3. Resolution of non-conformities detected in audits.
4. Joint follow-up between the Quality and AMP units of every aspect related to keeping certification.

2. Metro Network Operations Division:

The Metro Network Operations Division (AOM), working closely with Metro management and representatives of the Management Committee carried out the second of the Metro Service Charter, as specified in the 93200 standard.

At the same time, work was completed on all the support and advisory tasks required by AOM with regard to maintaining the current certification (ISO 9001 and UNE 13816).

3. Personnel Department of the Metro:

In 2016, work started on defining the processes and associated documentation for each and every one of the activities carried out in the Personnel Department of the Metro: management and administration of personnel, staff development, labour relations and legal counsel.

This is a project planned to last two years which means that it will continue into 2017 with an internal audit scheduled for the end of 2017 based on the requirements defined in ISO 9001.
All of the work undertaken this year was done in a collective way and coordinated with departmental staff, as this project is planned to be a strategic objective of the Management of the Metro Network.

4. Metro Security Directorate:

Work began this year with the staff of the Security Directorate for the Metro Network, to define a management model based on the requirements of ISO 9001 with the ultimate goal of achieving certification in the future.

This is another project started in 2016 that is scheduled to finish in 2017.

There is a more detailed project based on defining processes and procedures related to railway security, civil protection and security, inspections and fraud.

—**Environmental sustainability.**

1. Processing and maintenance of environmental permits and authorisations

This is about all of the administrative and technical procedures established by law that need to be submitted to the various environmental administrations (Metropolitan Area of Barcelona, City Council and the Catalan Government).

The Environment Department centralises the processing and maintenance of permits and authorisations for all Metro work centres.

The maintenance of Metro records includes processing the initial application and securing periodic renewals as detailed in the following diagram:

With regard to processing the activity licences for the Metro's workshops: Can Boixeres, Santa Eulàlia, Sant Genís, Sagrera, Vilapicina, Roquetes and Triangle started the procedure for processing the licence once the activity had already started (in 2006). For these centres it was necessary to agree a programme of corrective measures with the fire brigade which involved an associated programme of investments and a timetable. Once each centre makes the corrections, they contact the Environmental Control Body (EAC) so that they can run an initial check and issue a report. A favourable report from the EAC generally leads to the securing of the definitive licence. The process began in 2006 and is finalised at: Vilapicina, Roquetes, Sagrera and Sant Genís.

Communication:	Material	Aimed at	Renovation period	Centres affected	Comments
Activities – licence or environmental communication	Activity	Activities regulated by the City Council	6 years	9	Affects the repair workshops
Study to minimise waste products	Waste	Catalan Waste Agency	4 years	11	All those exceeding 10 t of waste per year
Preliminary Report on soil	Soil	Catalan Waste Agency	6 years	10	All centres that, according to RD 9/2005, are considered as engaged in Potentially Contaminating Activities (PCA)
Dumping Permit or Affidavit	Water	Activities regulated by the City Council	5 or 8 years	11	Every workshop that consumes more than 6000 m3 of water
Emissions log books	Emissions	Environmental Quality Management	**	11	All workshops focussed on emissions into the atmosphere

Work is now being done on the executive projects for Can Boixeres and Santa Eulàlia. After that, the Triangle centre will be addressed, establishing an investment programme for the executive project and carrying out the work (the licence resolution was just received on 25/01/2017).

Meanwhile, every six years, based on the initial data provided for obtaining a license, periodic inspections are required. In July 2017 the periodic inspection of the environmental aspect of Sant Genís, Roquetes and Vilapicina is due as well as the initial environmental inspection at the ZAL. It was necessary to request an extension of the deadlines. In the case of the ZAL the process was started with the Infrastructures Department of the Catalan Government as they delivered the workshop to us with a licence. The part to do with fires is completed (with a favourable report) and what is missing is the initial inspection for the environmental part, which will also be done in July 2017. It cannot be processed until the activity has started.

In 2018 it will be necessary to do the periodic inspection of the environmental aspect at the Santa Eulàlia, Can Boixeres and Sagrera centres and the initial environmental inspection at the ZAL. In 2022 it will be necessary to do the periodic inspection at the Triangle centre. The receiving administration for this is the City Council.

With regard to Metro dumping permits, the files currently valid are those for Can Boixeres, Roquetes, Sagrera, Triangle de Metro, Vilapicina and the Metro Network. During 2017 the file on the ZAL will be submitted, the ones for Sant Genís and Santa Eulàlia will be renewed and those for Can Zam and Hospital de Bellvitge will be processed.

With regard to studies on minimising waste, the ones for Roquetes, Sant Genís, Triangle de Metro, Vilapicina and the ZAL have been submitted. In 2017, those for Can Boixeres, Can Zam, Sagrera and Santa Eulàlia will be submitted.

With regard to preliminary reports on the situation with soil, the anticipated schedule is: July 2017: Roquetes, Sant Genís, Vilapicina and the ZAL and in 2018: Can Boixeres, Santa Eulàlia, Can Zam, Hospital de Bellvitge, Sagrera and Triangle de Metro.

With regard to emissions log books, of the 12 files either pending or pending assessment, the anticipated schedule is: July 2017: Roquetes, Sant Genís, Vilapicina and the ZAL, and in 2018: Can Boixeres, Boixeres Guadalupe, Can ZAM, Hospital de Bellvitge, Mercat Nou, Santa Eulàlia, Sagrera and Triangle.

2. Processing and maintenance of environmental permits and authorisations

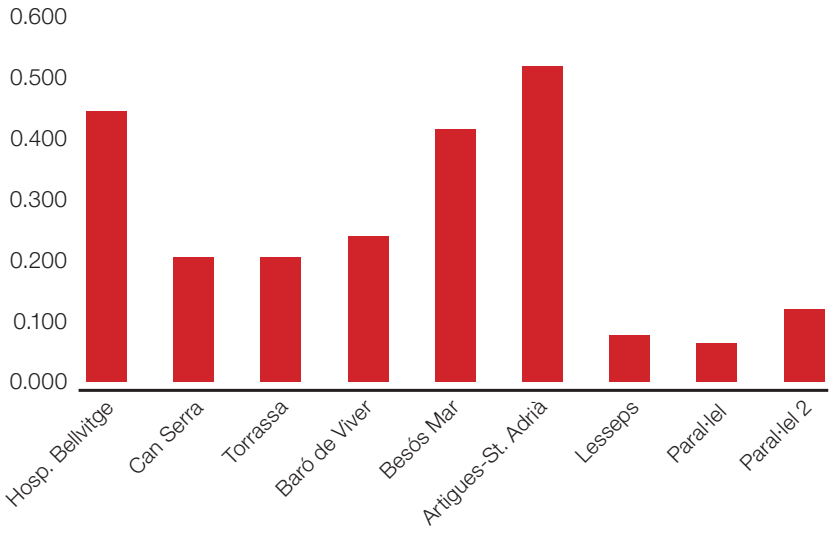
The Environment Department has designed the Document Management System for the TMB group in order to comply with the legal requirements and the requirements of ISO 14001 and 50001.

For the Metro, it is a question of taking advantage of the design of the management system and replicating the model already applied to TB, adapting it to the characteristics of the Metro and its way of operating. The schedule could be as follows:
—2017: Assessment of the legal requirements of the pilot scheme (Vilapicina) and a review of the compulsory procedures to implant and comply with.
—2018-2019: Review, adaptation and consensus on the rest of the procedures and implementation.
—2019: Certification of the pilot scheme.
—2020: Replicate it in other centres.
Right now, a schedule is in the process of being worked out for the implementation of the Environmental and Energy Management System (SGAiE) into Metro.

3. Optimisation of water by Metro

In 2013 the water in 26 wells collecting groundwater in the metro was studied and classified. The situation of the use of groundwater in metro pumping shafts in 2015 is shown in the following chart:

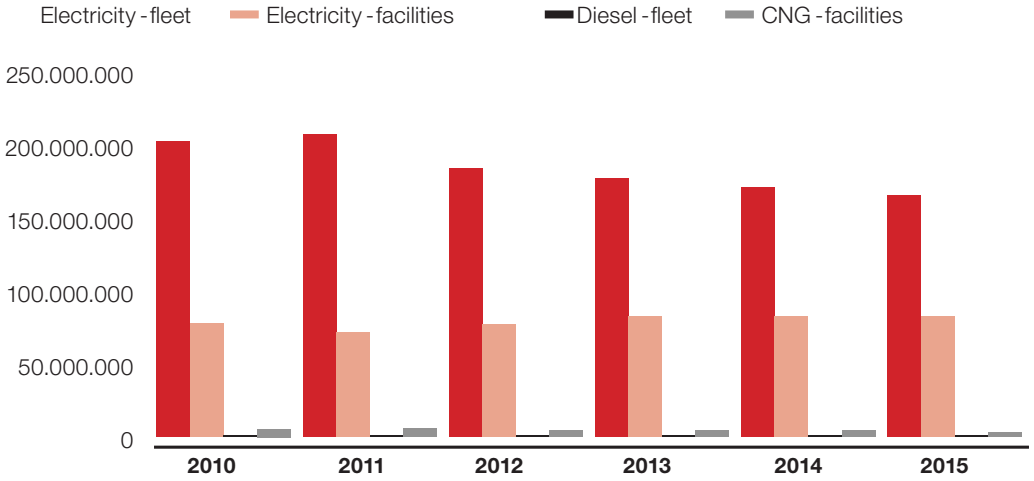
Hm³/years of current use of groundwater per pumping shaft (2015).



4. Optimisation of energy management

Noteworthy in the field of energy management is how energy consumption evolved in the Metro during the period 2010-2015 subject to annual verification by an accredited environmental body:

Metro fuel consumption (kWh)



	2010	2011	2012	2013	2014	2015
Electricity - fleet	207.949.043	212.688.475	189.037.954	181.735.585	175.329.516	170.880.121
Electricity - facilities	79.903.474	73.530.701	79.252.168	84.508.606	85.101.273	85.060.764
Diesel - fleet	717.449	698.226	757.102	745.543	702.131	647.503
CNG - facilities	5.662.026	6.179.608	4.297.639	4.796.706	4.418.252	4.387.222

In 2016, the TMB energy audit was submitted in accordance with Royal Decree 56/2016, analysing over 85% of TMB's energy consumption and putting forward improvement suggestions that TMB will introduce over the coming years. The implementation of the Environmental and Energy Management System will assist in the continuous improvement of this environmental aspect.

5. Selective collection and Punts Verds (recycling centres)

The quantity of waste generated by TMB in the period 2013 – 2015 rose slightly (1.5%). On the other hand, the amount spent on waste treatment between 2013 and 2015 suffered a sharp increase (>200%). The amount of transport carried out between 2013 and 2015 fell by 3.5% and spending on transport plus waste treatment suffered a large increase (> 150%), rising from 105,578 euros in 2013 to 265,213 euros in 2015.

For TMB overall, the types of waste that generate most revenue are: metro tracks, metal, lead batteries, out-of-commission vehicles and aluminium. On the other hand, the types of waste that generate most transport and treatment costs are: liquid waste generated in the cleaning process of trains and buses and managed with a water tanker truck, waste from hydrocarbon separators and septic tanks (water used to clean graffiti, water containing hydrocarbons and water with dangerous substances), banal waste (not collected selectively – grey container-), cloths and absorbent fabrics, wood and liquid coolant.

6. Metro network emissions map

In February 2015, work began on a new campaign for air quality sampling in the metro linked to the LIFE13 ENV/ES/000263 project, "Implementing methodologies and practices to reduce air pollution of the subway environment" (LIFE + 2013 call) and on the presentation of the results. The project lasts for three and a half years and air quality measurement campaign concluded in 2016. Reports and scientific articles are currently in the process of being produced. At the same time, actions are being taken to disseminate and communicate the results.

7. Implementation of environmental criteria for purchasing products and services

In 2016, to give impetus to applying the policy of Environmentally Responsible Purchasing, work was done on incorporating environmental criteria in the processes of procuring products and services. Specifically, the following actions were taken:

– Environmental and/or energy criteria were defined for compulsory inclusion in specifications or orders along with the methodology for guaranteeing the criteria are applied.
– A process for the Environmental Control of Business Activities (AQUILES) was established to advise sub-contractors working at our facilities about the environmental requirements they have to comply with.
– Criteria were defined for assessing suppliers (PROTRANS).
– Work procedure P716 was produced on the design and purchase of TMB products and services according to established criteria.

– Technical instructions have been written to introduce sustainability criteria into contracting products and services in line with the criteria established by the European Commission and by Barcelona City Council.
– Procedure P360 of the Contracting Committee has been revised to meet with the established criteria.
– On 21 November the Executive Board approved Procedure P716 that collects together the criteria established for inclusion in environmental criteria, environment control of business activities (CAAE) and the assessment of suppliers.

8. Balanced scorecard of TMB's environmental behaviour according to ISO 14001/EMAS

In 2016 work was done on constructing and implementing an environmental balanced scorecard for TMB. The aim is to provide the company with a tool that enables the different levels of TMB management to:
– Monitor the Environmental and Energy Management System.
– Monitor objectives and action plans.
– Monitor the Master Plan for Sustainability

With the balanced scorecard it is possible to follow TMB's environmental performance using the following indicators:

Indicator name	Indicator description
Energy consumption	Monthly energy consumption per km, per total passengers, per m^2
Emissions produced	Monthly CO_2, NOx and PM emissions produced per km, per total passengers, per m^2
Improvements in air quality / Emission savings produced	Savings in the emission of pollutants (NOx i PM) produced by transporting passengers.
Environmentalisation of the fleet / Technology	Total no. of vehicles per technology (Euro I, II, III, Euro I-III with SCRT filters, IV, V, VEM, Hybrids, Electrical) by total number of vehicles
Environmentalisation of the fleet / Energy sources	Total no. of vehicles per fuel type or energy source (diesel, natural gas, hybrid diesel, hybrid CNG, electricity) by total number of vehicles
Generation of waste	Monthly total tonnes of waste generated by type and classification
Water consumption	Monthly total m^3 of water consumed (network and installations)
Consumption of materials	Monthly total in t, kg or UN of materials consumed (network and installations)

The milestones achieved over the last year with regard to the design, construction and implementation of the balanced scorecard were:
— Functional design of the environmental balanced scorecard for the TMB group to comply with the requisites of ISO 14001 and ISO 50001.
— Finalisation of the construction of the balanced scorecard.

— Implementation by Transports de Barcelona SA.

The objectives for 2017 in respect of improving the design, loading data and establishing procedures are the following:
— Presentation to management of the Bus network balanced scorecard.
— Design, construction and implementation of the executive summary of the balanced scorecard (monthly summary of situation across all indicators).
— Implementation of QC for the Metro: incorporate energy and water data for the Metro.
— Automate the input of data and eliminate manual input. Plan to monitor consumption in TB and Metro installations.
— Obtain reports expressed in €, € per km and € per ticket validation. Integration of SAP BO with the *blauEnergy*
— computer application.Review and authorisation of procedure P744: Establish responsibilities for the supply and ratification of data and those responsible for monitoring and analysing indicators.


8
Studies

The work of the Research Board can be divided into two main types of study: regular and special. The first group includes all research which is conducted regularly over a period of several years. This type of research accounts for most of the Board's budget. The second type consists of studies in response to specific requirements at a certain time or those which, although repeated, do not qualify as regular.

1. Regular studies:

Within the regular studies, the three main ones, which between them account for 90% of the Board's budget, are:
— Customer perception study on Bus and Metro.
— Study of fraud on Bus and Metro.
— Measuring service provision on Bus and Metro.

Apart from these, within the set of regular studies it is also worth highlighting the one on complaints, claims and suggestions and various internal customer satisfaction studies.

2. Most important special studies:

1. Studies related to the analysis and control of fraud

During the year, work continued on the project of mapping bus fraud to help determine the best areas for inspection units to work in.

Monthly monitoring of the process for handling fraud penalties continued. This covers the main areas of interest: inspections, sanctions, payments by type and channel, receipts, allegations and the referral of cases to the authorities.

2. Studies related to sundry revenues and TMB transport ticket products

Support was given for the various tasks involved in optimising the policy promoting the TMB ticket product Hola BCN!: a study of the fares under consideration for 2017, the effects of the of the free transfer function (transfer to the airport by metro), effects of the days and hours function and the commercial potential of undertaking a marketing exercise together with Aerobús.

The objectives and functional requirements were established for starting a Big Data project with the Hola BCN! ticket for 2017.
Technical office support was given to various website projects for optimising e-commerce
www.barcelonasmartmoving.com: *referrals* (links to other websites) own environments, *on-page* SEO (website improvements to improve search engine positioning), *off-page* SEO (improvements outside the website so that other sites link to our page), SEM (*Search Engine Marketing* and *online* advertising), securitisation (to improve security) and the introduction of new products, among others.

3. Digital analytics and marketing

In the field of digital analytics, consultancy and implementation tasks are being carried out with regard to *Google Analytics* for tmb.cat, barcelonasmartmoving.com and noticies.tmb.cat. Support was also given to the migration of the new website in terms of maintaining its organic positioning/SEO. At the same time, collaboration is ongoing on SEO projects for tourism websites, on the new digital focus of JoTMBé and on the development of *Wi-Fi* on the Barcelona Bus Turístic.

Several market studies aimed at gaining deeper knowledge about the visiting public: Barcelona Bus Turístic, Catalunya Bus Turístic, Telefèric de Montjuïc and Barcelona City Tours.

A survey was undertaken on JoTMBé users as part of the Marketing Plan and support was given to the consultants *Deloitte* in the diagnosis phase with regard to knowledge about who is and who isn't the customer.

Other studies (Bus)

Support was given to the T-Mobilitat project with regard to information and customer service and also, at a technical office level, to the IAC (Information and customer service) with regard to queue management systems at TMB points, the developments in payment systems and the handling of cash (*CashDro*).

Meanwhile, with regard to network service planning, the main projects undertaken this year and those envisaged for 2017 are described below.

—Study and design of special services:

Throughout 2016, a number of special services were studied and designed for events involving TMB (Fira de Barcelona, concerts at Palau Sant Jordi and the Olympic Stadium, events on Montjuïc, and city events such as the Mercè and Gràcia festivals, and the Christmas operation).

—Collecting passenger information using RFID technology:

New equipment has been completed with the RFID technology used to collect data for surveys on bus mobility. Some minor adjustments and small changes were made following trials and they have already been used for the autumn campaign. Taking advantage of the delivery of new equipment, improvements were introduced such as: adjustments and elimination of errors in the equipment software and improvements in the use made of the data obtained.

Improvement updates were also carried out on a few older pieces of equipment including: renewing both the bases that support the RFID equipment and the anchor points that attach the devices to the bases.

During the autumn campaign, intensive use was made of four of the new devices and two of the new ones (with a satisfactory result) in order to have the maximum number of devices out on the street. While the old models are considered to be fully amortised and obsolete after several years in service (they have lasted twice as long as originally anticipated) they will continue to be used so long as they work correctly, but will not be repaired when they break down for good. During 2017, equipment maintenance is planned to continue as well as receiving new devices to continue with the technological renovation started this year.

—New Barcelona bus network (NXB):

Over the course of the year, work was done on defining the 5th phase, producing models of a variety of scenarios for the bus network of the future, bearing in mind Barcelona City Council's project to connect the tram networks along the Avinguda Diagonal. The reports regarding the NXB were produced using the available modelling tools (TransCad and Aimsun) along with other applications developed in-house by the Planning Department.

At the same time, there was an analysis made of route modification requests for the NXB on some routes already in service such as: changes to redraw routes V15, V17 and 22 and route changes for V3 and V5.

It is anticipated that rolling out the NXB will be completed over two more phases with the following provisional schedule: October 2017 (phase 5.1) and November 2018 (phase 5.2).

A study of the weekend bus network was made once Phase 5 was in place.

—Analysis of transfers to the bus network following the implementation of phase 4 of the NXB:

This year, phase 4 of the New Bus Network (NXB) came into service and an analysis was done of the real variation in transfers produced by this new phase in comparison with predictions made.

—Estimated ticket validations by bus stop:

At present the ticket validating system on buses does not link to the Central Operation Aid System (OAS) so it is not possible to link the ticket to the bus stop where it was validated. In conjunction with the Technology Department, a procedure was developed for geolocalising ticket validations made on the bus network. It is based on second level validation data and localisation information from the vehicle (geolocalisation, odometer, SAE). Work on developing the infrastructure, in *big data*, that will make these associations began this year and will continue into 2017.

—Other studies (Bus)

Several planning studies were carried for the bus network, the most noteworthy of which were:
—Origin by zone of passengers on bus routes 65 and 165 at different bus stops in Prat de Llobregat.
—Analysis of load factors on various routes (routes 13, 7, 33, etc.).
—Proposals for improvements based on complaints, claims and suggestions and on variables in service provision.
—Analysis of the distribution of passengers per route at Metro interchange stations.

At the same time, various studies were carried out on current bus routes, notably:
—**Routes 23 and 110:** proposal for a change of route at Zona Franca.
—**Routes 27 and 32:** analysis of demand relating to the future D40.
—**Route 79:** proposal for a change of route in the Marina district.
—**Route 109:** proposal to extend the Hospital Clínic route.
—**Route H16:** request for extension to the Ginesta Foundation.
—**Shuttle buses:** Metro (L4 and L11) and the Montjuïc Funicular.
—**Route 63:** proposal for route modification at the entrance via the Avinguda Diagonal.
—**Route 117:** modification proposal for the Font d'en Fargues neighbourhood.
—**Bus Improvement Plan 2017**.

—Proposal to adapt the current magnetic strip charging method to contactless cards:

With the T-Mobilitat project about to be introduced, the Planning Department started working with others on proposals to adapt the current charging system based on magnetic supports to new contactless cards. This proposal includes different models of functionality according to the nature of the current tickets: integrated tickets, TMB tickets and Metropolitan Area of Barcelona (AMB) subsidised travel cards. Work will continue throughout 2017 on a more accurate definition of the working model of new T-Mobilitat ticket types

Other studies (Metro)

The work of the Research Board can be divided into two main types of study: regular and special. The first group includes all research which is conducted regularly over a period of several years. This type of research accounts for most of the Board's budget. The second type consists of studies in response to specific requirements at a certain time or those which, although repeated, do not qualify as regular.

Special studies:

—Studies related to the sale and validation of tickets

Where necessary support was given to projects related to the dimensioning of the sale and validation system for new ticket halls and the redesign of already existing ones in the Metro network.

—Analysis and control of fraud

At the beginning of the year, a brand new plan was formulated for the security guard units positioned in the ticket halls of the Metro network aimed at discouraging fraudulent travellers.

It was decided to continue with assessing the PAR gate fraud counters that provide a continuous measure of the level of fraud on the Metro network on a weekly and monthly basis.
It was also decided to continue with monthly monitoring of the process of managing penalties for fraud. This covers the main areas of interest: inspections, penalties, payment by type and channel, receipts, allegations and the referral of cases to the authorities.

Other studies

On the other hand, in the field of **network planning**, listed below is an account of the main projects worked on over the year and those planned for 2017:

—Modelling of Metro Line 10 Sud:

An assessment was made of the southern section of Metro Line 10 using the operational experience from sections that have already opened and the changes to stations made this year. It was necessary to update some sections of the planned route due to redrawing changes made to the original model, bearing in mind the way some stations changed name as the project evolved.

On the other hand, the socio-economic data is based on a study done 10 years ago and have changed substantially, and so an update of the previous study is scheduled for the start of 2017 in order to make a more accurate reappraisal of the section of Line 10.

—Train occupancy figures:

This project, that started and continued throughout 2016 under the management of Metro, Rolling Stock and the Technical Department, collected real data on trains using the various pieces of equipment installed, a total of 15 pieces of equipment; three on each line and one one on Line 1. The result is rather average given that the system, through not being automated, cannot always guarantee the data it collects The analysis process is still handled manually which limits its capacity for being done at any time

Work was started on automating steps, and during 2017 it will continue along these lines as well as extending the projects to all trains in which it is possible to install data capture, which also implies automating both capture and processing due to the large volume of data being collected which would be unviable to process manually.

Preliminary passenger load analyses have been done with the new system and they are proving to be more accurate than the systems tested previously. There were also test checks run on the data collected using real data counted accurately on specific trains and the the similarity in the passenger load profiles was really very good. It should be taken into account that a manual count is based on the number of people while the automatic system extracts data in a totally indirect way based on the weight of the carriages.

—Information gathering and the analysis of the impact of the Metro L9 Sud coming into service:

Studies were carried out to obtain information and analyse in particular the effect of Line L9 Sud on some bus routes. The tasks undertaken can be summarised as follows:
—Obtaining information on the mobility of passengers using Metro L9 Sud.
—Information on the capture of new passengers from the time the new section of Metro was opened and the distribution of passengers by line at the interchange stations of the new L9 Sud.
—Analysis of the impact on bus routes 65 and 165. As a result of the work route 165 was redrawn.

—Microsimulation of pedestrian flows:

At the end of 2008 TMB purchased a licence for the LEGION programme, pedestrian flow simulation software that complements the various modelling projects that are carried out in the department. Since then it has meant, despite a laborious learning process, that many simulations have been done in this area.

The microsimulations carried out during 2016 were:
—Using microsimulation to assess the Fira station on L9 Sud at the time of maximum demand for exit and entrance of the Fira to the Metro station and the Metro station to the Fira.
—Using microsimulation to assess the impact of closing one access point to the station at Glòries.

The microsimulation process will continue throughout 2017.

9 TMB Administration and finances

TMB Administration and finances

Technical Secretariat and Insurance Unit

The Technical Secretariat of the Department continued to work in all fields that require coordination between services, and which are of a transversal nature. This has always been done by seeking positive synergies, pragmatism and simplification. In this sense, the most significant actions were the following:
—The preparation and tracking of budgets of expenses, staff and investments of the department, and also the staff expenses budget of the company Transports de Barcelona, SA.
—Proposals and follow-up of personal, strategic objectives of the department for 2016.
—Consolidation of the back-up actions to the management and implementation of the Technology Master Plan.
—Direct support in setting up the transparency Portal in the definition of the project and the identification and development of contents.

Another line of action was the direct support to boost Electronic Administration research. coordinating and safeguarding the implementation and success of various Action Plans carried out by each Department service. Some actions have already been started up and others are pilot tests to be established in coming years.

With regard to insurance, work has been done on the tender of mediation services and the assessment of an insurance *broker* (the successful bidder was *Aon Gil y Carvajal*, SA, *Corredoría de Seguros*) and of group Life Insurance of TB (the successful bidder was VidaCaixa).

Remaining activities maintained a similar level to the previous year. The total number of claims in 2016 was 4,434. The year closed with an average of 2.56 claims per vehicle and year (only claims with an economic impact).

TMB sales, revenue and general service logistics.

Key projects in this area included:

1. *T-Mobility Project:*

The T-Mobility Project was redirected in 2016, reaching an agreement to initially tackle only technology evolution, meaning from today's magnetic technology to contactless technology, leaving the evolution of the fare system to a second phase.

In June 2016, the ATM set up a work group, formed by representatives of the ATM, AMB, GGC, Renfe, Generalitat (Catalan Regional Government) and TMB. The purpose was to analyse how to adapt the current fare system to new contactless technology. After months of work, in October 2016, this group delivered the document: “Operating Model of the Fare System with T-Mobility”.

This document marks the policies and directives in different areas of ticket operation with contactless technology under 2 prerequisites:
—Maintain the rules and features of the current system.
—Propose the implementation of improvements, either as a result of new technology or needs of the system, operators or passengers.

In November 2016, the ATM presented the redrafting of the T-Mobility project, including the main decisions made to develop the project:
1. The strategic framework was established to develop the project..
2. A new model of governance of the T-Mobility project was agreed.
3.} A new model of management of the information and support system was presented, with the important participation of the ATM and AMB jointly leading the project.
4. Through the strategic group created, the models of agreement, guidelines for good management of the project were started, but always under the delegation to be made by the ATM to public operators from the implementation of the project to their set-up.
5. Mobiles will be used as validation from the first day it is put into service.
6. A pilot test will be carried out at the end of 2017 (pending definition of the scope).

To guarantee the success of the project, 13 work groups have been created, to be led jointly by the ATM, AMB, TMB and FGC, with the participation of transport operators, administrations and SocMobilitat: 1. Fare management; 2. Marketing; 3. Assistance and CAC Centres (customer assistance tools of all transport tickets)); 4. Information and Management Centre of Transport Information (CGIT) (transport information tools); 5. Communication (external communication of the project); 6. CPP management (management of the public private collaboration contract with the Societat Catalana per a la Mobilitat); 7. Common technological framework; 8. ATM technology systems; 9. Technology systems of operators; 10. Maintenance and operation of technological systems implemented; 11. Management of the start-up of T-Mobility; 12. Legal (implementation of all legal aspects of the project and contract); 13. Validation with mobiles and bank cards.

Up to the end of 2016, 5 of the 13 groups were put into action. At the same time, an additional group was set up, named Strategic Marketing Group, for the purpose of setting strategic lines of marketing of future digital channels, in which it will also participate.

2. Design of a new ticketing application:

In collaboration with the Technology Department, work has been carried out during the year on designing a new Ticketing information system. This is to adapt to the new needs of T-Mobility, both in its 1st phase, in which the current fare system will be maintained, and in a 2nd phase, when a new fare system will be implemented. Although this is not yet defined, it is certain to be different from the existing one.

It has been agreed that this new information system will be developed on the same platform as the *Ocicommerce* application, to facilitate the integration of sales and revenue data of Transport de l'Oci (Leisure Transport) with the BUS and Underground business.

The transfer of the current Ticketing application modules to the new one will be done gradually and in complete units of business. If the test results are satisfactory, in January 2017 it is planned to transfer all the BUS and TMB Points business to the new application.

It is now being analysed how to integrate in the new application the new digital channels planned for T-Mobility (new websites, *app*, etc), along with the use of credit cards for validation, sales and payment (*Tap & Go*).

3. Project to generate and control simplified invoices to sell travel tickets, directly from all TMB sales channels:

In order to meet a legal requirement and the need to optimize the current invoice issuing procedure to sell travel tickets asked by customers, during the year and in collaboration with the Economic-Financial Management and the Technology Department, a project was started. It consists of enabling the issue of simplified invoices by various equipment of the TMB and Projectes i Serveis de Mobilitat, SA sales channels, at the time of the sale.

A document of functional requirements was has been drawn up, which has been delivered to the Technology Department, in which the specifications needed to implement the following are provided:
— Developments required in different sales equipment of own sales channels, that enable simplified invoices to be issued at the request of customers.
— The processing of invoicing orders to issue complete invoices at the request of the customer.
— An application that enables the centralized management of all invoices made, avoiding the possibility of issuing duplicated invoices and the replacement of simplified invoices for complete invoices, as long as this is requested by the customer.

Owing to the fact that from some of our sales equipment, integrated tickets from the ATM and corporate tickets from the AMB (T-4) are marketed, contact has been made with both, in order to agree if simplified invoices associated to their tickets should be issued by the TMB or themselves. In both cases, it would involve setting up the corresponding agreements.

The dispensing machines of the Underground network, along with the sales equipment of the Bus Turístic, Tramvia Blau and the Telefèric, are planned to be adapted to issue simplified invoices in 2017. This is not possible in sales equipment on board buses, owing to a technological issue, as they will not be adapted until the implementation of T-Mobility

4. Renovation of bus self-payment machines:

In collaboration with the Bus business Department and the Technology Department, at the beginning of 2016, a project was started to renew self-payment machines installed in the TB depots. The purpose of these machines is to pay in the sales made by bus drivers. The main reasons why these machines need to be renewed are:

— *Obsolescence of Hardware:*
  — Problems with spare parts: the current maintenance company has formally notified that it cannot ensure the availability of required spare parts, as they are no longer manufactured.
  — Progressive increase in the number of breakdowns owing to the age of parts.
  — Impossibility of maintaining old and new Euro notes in circulation, owing to the low capacity of the electronic board of the wallet. To update the electronic board would mean a cost of over 800€ per machine.

—Obsolescence of Software
The new self-payment machines on the market, offer a series of features that facilitate the management and control of income.

— They provide *online* information on the cash accumulated in each machine. This optimizes the frequency of collection and reduces costs.
— They give detailed information on the type of coins and notes deposited in the central system
— They provide *online* information to a server of each liquidation and collection done.
— They have a centralized monitoring system (alarms).

Although there are currently 13 units of self-payment machines shared between 5 centres, it is planned to replace 4 units during an initial phase at the start of 2017 and 4 in a second phase in mid-2017. It will be assessed if the remaining units need to replaced or removed, depending on how the sale of a single ticket on board Buses evolves. This will probably decrease considerably in coming years, as a result of the implementation of the T-Mobility project (appearance of new digital sales channels, payment with bank card, etc.).

Payrolls, social security and remuneration of staff outside the agreement

2016 was a particularly complex year, as important changes were made in the operation and calculation system of Payroll and Social Security processes:

1. Firstly, the incorporation in the system of direct liquidation of Social Security contributions, within the Creta Project. This is an immense change in the traditional contribution calculation system.

Until now, the system consisted of companies generating a contribution file, based on the payroll calculation process. After validation in the Social Security systems (RED system), this file was sent online and then the payment of the resulting contributions was made.

-With the new system, companies send their salary data to the Social Security, through a new computer system (Creta), which makes a calculation of the contributions to be settled and returns the result to companies.

This system causes an important complication regarding the differences identified between the calculations made by the Social Security and those made by the payroll calculations of companies.

2. To implement the direct liquidation system of contributions, SAP requirements have obliged another major change to be faced. The payroll calculation model has been adapted, from a "deferred monthly" calculation system to a "current monthly" calculation system. This means that incidents generated by work activity of an employee are no longer handled the following month, but are now handled in the month they occur. To do this, a second payroll payment has had to be implemented in the first ten days of the following month, which includes the activities of the last days of each month. This modification has led to the revision of each payroll calculation procedure and cycle to ensure that changes do not cause any erroneous result.

3. Also in the process to adapt to the requirements of new work procedures of public administrations, the adaptations needed to meet the requirements of the Social Security have been faced, in the electronic referral of data regarding affiliations, occupational accidents, maternity and paternity leave, etc.

4. Application in the payroll for the years 2015 and 2016 of the remuneration increases and salary impact procedures established in the 2015-2019 Bus Collective Agreement.

5. This year has also seen intense collective negotiation. This has led to support tasks concerning salaries, practically throughout the year. In the case of TB, this finalized in June with the signature of the agreement.

Supply and logistics

During the year, the new TMB "Recruitment Profile" was started up. This collects information regarding the recruitment of companies and adapts to the latest legislation requirements. Consequently, tenders of any type, awards, successful bidders and orders are publicly announced, along with their complementary documentation, contract specifications, technical assessments, etc.

Economic financial service

Some of the main actions of the year are detailed below:

—TB credit facilities:
To meet its ongoing cash flow needs, the company has credit facilities with CaixaBank (9,500,000 euros), Banc Sabadell (5,000,000 euros), Abanca (3,000,000 euros) and BBVA (5.000.000 euros).

—Finance leases for buses:
Contracts for the manufacture and sale of 78 buses and finance leases thereon were signed on 10 and 15 May: 40 articulated hybrid buses, 10 double-decker buses, 10 standard hybrid vehicles and 18 standard CNB vehicles for a total of 30.6 million euros.

This amount was distributed between 5 finance entities: BBVA, Kutxabank, Deutsche Leasing, Caixabank i Ibercaja, at terms of between 10 and 12 years, at a variable Euribor interest rate at 3, 6 and 12 months.

—Diesel hedges:
As all analysts are forecasting that prices will rise in coming years, TB decided to implement a hedging strategy for TB fuel consumption. Taking advantage of the one-off oil price decrease at the start of the summer, which reached a minimum level at the beginning of August, a hedge was contracted on 1st August of 20% of the diesel oil consumption of the fleet with diesel engines, with a deferred start on 1.1.207 to 31.12.2017.

—Review of powers of attorney of proxies with bank signature:
The power of attorney of all proxies of the company were reviewed, particularly those with power to operate with financial entities.

—Claim for refund of excise tax on retail sales of certain hydrocarbons (IVMDH):
In March and April 2016, the Spanish Treasury paid TB the amount of 973,399.85€ plus 211,320.44€ in interest, corresponding to the inital claim of TB regarding IVMDH tax in 2011 and 1,155,756.38€ plus 195,367.25€ in interest, corresponding to 2012.

On 27/11/2015 TB received the rejection verdict from the Council of Ministers regarding its patrimonial claim from the State of 10,458,755€, corresponding to unduly paid input tax of IVMDH, for the period from January 2002 to December 2012. In spite of this, on 29/03/2016 the Supreme Court published two sentences in favour of two plaintiff companies, estimating the patrimonial claim from the Spanish State, regarding health tax during the application of this tax. It was also indicated that they will also be paid the legal interest from the date of presentation of the claim, to the date of notification of the Ruling of the Supreme Court.

On 13./04/16, the TB presented an appeal to the Supreme Court against the rejection verdict of the Council of Ministers.
Pending the resolution of the Supreme Court, on 19/10/2016 TB presented two documents to the Treasury Department, requesting the revocation and full annulment of the certificates from the Treasury, and of the administrative resolutions, which rejected our claim referring to the period from April/2005 to September/2010.

—Payments to suppliers
In 2016, adaptation has been made of the payment terms to suppliers, in accordance with current legal regulations, with a set payment date on 25th of each month.

—Long-term securities and deposits
During the year, the amounts indicated as established securities and deposits were clarified and regularized. This has meant that some amounts have been recovered, which were linked to expired contracts. Some amounts have also been regularized, which owing to the time elapsed, were impossible to recover.

—Establishment of control and tracking protocols of the cost of internal subsidized training, which is compulsory through the Royal Decree Law 4/2015 and Law 30/2015 plus others.
Together with the Training department, the protocol was completed to allocate and obtain costs from training activities issued, subject subsidization from the Social Security. On the basis of its implementation, direct reports will be obtained for justification reports. The target of this project is the control of expenses from the viewpoint of issued training with internal resources: equipment, fittings, materials and internal staff. Subcontracted training will also be followed-up externally through invoices It will be fully operative from 1st January 2017.

—Establishment of a corporate repository of energy supplies and water:
This project has been worked on jointly with the Information Systems department, and comes within the strategic improvement Programme of energy efficiency. It contributes to the obligation of the company to carry out an energy audit, according to the Official State Gazette, RD 56/2016. The first phase of control and validation was achieved of the amounts and prices invoiced by centres and policies. In a second additional phase, apart from the implementation of environmental management, it will enable costs and computions per uses, the validation of consumptions, simulation of future development of energy performance, calculation of accounting provisions and additional comparative analyses.
It will also support the annual certification of voluntary agreements with the Catalan Agency of Climate Change.

—Follow-up of the subsidies of investment and expense projects, and the link with costs and income per project:
Effort has been made in the reconciliation and balancing of debts transformable into subsidies. They have been linked to their corresponding investment or expenditure projects. In this way, the analysis of margins is guaranteed for allocations to the same cost objects.

Compensation, pensions and legal-labour corporate assessment

The 5th Control Commission of the TB Pension pension scheme was constituted in March. Operational coordination continued throughout the year, as support to the Technical Office of the Barcelona Transport Occupational Pensions Plan, with the intermediation of the fund manager, actuaries and external advisers, and in conjunction with other internal departments (Payroll and Finance).
The application of the General State Budget Law for 2016, has forced agreements to be reached (after meetings and negotiations with different areas and entities, from the Control Commission to other external areas). These agreements will enable the schemes and their benefits to be maintained in the best way possible. involving basic maintenance of agreements with respect to 2015:

Starting on 31.12.16, participants of group B were withdrawn from the Pension Scheme. These will have their pension commitments assured in a policy in the name of Transports de Barcelona, in compliance with the agreements reached in the Collective Agreement.

FMB administration and finance

Technical Secretariat and Insurance Unit

The Technical Secretariat of the Department continued to work in all fields that require coordination between services, and which are of a transversal nature. This has always been done by seeking positive synergies, pragmatism and simplification. In this sense, the most significant actions were the following:
—The preparation and follow-up of expenditure, staff and investment budgets of the area, and also the budget of staff expenses of the company Ferrocarril Metropolità de Barcelona, SA.
—Proposal and follow-up of individual and strategic goals of the area for 2016
—Consolidation in support and implementation actions of the Technology Master Plan project
—Direct support in starting up the transparency Portal in the definition of the project and the identification and preparation of contents.

Another line of action was the direct support to boost Electronic Administration research. coordinating and safeguarding the implementation and success of various Action Plans carried out by each Department service. Some actions have already been put into practice and others are pilot tests to be established in coming years.

With regard to insurance, work has been done on the tender of mediation and assessment services of an insurance*broker* (the successful bidder was *Aon Gil y Carvajal, SA*, *Corredoría de Seguros*).

The remaining activities have maintained at a similar level to the previous year. The number of incident reports received regarding the Metro were 5,505 of which 1,436 have been processed by the insurance company.

—Extension of the collection and change provision service in the line 9 South section:

The opening of line 9 South in February 2016, made it necessary to extend the collection and change provision service in installed dispensing machines. This has meant that adjustments have had to be made in planning collection services, particularly owing to the uniqueness involved:
—In terminal 1 and 2 stations, dispenser machines have had to be installed both before and after the line of payment
—These machines do not sell the same tickets as remaining machines of the Metro network.

Staff payrolls and salary outside the agreement

2016 has been a particularly complex year, as significant changes have been implemented in the operation and calculation system of Payroll and Social Security processes:

It has also been an intense year regarding collective negotiation. This has led to support tasks concerning salaries, practically throughout the year. In the case of the Metro, negotiation and resulting assessments of scenarios continue.

Economic financial service

The main innovations of the year include the following:

– *FMB credit facilities:*
In order to cover specific treasury needs, we have facilities with Caixabank (9,500,000€), BBVA (8,000,000€) and Banca March (5,000,000€).

2016 drawdowns against syndicated loan granted in 2014 for parts corresponding to 2016:
The last drawdown was made for 15 million euros on 30 November, as indicated in the contract.

– *Review of powers of attorney of proxies with bank signature:*
Powers of attorney have been reviewed of all proxies of the company, particularly those with powers to operate with finance entities.
– *Payment to suppliers:*
During the year, we have adapted payment terms to suppliers, in accordance with legal regulations, with a set payment day on the 15th of each month.

Compensation, pensions and corporate legal labour assessment.

Regarding the Metro Pension Scheme, operation Coordination functions have continued, as support to the Technical Office of the Occupational Pension Scheme of Ferrocarril Metropolità de Barcelona, and the intermediation with the fund manager, actuaries, external advisers, in conjunction with other internal departments (Payrolls and Finance).

The application of the Spanish National Budget Law for 2016 made it necessary to hold meetings and negotiations with different bodies including the Control Committee and other external bodies to reach agreements that would enable the company to maintain its plans and benefits, leading to the repetition in its basic aspects, of agreements in 2015

10 Our people

Personnel management in the TB area

Bus Labour Relations and Legal Department

—Collective bargaining

After nearly 17 months of negotiation, the new TB collective Agreement was signed on 10th June,between the Management and the CCOO, SIT and UGT, the majority unions in the Work Council. This is for the period from 2015 to 2019.

The new Agreement, with a 5-year term, provides the stability required to continue providing an excellent public service in order to face major mobility challenges in the city of Barcelona and its Metropolitan Area. Its main characteristics are the following:
—5-year term of the collective agreement (2015-2019).
—Maintenance of the annual working time and work days
—Updating of salaries throughout the period. Increase of the amount of variable remuneration to achieve positive results in major business goals.
—Continuation of the current work organization, respecting the 3 existing models of rest periods (G57, G65, G72, along with the Bus Turístic). Improvement in some aspects (reduction in the percentage of split driving services generally chosen by all groups who want this, or adaptation of the daily rest period to Rolling Stock).
—Continuation of employment and partial retirement following the applicable regulations, in spite of the increased cost of consecutive legal modifications.
—Possibility of incorporating staff, currently outside the agreement of groups 4 and 5, into the agreement, individually and fully voluntarily, in accordance with the personal and professional circumstances and needs of each employee.
—Significant improvement in pension schemes, such as the opening of group D for all staff currently attached to group B.
—Implementation of a rotating, dual model of Professional Training, as a tool to improve youth employability
—Ratification of the Equality Plan for the 2014-2018 period.

—Works committees

Negotiations with the Works Committee took place throughout the year via various Work Commissions (Joint, Permanent, Operations, Rolling Stock and Workshops, Administration, etc.).

a) The Joint Commission issued opinions on a number of conflicts presented to it prior to legal proceedings being initiated.

b) The main agreements reached with the Operations, Rolling Stock and Workshops, Administration, and Permanent committees were:
1 – In accordance with the provisions of the 2015-2019 Collective Agreement, the chosen regulations will be done to formalize allocation enquiries to different groups, along with the management of general choices of drivers, Rolling Stock and control.
2 – Approval of work calendars applicable to 2016 of all groups attached to these work commissions.
3 – Agreements referring to holiday shifts for different groups of the company.

—Labour Relations and Legal Department

Activity concerning administrative and legal proceedings was as follows:

2016	TB
Individual claims	94
Industrial disputes	11
Workplace inspections	32
Strike calls	5
Strikes (days called)	10
Strikes (days held)	9

—Significant collective disputes occurring in 2016.

The most significant industrial disputes were:

— Disputes relating to the calculation of amounts payable during holiday periods lodged by the CGT and UGT.
— Collective dispute lodged by the CGT union regarding time payable to driving services as attendance time.
— Collective disputes lodged by: firstly BS and COS, and secondly by ACTUB, regarding the payment of travel from the starting or ending point of the service to the assigned CON (Business Operations Centre)..
— Collective dispute lodged by CO regarding staff shift rotations.

—Disciplinary system

The number of disciplinary proceedings instigated and explanatory reports issued was in line with the previous year.

—Labour disputes

There have been a total of 9 days of strikes (03/02, 15-19/02, 23/02, 25/02, 03/06). During these days, there were partial stoppages of a minimum of two hours to a maximum of five.. These stoppages were called by a minority of the Work Council, within the framework of the negotiation process 2015-2019, along with various Assemblies.

—Unions. Union elections

Twelve trade unions were active in the company in 2016. 8 present in the Council (ACAT, ACTUB, CCOO, CGT, COS, SIT, UGT, USOC), 4 non-present (BS, CNT, CO i PSA), although the latter two unions formed part of the USOC candidacy for the 2014 Work Council elections.

Planning, management and development of Bus staff

—Contracts

With regard to recruitment and in order to be able to meet different needs, including proposals (annualization of the 2015 Improvement Plan, increased holiday provision of the Bus de Barri (Local District Bus), various special shuttle services to maintain the Funicular and Metro and FGC in summer), plus the application of the 2015-2019 Collective Agreement (Partial Retirement), a total of 505 contracts have been drawn up during the year. These comprise:

a) Partial pensioners: Following regulatory changes, which put back partial retirement rights to the age of 61 years and 4 months, a total of 27 employees took partial retirement in 2016. These contracts were drawn up from July

b) Relief staff: 32 Contracts of temporary staff (employed on a casual basis or under works and service contracts) became permanent thanks to the partial retirement of employees reaching the age of 61 years and 4months. The Unit also managed and coordinated with operations centres the undertaking of 15 and 25% of work of current pensioners (who took partial retirement between 2011 and 2015).

c) Disabled employees: Contracts to cater for the readmission of company staff where full permanent disability has been recognised, making it impossible for them to carry out their usual work. The allocation of new jobs is made according to the vacancies available and the compatibility of the work with the disability recognised. This year 8 such employees were contracted.

d) Temporary staff: the contracts of weekend staff were extended until they can be converted into relief contracts when other staff take partial retirement under the legal requirements established for 2016. New contracts have also been made with people who had previously been contracted.

e) New temporary staff: 72 new recruitments have been made, 61 part-time contracts and 11 full-time contracts.

—Absence from work

Work continued on set protocols (monthly meetings with CON control structures, personal follow-up in cases of possible abuse or fraud, ongoing notification of indicators to employee supervisors, etc.). This is aimed at decreasing and controlling absenteeism in the Bus area. The chief measures taken included the following:

— Monitoring of individuals to ensure that temporary sick leave is taken appropriately.

— The system for dealing with temporary incapacity was reinforced, in conjunction with the Workplace Health Unit. This system ensures doctors' home visits to patients to assess the reasons for them taking sick leave, are organised as efficiently as possible. Business centre managers play an active part in this process.

—Procedures and rules

Work continued to review and improve existing procedures. In the month of February, the new CRETA contribution system, according to RDL 625/2014, successfully came into service without any incident being recorded..

—IT systems

Improvement and reinforcement of the monthly analysis model has continued, prior to processing in payrolls, particularly regarding a: changes in paid rest periods, overtime, calculation management, bonuses for versatility and productivity, permanent and variable night shift, leave, work calendars of different groups, balance of rest periods through model change and timetable rules of other groups.

—Travel Passes and uniforms

The work of the Travel Passes Department mainly involved renewing travel passes that expired on 1/10/2016 7.836 passes had been renewed up to 31st December 2016.

—Development

The unit's work in this field focused on a number of areas:1.

1) Training plan: In collaboration with the Training Department, the process to draw up the 2017 Training Plan was coordinated. Special attention was made to training needs, the control of actions and maximizing amounts refundable through allowances of Social Security contributions.

The most significant training actions included the following: Professional Competence Certificate (CAP), driving qualifications for electric and/or hybrid vehicles, qualifications for hybrid and CNG, waste water vehicles, etc.

2) CAP continuous training: This is the first year the Training Department has directly taken charge of procedures with the CONs. Help is provided to determine a strategy so that incidents can be solved (professionals resuming work after a temporary incapacity, and who were not able to carry out the CAP when planned, and others).

3) In conjunction with the bus operational Area, training of 10 operation controls of Development was planned and coordinated.

4) Updated Driver Manual:4 a new manual for drivers was prepared including key information on all the company divisions and departments.

5) Trainers of newly incorporated drivers: coordination and follow-up of trainers was done to incorporate new drivers in May and July.

6) Action plan to reduce traffic accidents: Participation in drawing up this Plan, together with the CON team, coordinating actions to update training on Accident Analysis, Accident Analysts and accident observations and accident Observers. Work was also done on statistics to be able to prepare Action Plans in greater detail.

7) Individual training permits (PIF): A total of 10 individual training permits have been processed over the year.

8) Performance assessment: a coordinated project was implemented to develop and apply performance assessments for staff covered by the collective agreement, and training was provided regarding areas for improvement detected.

—New organization of the Bus Management

On 23rd December 2016, various organizational changes and appointments to the Bus Network Management were made. The main goal was to continue working on new technology and the implementation of the final phases of the New Bus Network, from 2016 to 2018.

Personnel management - TB corporate

1. Technical Secretariat

Regarding budget monitoring, coordination and management of information systems and project monitoring of the Area, the Technical Secretariat continued working on all those areas that require a high level of coordination between services. The most significant actions were the preparation and monitoring of budgets of the Area and also of staff of functional Areas, plus back-up in information systems to different services of the area.

In Organizational Classification, all pending revision requests were completed and solved over the year (around 20), along with all ratifications of pre-assessment of new workplaces (around 20 more). These results have consolidated and legitimized the work done by the workplace assessment committee, formed jointly by representatives of the company management and representatives of all majority unions.

Workplaces of all areas of the TB network management have been resolved: Central Workshops, Rolling Stock, Coordination-programming and projects, Infrastructures, Telecommunications, Engineering, Network Support, etc. The creation and incorporation of two new groups (A12 and A11) in the salary scales, as a result of the last collective agreement, along with the need to manage workplaces inserted into each of these two new groups, with a different and existing methodology (ICSA), has enabled training to be programmed and given for all members of the assessment committee, in the description and assessment of HAY workplaces methodology.

Technical support and assistance has been given on a daily basis, both to Representatives and postholders, in all functional organizational adjustments throughout the year. In some way tget affect the functional contents of workplace descriptions or basic reporting and allocations.

2. Functional division personnel management

Efforts to control staff numbers continued with work to ensure vacant posts are filled efficiently. This included managing and coordinating the work of 20 partially retired employees, preparing employment contracts for partially retired employees who meet the required conditions, and organising the corresponding relief staff.

3. Contracts

In functional divisions, seven new employment contracts were prepared and one contract was modified or renewed during the year.

4. Personnel management services centre

1 Selection and promotion

During the year, the external selection process should be highlighted to cover temporary summer vacancies: drivers and maintenance operators. In the first case, there were 1,200 candidates and a total of 107 people were finally admitted, who have been covering temporary needs in the summer and at weekends, thereby forming a job pool. 23 people have been selected out of 281 candidates, to give support to maintenance operators during the holiday period.

Other positions covered by an examination with internal candidates, for different departments of the Bus Network Management are: Chief Technician in the Acquisition of New Fleet and New projects, Administrative Assistant of TB Labour Relations, Head of Management and Development Planning of Bus staff, Manager of rolling stock materials, Technician of CTBus studies and analysis, Administrative Assistant of the maintenance and projects technical office, CON Agents and rolling stock Warehouse Manager.

In corporate services, different examination and selection processes were done, to cover needs of the Executive Marketing Management , the Executive Economic Finance Management and the Executive Management of Innovation, Technology and Inernational Business. Throughout the year, people who had been promoted were monitored and assisted, before completing the trial period. This was to assess their degree and integration and satisfaction with the workplace, provide support if difficulties were detected and to globally complete the incorporation process to the new workplace.

2. Development and management of personal improvement

With regard to CAP training (Professional Competence Certificate), the session in interpersonal relation topics has been consolidated within the programme addressed to the drivers' group. The aim of this session is to reflect on how our relations influence the management of all situations we could face in customer service. Support was given with recommendations on how to improve the tools we have to tackle these different professional situations. 23 sessions were held with a total of 460 participants and 69 hours.

In the team cohesion Programme/Project of the Central Warehouse, a strategy was programmed during the first quarter of 2016, aimed at improving both leadership and team cohesion of the Central Bus Workshop Unit. 8 *coaching* sessions were held for teams, with full attention techniques and an accurate, individual follow-up throughout the process which should last 9 months. Group and individual follow-up sessions are programmed for 2017, on their plans of action to consolidate the path they have started.

The chief goal of the Development of People and Organization (Talent Management) project, is to have current knowledge on organizational skills, the ability to anticipate decisions linked to people (retirements, changes, new projects,...) and to have an organization in constant development. To achieve this, various sessions have been undertaken throughout the year. These have been in workshop format, to reflect on various challenges of the organization, adapting missions and dimensions of each group. Managers of the CON have taken part, along with development and personnel manages of the CGOL group.

Within the leadership Programme/Project for the Payrolls and Social Security Unit, the proposal aims to improve leadership skills and team management. This is because in 2015 a substantial change was started in management methods, and the difficulty in adjusting to new techniques and structures.This is why a training itinerary was applied addressed as a team to the Unit managers, working at group and individual level, on how to progress in interrelations, improve the environment and cohesion to achieve goals. A total of 6 sessions were held, starting in March and ending in July, with the addition of two group follow-up sessions of the action plan generated and drawn-up by the group.

3. Training

During 2016, the Training Plan wss developed similarly to the previous year. Training actions have mainly been within the Training Plan, which comprises both technical training and transversal training (languages, office automation, skills and abilities for staff outside the agreement and control, etc).

TB	**2012**	**2013**	**2014**	**2015**	**2016**
Courses (1)	679	692	477	611	602 (2)
Number attending (3)	3,384	3,325	1,949	1,841	2,287 (4)
Number participating (5)	6,104	6,259	3,492	3,915	4,212 (6)
Training hours (7)	13,729	12,225	5,334	6,919	6,820 (10)
Hours per attendee (8)	70,894	71,690	49,196	51,609	54,258 (9)
Ratios					
Number participating/ course	8.99	9.04	7.32	6.41	7.00
Hours per employee (11)	11.61	11.45	14.09	13.18	12.88
% of personnel trained	85.79	85.57	50.62	47.10	58.13

This is detailed in the notes given below:
(1) Number of sessions held throughout the year. If a course is held 5 times it is recorded as 5 courses
(2) courses provided for Bus network Management are added, plus corporate courses with at least one participant from DXBus.
(3) The number attending is the number of people receiving training, bearing in mind that a person who has, for example, attended three courses will only be recorded once.
(4) Includes attendees at courses provided for DXBus plus those attending corporate training courses.
(5) The number participating is the number of people receiving training, bearing in mind that a person who has, for example, attended three courses will be recorded three times.
(6) Includes attendees of DXBus plus TB attendees to corporate training courses.
(7) Training hours are those given by the trainer, calculated by the training completed.
(8) Attendance hours are the number of hours in the course multiplied by the number of people attending.
(9) Includes hours attending courses provided to DXBus plus attendance at corporate training courses.
(10) Includes training hours provided for DXBus plus training hours on corporate courses with at least one participant from TB.
(11) The number of hours attended divided by the number of participants.
(12) The average number staff in 2016 was 3,934.48 employees and the number attendees was 2,287.

As observed in the table, the ratio of participants per course increased compared to the previous year, to reach 7 people/course. The percentage of trained staff has also increased to 58.13%.

The most significant aspect of training activities of the year, regarding technical training, were:
— Continuous Training of the Professional Competence Course (CAP) has formed an important part of the training plan as regards volume of hours/participant. This year, the second 2015-2020 cycle has been continued, with updated contents and new dynamics. 25 "Continuous Courses of CAP" have been given over the year, with a total of 453 employees trained (representing 15,855 hours/participant), with a maximum of 20 participants per group. Similarly to other years, great effort has been made to improve the knowledge of trainers, including training on "How to manage feelings", "Group Dynamics" and "Fire in New Technology Vehicles".
—Following the same model as previous years, a total of 112 candidates have received training on New Drivers, who have joined the organization. This means a total of approximately 9,968 hours/participant, between external training (35 hours), internal training (40 hours) and two double sessions (14 hours).
—Similarly to other years, work has continued in the Rolling Stock Skills model, owing to the good results and use obtained.
—Work has continued on implementing new technologies to vehicles, in regard to vehicle hybridization processes, buses with CNG and purely electrical vehicles. In this sense, training on new Solaris electrical articulated models (model E18) is highlighted, which are available to CON Rolling Stock operators involved and technicians of the Bus Technical Division.

—Training annex Workshop walkways to Zona Franca 1.

The training action concerning new technologies, tools and systems, plus training linked to technological projects implemented in Corporate managements is noteworthy. Upgrades regarding financial systems and legislative innovations, training to learn digital marketing & *e-commerce*, digital marketing & *Social Media*, along with the use of tools that enable metrics such as SEO, SEM, *Google Adwords*, Professional relations with clients, etc.

The following are noteworthy in transversal training:
—The start-up of the Organizational Development Centre (CDO), where significant training is carried out, including the Contractor Portal and Transparency Law, *Big Data*, Training for trainers, Project management, Time management, Strategic leadership, etc.
—Continuity in language training for those who require it in order to develop their assigned duties.
—Training in office automation through *e-learning* in different Office 2010 programmes and features of*Click & Decide*.
—Continuation with the deployment on specific training in Occupational Risk Prevention.
—Education for trainers specialized in first aid.
—Accident prevention programme - Training for driving analyist trainers and observers.
—Conflict management for Intervention and Control Agents.
—Other transversal training actions in: The data protection law, Application of QRS, Fraud management, speech therapy, etc.
The satisfaction level of attendees of the TB courses, was 3.44 over 4, an improvement on last year's level.

Similarly to previous years, this year the difficulty was again experienced in the availability of Rolling Stock Maintenance staff of all CONs, to participate in training actions within the Area of Health and Security. However, in spite of this, more courses were given on this subject than the previous year: Occupational risk prevention in the workplace, training in fork-lift trucks, bridge cranes, lift platforms and columns and work at heights.

As in previous years, efforts were made to optimise resources, ensuring that investment in training is recovered through the Social Security credit given by the *Fundación Española para la Formación y el Empleo* (FTFE). This year the credit assigned by the FEFE was more than last year (542,117 €). 90% has been made available, which is a considerable percentage. However, it should be kept in mind that the level of allowances, in general, could decrease in the future.

4. Competency management systems. Projects and innovation

This year the number of people submitted to Performance Appraisal was almost the same. In 2015, 295 people of the Bus Network were assessed and 15 from Functional Areas. In 2016 the number was 298 and 15 respectively, meaning three more than the previous year.
Once again, provisional improvements have been made to the form, such as the inclusion of development agreements established in the previous performance appraisal. This has reinforced the continuity of the process from one year to the next. Work meetings have been held with users, to identify needs and possible improvements for the next renovation of this system. In this sense, a document has been drawn up including the functional needs of this new version.

Work has been done during the year on an ethics code within the framework of a proposal from the Values Management. The first draft has been drawn up of a Strategic Plan of Human Resources 2017-2020. Support has been given to the Objectives Management of the Service and also to improvement initiatives of processes and the generation of Selection and Training procedures in the Service.

Social and healthcare assistance:

Prevention of injuries due to workplace accidents and occupational illness:

The development of the Prevention Plan has continued this year. The following significant actions have been carried out:

		2016
New job risk assessments	New workplaces	**34**
	New Work Centres	**2**
	Review and updating of workplaces	**96**
	Review and updating of Work Centres	**21**
Specific assessments	Safety reports	**29**
	Industrial hygiene reports	**24**
	Ergonomics Reports	**14**
Updating of the PAU document (self-protection plan) and emergency dossiers		**4**
Review of work processes and instructions		**3**
Renewal of machinery and work team safety certificates		**179**
Group follow-up meetings of Bus Occupational Risk Prevention		**6**
Research into work accidents	Ordinary	**326**
	Specialized	**4**
Managing the documentation for coordinating business activities	Total companies managed in 2016	**453**
	Total active companies in the system	**912**
	Incidents	**500**
	Allocation of risk level based on type of order	**92**

As part of the health monitoring Programme, 2,120 medical examinations were conducted and 358 examinations were unplanned.

The Health and Safety Committe has continued its usual tasks throughout the year: 12 ordinary meetings, 3 extyraordinary meetings and 12 joint visits to work centres. It is important to highlight the new action procedure against assault from external violence.

Finally, we would like to underline the approval by the Executive Board of the updating of the Occupational Risk Prevention Master Plan for the period 2016-2021, and also a diagnosis report on the situation of the current management system of Occupational Risk Prevention, regarding the possible ISO 45001 certification in the future.

Occupational welfare:

Regarding the Equality Plan, the document "Report on the follow up of the 2016 Equality Plan" should be mentioned.

This year work has continued on developing different actions in participation systems, including.
—Training of 9 work groups with a participation of 41 people.
—Implementation of the 5S methodology (sort, set in order, shine, standardize and self-discipline) and a maintenance audit of the system in Triangle CON at: the CON office store and the CON tool area.
—Company loyalty events (silver and gold anniversaries) with 221 employees.
—Various sports, social and cultural events (TMB athletics group, Tai-chi group, Art group, Photography group, MTB group, the TMB Choir and the hiking group).

Promotion of health and prevention of common diseases:

Several programmes were implemented: Mental health, cardiovascular risk prevention, colon and prostate cancer prevention.
A total of 305 employees received flu vaccinations under the flu prevention programme while 32 employees were vaccinated against tetanus and diphtheria.

The TMB received the Certification and Recognition of Good Practice in Occupational Health Promotion from the *National Institute of Occupational Safety and Hygiene (INSHT).*

Social and healthcare assistance:

The most significant data of the year are summarized below:

		2016
Medical care given in response to work-related accidents:	Injuries which do not lead to time off work:	**70**
	Injuries which do lead to time off work:	**345**
	Of which 97.6% were minor injuries	
Medical measures in response to work-related accidents:	Visits carried out	**1,714**
	Number of diagnostic tests	**186**
	Referrals to specialist doctors	**452**
	Number of surgical interventions	**14**
	Number of therapy sessions	**2,038**
Medical measures to deal with temporary sick leave for non-industrial illnesses:	Medical visits carried out	**3,604**
	Number of diagnostic tests	**39**
	Referrals to specialist doctors	**23**
	Number of surgical interventions	**-**
	Number of therapy sessions	**18**
Weight loss programme		**15**
Programme to help employees give up smoking		**14**
Social work:	Personalized attention	**519**
	Care programme for conditions involving dependency	**15**
	Follow-up of prior year interventions	**123**
	New continued intervention cases	**40**
Social care fund (FAS):	Beneficiaries:	**86**
	Applications received	**43**

Personnel management - Metro corporate

1.Technical Secretariat

With regard to budget monitoring, the coordination of information systems and projects monitoring of the Area, the Technical Secretariat has continued working on all those fields requiring a high degree of coordination between services. The most significant actions were the drawing up and monitoring of budgets of the Area, and also of Functional Area staff, plus support to different Area services regarding information systems.

In Organizational Classification of workplaces, the initial proposal of the new classification model of workplaces was investigated, amended and adjusted, in order to exceed the current system of categories.

Proposals and improvements were made, as an alternative prior to the establishment of a complete description and assessment of workplaces (similar to that of the TB, for workplaces within the agreement), plus a model of professional groups and roles. A proposal of regulations and a manual were completed, in order to visualize the management of this new model as soon as it is put into operation. There has been full collaboration of the Metro network Management in this important issue, has been Job Evaluation Committee issued rulings.

It also provided technical support and advice to both representatives and postholders on all the organizational and operational changes introduced in the year, which have affected the functional content of job descriptions, reporting structures or the allocation of organisational roles.

2. Contracts

In the functional divisions, 29 new employment contracts were prepared and one contract was modified or renewed during the year.

3. Personnel management services centre

1. Selection and promotion:

Coverage processes were performed, both via internal examination and external selection, to meet the needs of the four areas of the Metro Network Management (Operations, Personnel, Maintenance and Projects and Technical, plus the Network Security Management.

This year the major challenge was achieved of opening the L9 South section. From the Selection area, the team of Operation Technicians of the Automatic Lines was reinforced, with the incorporation of 12 more people (for which there were 890 candidates). Positions were also covered of Automatic Line Operators (OLA) and emergency Operators for the Metro Control Centre. Internal and external staff were incorporated for the 10 vacancies of the Technical Operational Commands (CTO), out of 433 candidates. During the holiday period, 63 Customer Service Agents were selected out of over 5,000 candidates. The position of Technician.Head of timetable and offer design production should be mentioned.

Other significant processes include the following:
—6 positions of Security and Civil Protection Coordinators were covered in the Network Security Management (management of 217 candidates). A group of staff were also selected to perform massive fraud control tasks (out of 251 candidates).
—In the Maintenance and Projects Department, processes were done for Rolling Stock, Infrastructure, Superstructure and projects and Metro Infrastructure Works, at engineering level and Head of Train Cleaning, Technician/manager of Low Voltage projects, and head of Works Maintenance, head of track Preservation, etc., up to around thirty internal and external processes. It is noteworthy to mention the process of Rolling Stock maintenance operators, where 13 vacancies were covered from around 360 candidates.

With regard to Corporate Services, various examination and selection processes were done to cover the needs of the Executive Marketing Management, the Executive Economic Finance Management and the Executive Management of Innovation, Technology and International Business.

Monitoring and assistance has been done throughout the year to promoted staff before the end of their trial periods, in order to assess their degree of integration and satisfaction with their workplace, give support if difficulties are detected, and globally complete the incorporation process to the new job.

2. Development and management of personal improvement

A total of 4 internal workshops were held, given by a team of professionals of the Development and Management Unit of Personal Improvement. These workshops were addressed to different TMB professionals, and included work on team cohesion and leadership skills. A total of 40 hours training was given in 14 sessions involving 57 participants (39 employees). Attendance to external training should also be underlined, to which support is also provided. In total, there were 128 people in 186 sessions of assistance. New activities aimed at different groups were designed, including:

—Leadership programme/project for the Payroll and Social Security Unit.
The proposal made aims to improve leadership and team management skills, as a substantial change was made to the method of management in 2015, and also because of the difficulty involved in adapting to new techniques and structures. This is why a training itinerary was applied addressed as a team to the Unit managers, working at group and individual level, on how to progress in interrelations, improve the environment and cohesion to achieve goals. A total of 6 sessions have been given, starting in March and ending in July, adding two group follow-up sessions of the action plan generated by the group.

— Team-building skills programme/project for the Metro Maintenance Division:
The initial project consisted of 12-hour external training and two follow-up sessions per Unit. These were given internally by our Unit. 13 follow-up sessions were achieved, and completed with 5 sessions held in 2016.

— Assistance programme to the new control:
This programme is to encourage the personal and professional development of each promoted/incorporated member of staff. It reinforces their role of effective leadership and approach, generating synergies and guiding actions and attitudes to the mission, strategy of the Company. To achieve this (as a result of the training action given by attendees in leadership, communication, team work and resource management and decision making, in 4 sessions of 7 hours), an action plan is being drawn-up, in which monitoring is done by their managers and/or tutor. Our mission is to provide support tools and assistance to achieve it and later assess its transfer to the workplace.

Training was started in December 2016 in the first group of 16 controls. Three more groups are programmed, with a total of 40 scheduled. Monitoring is planned for the first quarter of 2017.

— Staff Development and Organization Project: Talent management.
The TMB Corporate Management of Human Resources is assigned to start-up the project, available both to Bus and Metro networks and Corporate areas. The goal is to identify the skills and promotion factors of people, with current knowledge on organization skills, the ability to anticipate decisions linked to people (retirements, changes, new projects,...) and to have an organization in constant development. To achieve this, the Unit prepared information on the professional career of participants (90 in the Metro group), as a result of past and participatory knowledge in various tools and development projects.

3. Training

The following table shows the most significant ratios in 2016 of training activities, both of a technical type for Metro and functional areas:

FMB	**2012**	**2013**	**2014**	**2015**	**2016**
Courses [1]	1,906	2,287	3,024	2,806	3,298 [2]
Number attending [3]	3,285	3,714	3,447	3,602	3,654 [4]
Number participating [5]	10,747	13,465	11,207	12,612	14,842 [6]
Training hours [7]	24,192	19,465	19,741	31,183	18,189 [10]
Hours per attendee [8]	90,652	76,335	67,800	116,253	79,978 [9]
Ratios					
Number participating/ course	5.64	5.88	3.71	4.49	4.50
Hours per employee [12]	8.44	5.67	6.05	9.22	5.39
% of personnel trained	102.0	170.0	110.3	114.7	113.3 [11]

An explanation is given in the notes below:

[1] Number of sessions carried out throughout the year. For example, a course can be held 5 times and is therefore 5 courses.
[2] Includes courses provided for the Metro network Management, plus corporate courses with at least one participant from the DXMetro.
[3] The number attending is the number of people receiving training, bearing in mind that a person who has, for example, attended three courses will only be recorded once.
[4] Includes DXMetro attendees plus those attending corporate training courses.
[5] The number participating is the number of people receiving training, bearing in mind that a person who has, for example, attended three courses will be recorded three times.
[6] Includes attendees of DXMetro plus those from Metro attending corporate training courses.
[7] Training hours are those of the trainer, calculated by the training completed.
[8] Attendance hours are the number of hours in the course multiplied by the number of people attending.
[9] Includes hours of DXMetro plus attendance at corporate training courses.
[10] Includes training hours of BXMetro plus training hours on corporate courses with at least one participant from Metro.
[11] The average staff in 2016 was 3,203.09 employees with 3,654 attendees.
[12] The number of hours attended divided by the number of participants.

Courses were programmed to adjust as far as possible to the availability of participants, depending on the service. On-site training was increased to allow more flexibility, particularly in groups such as Customer Attention Agents and maintenance staff.

In 2016, the training management model has been maintained for the Special Railway Register, regarding renewals of driving Certification. Training has continued as a result of the review of the Metro Driving Regulations, through which the staff currently enabled for driving have been trained.

With regard to Technical Training, the annual retraining of Operational Technicians of Automatic Lines (TOLA) has continued, along with the training of new workplaces, including training in customer service addressed to recruitment participants of a Control and Intervention Agent (ACI). Specific legal regulations training has also continued for intermediate controls that affects the business (labour regulations, Data Protection Law, etc.) and the updating of customer attention Agents (ACC) during the summer, increasing the number of training hours to incorporate customer attention training.

The New Railway Register has continued in all driving certification renewals for the ACC group and Motorcyclists, along with the start-up of an assistance Plan for new intermediate controls of the network (including competence training), and training reinforcement in critical situations of the control structure. This is to give support to the ACCs and motorcyclists in psychological first aid.

In Corporate Managements, training actions should be highlighted regarding technological innovations, tools and systems, along with training linked to technology projects implemented. Updates regarding financial systems and legislative innovations, training to learn trends in digital marketing & *e-commerce*, digital marketing & *Social Media*, plus the use tools to enable the corresponding metrics such as SEO, SEM, *Google Adwords,* Professional customer relations, etc.

The following should be underlined regarding transversal training:
—The start-up of the Organizational Development Centre (CDO), including training actions of the Contractor Portal and Transparency Law, *Big Data*, Training of trainers, Project Management, Time Management, strategic Leadership, etc.
—Continuity in language training for those who require it in order to develop their assigned duties.
—Training in office automation through *e-learning* in different Office 2010 programmes and features of*Click & Decide*.
—Continuation with the deployment on specific training in Occupational Risk Prevention.
—Education for trainers specialized in first aid and creativity/*coaching*, for trainers specialized in Railway Safety.
—Dispute management for Prevention Assistants.
—Other transversal training actions in: The data protection law, Application of QRS, Fraud management, speech therapy, etc.

Once again the global level of satisfaction of attendees regarding courses given to Metro was 3.36 over 4 points, which continues to be a highly satisfactory score.

As in previous years, efforts were made to optimise resources, ensuring that investment in training is recovered through the Social Security credit given by the Tripartite Foundation for Employment Training (FTFE). This year the credit applied amounted to 397,556 €, that is 93% of the maximum total amount that can be reimbursed by the FTFE, which is a considerable amount.

4. Competency management systems. Projects and innovation

This last year, the Performance Appraisals have increased by 16.15%, basically owing to the incorporation of new Technicians of automatic lines (TOLA) of the South Section of L9. In 2016, 791 appraisals were done on the metro network and 15 in functional areas, consolidating the upward trend in the scope of the tool.

Once again provisional improvements have been introduced to the form, such as the inclusion of development agreements established in the previous performance appraisal, reinforcing the continuity of the process year after year. Work meetings have been held with users to identify needs and possible improvements in view of the next renewal of the system. In this sense, a document has been drawn up including the functional needs of this new version. This question has been worked on as one of the core concepts of the DARWIN project.

Participation in the DARWIN project has been maintained, in communication and development work teams of collaborators, indicators and performance appraisal.

Throughout the year, work has been done on an ethics code within the framework of a proposal from the Values Management. The first draft of a Strategic Plan of Human Resources 2017-2020 has been done, giving support to the Objectives Management of the Service. Support has also been given to improvement initiatives of processes and the generation of Selection and Training procedures in the Service. A proposal to study the internal environment has also be drawn up, explicitly designed by Metro units.

Social and healthcare assistance:

Prevention of injuries due to workplace accidents and occupational illness:

This year, the development of the Prevention Plan has continued. The following significant actions have been carried out:

		2016
New job risk assessments	New workplaces	**4**
	New Work Centres	**39**
	Review and updating of workplaces	**75**
	Review and updating of Work Centres	**78**
Ergonomic assessments	Safety reports	**84**
	Industrial hygiene assessments	**29**
	Ergonomics Reports	**11**
Emergency plan and self-protection	New emergency plans	**1**
	Updating of PAU documents and emergency dossiers	**37**
	Partial emergency simulations	**7**
Review of work processes and instructions		**33**
Managing the documentation for coordinating business activities	Total companies managed in 2016	**453**
	Total active companies in the system	**912**
	Allocation of risk level based on order type	**92**
	Notification of start of external activities	**283**
	Total incidents	**500**

20 activity coordination meetings have been held with Concessionaires of L9/10 North and L9 South. Work management and activities in new infrastructures of L9 South involved: 600 work procedures, 50 work coordination actions and 6 revisions of infrastructure and preventive measures.

712 actions have been carried out for the maintenance of the safety certification of machines and work equipment.

As part of the health monitoring programme, 1,404 medical examinations were conducted, and 606 unplanned

The Health and Safety Committee has continued its usual tasks throughout the year: 11 ordinary meetings, 28 monitoring meetings of ongoing issues and 19 joint visits to work centres.

Finally, the approval by the Executive Board should be mentioned regarding the updating of the Master Plan of Occupational Risk Prevention for 2016-2021. Secondly, a diagnosis report on the situation of the current management system of the Prevention of Occupational Risks, regarding the possible future ISO 45001 certification. Minimum safety and health specifications have been reviewed and updated of the metro network installations, and a voluntary Occupational Risk Prevention audit has been done.

Welfare in the workplace:

Regarding the Equality Plan, the document "Report on the follow up of the 2016 Equality Plan" should be mentioned.

This year work has continued on developing different actions in participation systems, including.
—Regarding the Team of analysis and optimization (TAO), 9 analysis and optimization teams were formed in the automatic lines, with a participation of 24 people.
—Implementation of the 5S methodology (sort, straighten, shine, standardise, and sustain) and system maintenance audits in the following work centres:
- Control offices of the Sagrera Rolling Stock workshop.
- Vilapicina long-cycle workshop.
- Roquetes engine shed gate.
- Individual protection equipment and consumables area of Can Zam.
- Track machinery workshop of Can Boixeres.

—Improvement project: the appointment circuit for medical examinations of the Prevention Service..
—Company loyalty events (silver and gold anniversaries, with 46 employees.
—Various sports sports, social and cultural activities (TMB athletics group, Tai-chi group, Art group, Photography group, MTB group, the TMB Choir and the hiking Group.

Promotion of health and prevention of common diseases:

Several programmes were implemented: Mental health, cardiovascular risk prevention, colon and prostate cancer prevention.
A total of 117 employees received flu vaccinations under the flu prevention programme while 60 employees were vaccinated against tetanus and diphtheria.

Social and healthcare assistance:

The most significant data of the year are summarized below:

		2016
Medical care given in response to work-related accidents:	Injuries which do not lead to time off work:	**56**
	Injuries which do lead to time off work:	**313**
	of which 98.3% were minor injuries	
Medical measures in response to work-related accidents:	Visits carried out	**1,162**
	Number of diagnostic tests	**122**
	Referrals to specialist doctors	**220**
	Number of surgical interventions	**10**
	Number of therapy sessions	**959**
Medical measures to deal with temporary sick leave for non-industrial illnesses:	Medical visits carried out	**3,304**
	Number of diagnostic tests	**14**
	Referrals to specialist doctors	**15**
	Number of surgical interventions	**1**
	Number of therapy sessions	**18**
Weight loss programme		**11**
Programme to help employees give up smoking		**9**
Social work:	Care programme for conditions involving dependency	**19**
	Follow-up of prior year interventions	**109**
	New continued intervention cases	**36**
Social care fund (FAS):	Beneficiaries:	**108**
	Applications received	**178**


11
A firm commitment to innovation

International business and Research and Development of TMB and TB

1) Development of new business and external consultancy

During the year, the International Business Development Division continued to provide assessment and consultancy services for public transport companies, while seeking and acquiring operations in other cities outside Barcelona.

Its main aims are as follows:
—to exploit *the know-how* of the company for commercial purposes;
—to position it as an international benchmark operator;
—to increase the qualifications of TMB technical staff in accordance with the technical progress made in the world of transport;
—to promote research and development projects (R&D), and
— to develop new businesses.

TMB has participated in various external projects, either alone or jointly with other engineering or consultancy companies, such as AGL, or with other operators, such as Moventia and Vectalia. With Vectalia, TMB continues to run a successful urban transport network in the Perpignan area and in the city of Antibes in France. Iin 2016, an extension to the concession up to 2021 was signed (it terminated in 2019) in Perpignan. This was because the Agglomeration wishes to incorporate hybrid buses and also changes have been introduced in the design of the bus network.

A technical advisory service, commissioned by the Government of Panama, was provided to the Panama Metro to help it reorganise the Bus operation (MetroBus) in Panama City. A large part of the project was stopped in 2015, but started up again in mid-2016. Our consultants travelled to Panama, to make an analysis of the situation and validate the diagnosis developed in 2015. They also proposed to the bus and metro company a series of measures, to improve the bus service in Panama City.

Owing to political problems in Bangladesh, the BRT project (Bus Rapid Traffic) in Dhaka, was resumed in October 2014. During 2015 some consultation services were provided, but the project was finally put on hold again due to political issues affecting the end client. Our team of experts provided advice on the specifications for the BRT's buses, stops and stations. In 2016, the project was permanently shut down. TMB worked jointly with ALG (now INDRA).

Tenders were presented at the bidding of projects, which could materialize in 2017. These include the bidding for the revision of the Ulan Bator (Mongolia) mobility plan, in conjunction with the Ardana consultants of Group-4.

The Bus business has also participated in projects that were finally not assigned, such as:
—Bidding for the operation of part of bus services of Nice.
—Review and modification of the business plan to implement an Integrated Transport System, and to perform new pilot testing in the island of New Providence (Bahamas), together with Mcrit.
—

2) Research and Development

TMB was contracted as collaborator in the R&D project *BigloT* (*Bridging the Interoperability Gap of the Internet of Things*). This was a technological solution for multi-standard, multi-platform and multi-domain applications and services of the Internet of Things.

TMB collaboration consisted of testing radio devices on board buses, that enabled mobile phone-based apparatus to be used.

3) International activity

There has been intense activity in this field in 2016, namely visits from international delegations to Barcelona, and the active presence of various TMB professionals in international public transport organizations.

Active participation of TMB professionals in the International Association of Public Transport (UITP), the*Association of Collective Urban Transport management companies (ATUC) and the International Bus Benchmarking Group (IBBG).*

International business and Research and Development in FMB

1) Development of new business and external consultancy services.

Throughout the year, the New Business Development Division has continued actions in assessment and consultancy for companies related to public transport. Its main goals are the following:

—to exploit the company's know-how for commercial purposes,
—to position it as an international benchmark operator,
—to increase the qualifications of its technical staff in accordance with the technical progress made in the world of transport,
—to promote research and development projects (R&D), and
—to develop new business.

TMB has participated in various external projects, either alone or jointly with other engineering or consultancy companies, such as AYESA and AUDING-INTRAESA, GPO and Typsa. TMB is also participating as a partner in ENSITRANS, jointly with SENER, Lisbon Metro and the Portuguese engineering company FERCONSULT. Through this company TMB has worked since 2010 for the Oran tram service in Algeria, auditing its trams, yards and workshops. This year the Oran project has been completed, and it now remains for Ensitrans to finish the Algiers project.

In 2016, the consultancy service has ended of the Panama Metro project, as phase 2 of this project has been completed. At the start of 2016, the services of two members of TMB staff were extended (there were three people at the start), to continue giving support to the consolidation of Panamanians who were starting to take over control of the metro. At the end of July, one of the TMB staff members, acting as Manager of Operations and Maintenance of the Panama Metro, left his position and returned to Barcelona, to be replaced by a Panamanian The 5 remaining months of the contract were undertaken by another technician, who will terminate the contract in May 2017.

The Line 1 Panama Metro project will be completed with the visit of the Safety Team of Barcelona Metro in March 2017. The FMB will have formed part of the Safety Department of this Metro, and will have left a Railway Safety Management System (SGSF) in place.

In January 2016, train auditing started for the Panama Metro Line 2 project at the Alstom factory in Santa Perpètua de la Moguda (Barcelona). From July 2014, bid specifications of trains had been drawn up and the assessment commission was attended concerning the analysis of bids presented.Also in relation with this audit, the consortium asked TMB to take over the supervision of Yards and Workshops, particularly of equipment required and their optimum location at functional and operational level. The TMB Safety team was also asked to participate in the project to give support to risks exported from different systems audited by the consortium.

On 30th May 2016, the TMB and the Panama Metro (MPSA) signed an Auditing contract for the construction and start-up of 70 new coaches for line 1. The contract also stipulates that current 3-coach trains of line 1, will now consist of 5 coaches (40 coaches).

In May a new contract was also signed with the Santiago de Chile Metro, to define the Operation Model of the implementation of Tetra Radio throughout the Metro network. The duration of the project was planned for 6 months, and was completed in December.

The Fare System project of Transport integrated in the City of Cuenca (Equador) was released. In August an agreement was reached to complete the project, as it was the wish of both parties to close this contract, in view of the unforeseen situations that had occurred.

Hence, the projects completed during the year were:
—Operation model of the implementation of Tetra Radio throughout the metro network of Santiago de Chile.
—The Oran Tram in Algeria..
—A transport fare system in the city of Cuenca, Ecuador.

Metro has continued collaborating in the following projects:
—L1 and L2 of the Panama Metro.
—The Zaragoza tram service.
—Auditing of technical studies of the Ecuador *Electric Train*.

Bids were presented for the following projects, which may be confirmed in 2017:
—Benchmark operator in the project *New Metro North* in Dublín.
—Advanced engineering study left branch of*Cross Island Line Eastern* in Singapore, which comprises a 10 km. branch and a macro depot for 120 trains with 8 coaches.
—*Evaluation of Alternatives and Design of the Operation of the first Metro line in Quito* (Ecuador).

In addition, Metro participated in projects that it was finally not awarded, including:
—Granada Tram service, in collaboration with Ayesa and TCC.
—Improvement in internal and external communication of the Medallin Metro (Colombia).
—Auditing Proposal for the construction of a metro line in Toulouse (France), jointly with Sener.
—*Back up to the Structuring of the Institutional System of the Bogota Metro*, jointly with GPO.

2) Research and Development

At the end of 2016, Ferrocarril Metropolità de Barcelona actively participated in the following projects:

– ERRAC

Project of the Seventh Framework Programme of the European Union, renewed for a new framework programme called Horizon 2020. This is a technological platform intended to promote European research in the field of national, regional, local, urban and suburban railways. ERRAC brings together representatives of the European Commission, member states and R&D railway stakeholders (operators, industry, researchers, etc.) and proposes to the European Union priority areas of R&D for framework programmes, especially the forthcoming eighth programme. This platform will be operative until 2020 and TMB is one of the two Spanish bodies represented and one of the three organizations representing urban rail transport in Europe.

-IT2Rail:

The Information Technologies for Shift2Rail (IT2Rail) project is considered by the European Union to be a *lighthouse* project. It aims to provide a new seamless travel experience, giving access to a complete multimodal travel offer which connects the first and last mile to long distance journeys. 20 European companies are taking part, in which urban public transport is represented by TMB, VBB and the UITP.

– NGTC (New Generation of Train Control):

The aim of NGTC is to develop the specifications of urban train control systems and of major railway lines, based on the features of the ETCS (*European Train Control System*) and on CBTC solutions *(Communications Based Train Control)*. it goal is to achieve maximum synergy between both. The intention is to develop a platform based on interoperable and interchangeable standard interfaces covering the entire range of railway applications from urban lines to major railways.

- FosterRail:

The aim of the Foster Rail project is to strengthen research and innovation strategies in the railway sector and to promote the work of the European Rail Research Advisory Council. The project ended in April.

– LIFE-Improve:

The aim is to implement methods and practices that can reduce pollution of the underground environment.

– VA-RCM:

The aim is to find a solution based on ongoing monitoring of conditions of the train doors, to detect and faults from occurring, through mathematical algorithms that analyse the high level of door vibration data. This would significantly improve quality and maintenance costs..

Ferrocarril Metropolità de Barcelona was also contracted as collaborator in the following R&D projects:

– Eliptic:

The project *Optimising existing electric infrastructure and rolling stock in order to reduce costs and energy consumption*, on which the bus company is actively working as members of the consortium. It seeks to demonstrate how to save costs and energy by electrifying public transport and optimizing the use of current infrastructures and rolling stock

Collaboration by Metro consists of undertaking a theoretical study on how power supplies outside the network, should operate, using the electrical infrastructures of the network.

TMB is participating in the following new 2017 R&D projects, which are proposals presented at calls to Horizon 2020 of the European Union. URBMOBIM *Urban mobility BIM*.

3) International Activity

There was intense activity in the international sphere in 2016, with visits by international delegations to Barcelona and the presence of TMB professionals in various international public transport organisations.The extension of Line 9/10 led to greater activity in this area. TMB's Director of the TMB Strategic Projects Service chairs the Automatic Metro Observatory of the International Association of Public Transport (UITP). TMB continued to play an active role in the European *lobbying* group, the *Major Metropolis Group*. The members of this group are multimodal operating companies in major European cities who seek to boost the role of these companies in the economic development and well-being of the European cities.

TMB representatives also played an active role in the activities of the International Association of Public Transport (UITP), the *Association of Urban Public Transport Operators* (ATUC), the *Latin American Association of Metros and Underground Systems* (ALAMYS) and the *Nova metro benchmarking group*.

Technology

TMB's Technology Division was set up to based on the integral management of "Information and Communication Technology (ICT)". The main aims of these technology services include:
—To support the aims of the business (Bus, Metro and Leisure Transport).
—To help the business to save time and money as far as possible.
—To minimise and prevent risks.
—To contribute to meeting the present and future needs of the company's customers.

Corporate technology projects 2016

The technology and organizational projects within the global environment of TMB and TB, include:

– Technology master plan (PDT):

Work continued on the projects identified in the Master Plan for Technology route map which was reviewed in 2014 to cover the period 2015-2020, and adapted to reflect the current programme contract, which expires in 2017:
—*Improved power supplies and air conditioning at the La Sagrera data processing centre:* this action was completed during the second quarter of the year.
—*IP Video Surveillance System:* In 2016, the implementation of a Video Surveillance System was completed (phase-0, contracted in 2014). This enables previous TMB video systems to be integrated and the deployment of new ones. In the CON area, CCTV cameras were partially renewed at the Horta centre.
—*Digitalization of analogue signals:* Replacement of the current, obsolete telephone system, for a new IP (Internet Protocol) telephony system in all areas of TMB. The tender to implement telephony in all Metro stations is currently being prepared. This tender will include both fixed and wireless telephony. Implementation work in stations will start in 2017. With this tender, the changeover to IP telephony programme will be completed.
—*SCADA Bus system:* Continuity, following the roadmap planned in the PDT, of the connection of elements and new systems of the remote control of fixed BUS facilities. This year, the following buildings have been incorporated in the system: Zona Franca I depot, depot infrastructure and the the charging station of electrical vehicles, within the ZeEUS project.
—*New SAP HANA infrastructure:* A tender has been called for a new infrastructure to migrate enterprise resources planning systems (ERP), based on SAP R/3 to SAP HANA software. This technological development marked by the manufacturer, means a major change in current architecture. The potential of this new environment will open up to new features in TMB information systems processes. It will be operational to start migration of different environments during the first quarter of 2017.
—*Microsoft licences:* a tender was called to acquire Microsoft licences to upgrade the current software environment, both at server and user level.

—Customer service and information

Work continued on the TMB customer service and information project, started in 2013, to meet the changing needs of the public via new digital channels, with improvements to quality and internal management, applying a comprehensive approach to Bus, Metro and other digital channels. The following projects were implemented during the year:

—*Evolution of the TMB website:* work has continued on projects underway since 2014. Roadmap planned within the 2014-2017 Programme Contract: publication of the new web portal with a new image, new architecture of contents, responsive, adaptable browsing depending on the device, certified for quick and light accessibility. Implementation of a new self-scalable cloud infrastructure.

— Design, layout and contracting for the implementation phase of the new corporate website.

— Design and procurement of new website infrastructure.

—***E-commerce:***

The following has been possible as a result of the creation and start-up this new channel in 2015:

—Develop the project to sell products from third parties.

—Incorporation of BBT Nit and booking management.

—Improvement in SEO to increase positioning in search engines.

—Enabling of secure payment to reduce fraud.

—Development and implementation of the new tax system for Travel Agencies for the TMB company, S.L.

—Development of the billing module. In 2016, turnover of *e-commerce* reached 4 million euros.

—For 2017 it is planned to implement products addressed to Catalunya Bus Turístic.

—T-Mobility Project (contactless card in the Metropolitan Region of Barcelona):

This project is based on the development of the *ticketing* system of the Metropolitan Region of Barcelona. Promoted by the ATM and with the support of the AMB, the aim of this product is to replace the magnetic ticketing system (obsolete) with a modern system, based on contactless cards (TSC).

TMB is the main operator of the AMB, and the TMB Technology Division has participated intensely in the reorientation and new focus of the project.

The project will be resumed at the beginning of 2017, with new directives (continuity of the current fare system, co-management of the project between the ATM and TMB and FGC public operators, reconsideration of the implementation procedure to reduce impact on transport operations, management of change to minimize risks, etc.). The goal is to have contacless cards in operation by December 2018.

—**Problem management:**

Following the consolidation of ICT management processes, Problem Management has been implemented on the same ITSM tool (integral tool in the management of IT services), aligned and integrated with Change Management processes, Configuration Management and Incidents and Requests Management. This process will facilitate the management of whose cases, which owing to repetition, scope or complexity, require multi-departmental collaboration to improve the operation of services or systems, generating improvements and reusable knowledge.

—**MDM (*Mobile Device Management*):**

With increased mobility processes and functions, the number of mobile devices (smart phones, laptops, tablets, etc.) is increasing (and is expected to continue), along with features implemented on them. Owing to the volume and access possibilities to information and corporate processes, correct management is required. In 2016, an MDM tool was selected and implemented. This enables devices to be technologically managed, facilitating support and maintenance, configuration and deployment of applications. At the same time it enables security control over these devices.

—**Deployment of the platform for advanced analysis "*Big Data*".**

BigData is the name of a set of data, procedures and computer applications, which owing to their volume, their varied nature and the speed at which they have to be processed, exceed the capacity of usual computer systems. This data processing is used to detect patterns insdie, and can therefore make valid predictions for decision-making.

This system deals with all activities related to systems that manage large data sets. The most common difficulties in these cases are capture, search, sharing, analysis and their display.

The purpose of the project started at TMB was to deploy a base platform on which to develop projects in the scope of advanced analytics. This should provide solutions to the different problems arising in these types of systems, meaning they should facilitate storage and processing of large volumes of data, at different speeds, both in real time and batch uploads. The application possibilities of *Machine Learning* or Artifical Intelligence, provided by this system are highly significant.

The new platform will be fundamental and should be used as a base to develop new technolgies called *BigData* in many TMB environments.

By making use of innumerable data sources based on the available sensors, social networks, and applications, it can achieve tactical and strategic improvements in management.

The initial projects that are being developed under this technology are:
—Validations per stops.
—Adaptation measure of the driver to the SAE regulation orders.
—Ticket analysis*Hola BCN*

– GIS-PPS Integration:

With the evolution and deployment of the new timetable system (PPS), new integration has been developed with GIS, including new features, that can input integrated data (location and departure times) to: <1><2>
— SAE system to regulate buses.
— Services to calpuate transport routes of the TMB API, which provide service to the website, mobile application, *open data*, etc.

—**TMB API:**

The API services of TMB (*Application Programming Interface*) continues to be developed and adapted, increasing the number of applications used. The deployments of some of them are given below:
—*TMB App:* deployed at the start of 2016, with 2 million calls a day. Events were also supported, (*Mobile World Congress,*Metro and Bus strikes) reaching 3 million/day.
—*TMB website:* the new version uses API for all dynamic data offered, with 1 million calls a day.
— *Open Data:* the use of API will be open to the public in 2017 from the Developer Portal.

—**Improvements in bus maintenance.**

Work continued to improve and rationalise maintenance processes in SAP for Metro (rolling stock and infrastructure) and Bus (engineering and civil works and mobility), including:

This included:
—The incorporation of work orders in the rolling stock section. Automatic reclassification of Bus breakdowns. Allocation of hours in Bus workshop orders.
—Incorporation of new sectors in Bus maintenance management: engineering and civil works. Preventive implementation in Civil Works.
— Incorporation of mobility in maintenance Management of work orders and warehouse materials through a PDA.
—Incorporation to SAP of the Ponent Telecommunications Workshop and integration of external maintenance workers.
—New catalogue of incidents at Stops and online communication to external maintenance.
—Improvement in the Geolocation of Bus incidents and accidents.

—**Adaptation of the financial and human resources modules:**

Adaptation of the Human Resources management system (SAP RH) to the new requirements of the direct Payroll Payment System with the General Treasury of Social Security(Cret@). This is to manage contributions, affiliations, IT communications, etc. This adaptation has meant that IT supplements and benefits, which are now processed on a deferred monthly basis, are now on a current monthly basis.

—Analytics and reporting

Analytical reporting for TB and Metro on SAP HANA technology, that enables processing of volumes of information at a much higher speed than current tools. In the case of TB, these analytics have been implemented to create reports, visits and employee service indicators, block of vehicles and travel, validations, staff, allocations and coverage, technical and real passage times, etc., In the case of Metro, in order to undertake an analysis for the Operations division (activities, staff and coverage).

—Other projects

—*Contractor profile:* development of an application accessible from the TMB website, that enables compliance with legal regulations regarding recruitment in the public sector.
—*Automatic scan of delivery notes:* OCR reading of delivery notes of goods and services, and automatically attached to the purchase document.
—*Energy efficiency platform:* Construction of an energy supply platform that gives coverage to various ISO quality standards, facilitating the tracking of energy efficiency (monitoring, alarm management, etc.). It will be the corporate repository of supply invoices.
—*Construction of an ICA scorecard:* Construction of a scorecard to monitor environmental quality indicators. It includes energy supplies, water, generation of waste and hazardous materials.
—*Fraud claims from the website:* this enables claims to be presented of fraud records from the TMB website.

Bus

Improvements to Bus service operations

—ZeEUS project (electric buses):

The Technology Department is participating in this project of the Bus network management, by providing the adjustment of consolidated Information Systems to the standard fleet, and supply new specific systems required for the use of new traction and electricity technology.

Of the new adjusted Information Systems, the following are highlighted: monitoring and control of depot and street loading stations (Carrer Cisell) and the telemetry of vehicles.

—Central Operation Aid System (OAS):

Evolution and adaptation of the Central OAS system, to achieve greater dynamism, to enable better street management and to facilitate operation processes, activity indicators *online*. Evolution of the System continues as planned in the PDT 2015-2020 roadmap. The following projects have been undertaken this year:

—**P12:** The project has been implemented to manage regulatory measures in OAS in real time. This will improve the area of forecasts and regulations, along with improved operation in the control room through process digitalization. The new system has been implemented in Ponent and Triangle. The deployment is planned shortly in the CON of Horta and Zona Franca 1. The state of Phase 2 is pending, which is aimed at managing incidents and breakdowns in OAS.

—**P10:** During the year, the new communications model TCP/IP of the Central OAS has been defined and contracted. This is to be able to interact with buses through the new mobile 4G network. The first group of features has been defined in order to make use of the new communication channel.This project will be implemented in 2017.

—**P7.1:** Various improvements in the area of scheduled lines have been defined and contracted. Identification of the control system, to enable to link extractions of statistics; provide accessibility to variations on the theoretical service that are caused in providing the service; reinforce the customer view in the operation of lines; improve the operation with information available before the vehicles leave the CON. These improvements will be implemented in 2017.

—**P20:** The new model of Infotransit has been defined and contracted, which will improve information given to the customer in the area of forecasts.

—Infomobility:

During the year, the New Management System of Resources in the bus area has been developed. This will replace the previous *TetraMaps*, which were used from the operation to locate personnel through *Tetra*terminals. Improvements of the new system are:
—The platform is designed to locate and display different types of terminals (*Tetra*, mobile phones etc).
—it enables an enhanced representation on the map (icons for groups, activities, status, etc.
—Self-assignment from the terminal itself (*login*, allocation of vehicle, change of activities, change of status, etc.).

—Service planning information systems:

This refers to all information systems designed to help integrate processes related to services available and those for managing the resources needed to provide them (personnel and vehicles). During the year, the new PPS application has been started up - Service to give support to all timetable management processes to TB. This new application uses the advantages of the SAP HANA technology platform (Databases in memory), and replaces the timetable application (BDH).

—Business intelligence BI project for the Bus business:

BI projects have been developed throughout the year.
—Validations per stop: This projects makes a crossover between data of the validations System and data of the bus location system, giving a detailed view of validations that are done at each stop of the route. This is a very important achievement for the Bus business, as it provides detailed knowledge on the demand for the service.
— *Passenger account:* Regarding the implementation in 20 buses of a new ticket account system, data integration has been developed at central level, between the data of this system and the location of the Bus. This crossover gives detailed information on people getting on and off the bus, which is done at each stop on the route.

— Measures to improve information to customers

— information to customers:

Work has been done on this area to define and implement the technological needs linked to information systems addressed to customers.

During the year, two projects have been undertaken to improve SIU (Information System to Users) channels and PIU (User Information Points).The objective was to improve these channels with more agility. The most important achievements were:

- — Enabling contents programming.I
- — Automating the contents validation process.
- — Reducing the number of versions to be published in the channel.
- — Preparing the channel for the*online* scenario.

– Public Wifi in buses:

Deployment was carried out in buses during the year. It is planned to adapt the whole fleet at the beginning of 2017, providing Public *wifi* (as required by the City Council) and *online* communications of the Bus with Business Operation Centres
(in order to meet the business requirements of TMB).

Metro

The following technological and organization projects are highlighted within the global scope of TMB and FMB.

—**Master Plan for Technology:**

Work continued on the projects identified in the Master Plan for Technology route map which was reviewed in 2014 to cover the period 2015-2020, and adapted to reflect the current programme contract, which expires in 2017:

—*Upgrade of equipment rooms:* The Phase 6 partial transfer of the Drassanes and Tetuan communications centres and the extension of the Rambla Just Oliveras, Espanya (L3), Verdaguer (L4), Joanic and Alfons X centres were completed. Phase 7 (Maragall L5; Via Júlia; Fabra i Puig; Sant Martí; Bac de Roda; Monumental i Universitat of L2) and Phase 8 (Avinguda Carrilet, Paral·lel of L2 and Verneda) are currently being implemented.. With the Tender of Phase 8, the Project will be completed.

—*Transmission Network (MPLS):* Phase 4 (MPLS in 14 L5 stations, in 4 operations and part of the CPD) was completed this year, along with Phase 5 (18 L3 stations and 6 operations). Phase 6 was assigned (November 2016), which will cover: 22 L4 stations, 17 L2 stations and 4 operations. With this tender, the deployment of all Metro stations and Operations will be completed.

—*IP video surveillance system:* In 2016, the implementation of a Video Surveillance System was completed (phase-0, contracted in 2014). This enables previous TMB video systems to be integrated and the deployment of new ones. CCTV equipment of stations was started to be renewed in 2016. This year, phase 1 (14 stations of line 5) was done, and phase 2 (remaining L5 stations) are being implemented. We are now in the final bidding stage of phase 3 (all stations of L1), which will be developed in 2017.

—*New IP PA system:* Information systems are essential for the operation of the Metro, particularly in emergency situations. The current loudspeaker system presents technical and functional deficiencies and there are issues of obsolescence. In 2016, work was done on implementing a central system, which can integrate old TMB loudspeaker systems with the possibility of deploying new ones. Bidding was also started in 2016 for the renewal of equipment in all Metro stations.The work will be assigned and started in 2017.

—*Digital Mobile Radio (DMR):* To meet the radio communication needs of Metro, the TMB included in its Master Plan for Technology the implementation of the TETRA radio-communications system, but the high cost of the system has stopped progress on this project. Other solutions were studied in recent years and, finally, the DMR solution was selected as an effective, and more economical, alternative to TETRA.

DMR is a standard that was conceived and developed as a narrow band digital radio protocol to improve spectral efficiency on the traditional PRM analogue radio, and to facilitate two-way communications through digital radio.
After a technical check of the system in a pilot test, the project bidding was completed in 2016, assigning the system to *Hytera*. Technical design was also started, detailing the system and its manufacture to start implementation in 2017.

—Plan to replace obsolete critical systems:

Continuation of the roadmap on critical systems, which were identified as obsolete. These include PDH transmission networks (Plesiochronous Digital Hierarchy) and SDH (Synchronous Digital Hierarchy), telephony systems of stations, offices and operatives, the radiotelephony system, etc.

Renewal in TMB of part of the SDH equipment (discontinued) was considered to guarantee correct operation of the core of TMB networks. in the access network, cabling of stations with copper was considered, in various sections that have to connect to the MPLS network (IP). (IP).

Regarding Low-Speed Converters, the infrastructure of converters was started of the semi-line L1-B. With this action, deployment in Line 1 has terminated. The majority of services have been migrated to the new network, and hence the PDJ network of L! can be dismantled.

Converters have been installed throughout L3 (pending migration from services planned for 2019). Phase IV has been assigned, which covers the purchase and installation of converters for the whole of L5.

—Second line on metro L9 and validation and acceptance testing for the L9 South.

In 2015, the Technology Division dedicated a high amount of resources to this strategic project. Specialists from every area were involved in the acceptance testing of the new line: ticket validation and sales, information systems, including the adaptation of all information systems affected by the separation of L9 into two lines (L9 North and L9 South), and technology infrastructure (networks): Physical systems tested include the PDH system, voice (SDH), data (IP), *Wi-Fi* (on board trains), chronometry, telecommunications (TETRA, telephony, PA systems, intercoms, video surveillance) and customer information boards.

During 2016, with L9 South at full capacity, the technology team continued working and making the adjustments required for the correct operation of the service.

—Improvements to Metro and Bus maintenance processes:

Work continued to improve and rationalise maintenance processes in SAP for Metro elements (rolling stock and infrastructure) and Bus (engineering and civil works: Mobility), including:In particular:
—Testing the mobility concept to support station maintenance processes. Management of work orders through a PDA. Management through the Website.
—Reorganization and inventory of materials in Metro Maintenance centres.
— New communication circuit of incidents in Metro.

—Other projects

—*Statistics of calls to the Metro Control Centre:*Automate the attainment of different call statistics to the Metro Control Centre, based on the telephone switchboard database.

Actions to improve Metro

Operations and Infrastructures. Apart from the actions described above, the following are highlighted within the specific area of Operations of Metro Business.

—*Service planning and allocation:* In this area, which is essential for network Operation, a step forward has been made in service provision, efficiency and productivity. During the year, concept testing has been undertaken of a new service assignment motor, for service planning processes, based on CPLEX technology. This improves response times of the current solution and enables more optimum solutions to be achieved. A parallel was done during the year regarding the current solution and it will deployed to all managements in 2017.

—*Public Wifi:* An assignment was received from the City Council in 2014 to provide *wifi* in 16 stations (only platforms). During the initial months of 2016, all work on this group of stations was completed in accordance with the agreement.

—*Improvements to Metro and Bus maintenance processes:* Improvements have been made in SAP with the attainment of CCM operator attention statistics and the reorganization and inventory of materials in Metro maintenance centres.

12 Communication with customers, employees and the general public

Communication, customer service, marketing and TMB business area.

Corporate communication, advertising and corporate identity

—Corporate information:

In boosting digital strategy of TMB communications, a 2016 Basic Data leaflet has been drawn up, in paper and digital format, plus the 2015 TMB Annual Report in three languages and accessible for people with visual impairment. The 2016 TMB Institutional Presentation was been drawn-up and updated, in three languages (Catalan, Spanish and English), which is also accessible.

An innovation has been the preparation, design and manufacture of a *Welcome pack* to present TMB. A new TMB institutional video has also been prepared and edited, and Communication Plans have been made regarding shutdowns in the metro network planned for 2016 In the Montjuic Cable Car (November 2015 to March 2016), in L4 and L11 lines in March, L2 (August), L9 South (November) and L5 (December). These have led to various meetings with local councils and Barcelona districts affected by the shutdowns, in order to present different communication plans.

Other noteworthy actions include support tasks and preparing various contents, presentations and audiovisuals for subjects of the Communication Division and for projects of other TMB Divisions and Departments, which include: Opening of the new Metro L9 South, the 90th anniversary of the Transversal Metro, the Presentation of electric, articulated vehicles and the recharging point, the Presentation of hybrid buses, the Alamys Assembly and Congress, the new Campaign "Move for people with disability" and the Project *Improve Life a Metro*, plus others.

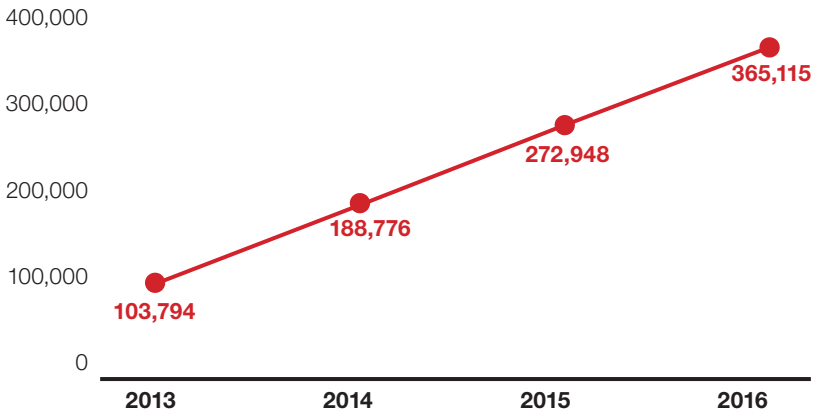
Finally, a total of around 7 hours and 30 minutes of audiovisual production has been done. We should also underline the management of the TMB photographic archives (with an intake or introduction of over 4,700 photographs) and the *Youtube*channels (intake of over 80 videos, *Slideshare*etc.

—Advertising and corporate identity

The following has been carried out in 2016 regarding corporate campaigns.
—Line 9 South campaign. Communication action was done at the start of the year.
—HOLA BCN campaign: the creative content of this campaign was updated to include the features of the product in the message. With this creativity, the environment of ticket vending machines (DA) was covered, of the main metro stations with greatest impact on the non-resident market, along with metro stations of the Airport.

—Club JoTMBé

The number of members registered in the club JoTMBé has increased year by year, to reach over 365 thousand in 2016.



A series of actions has been carried out during the year, with the following results.
—106 competitions have been held, with prizes consisting of tickets or invitations to shows. The number of participants was 189,767 and 237,331 participants. 11,032 prizes have been awarded.
— There have been almost 6 million visits to the website.
—It has been present in the main sectors of interest for our subscribers:music, theatre, films, fashion, sports and culture. The club has become established as a benchmark for the main film producers.

Continuing the path of recent years and on the occasion of Sant Jordi, the 10th edition of the *online* Short Story Competition was held, which once again has been a tremendous success. Similarly to previous years, with regard to communication actions of this campaign, characterized by the integration of various supports, customers have participated by sending in their stories, reading them and making comments.

This year the 7th edition of the *Subtravelling*competition was held, which is linked to JoTMBé club. There have been 27,652 visits from single users.The database contact plan is one of the main sources to attract visits to the site, and also direct visits.

52 videos have been sent to the "Roda a TMB" section. There have been a total of 28,421 votes and 2,420 voters this year in Microcurts.

— Corporate identity

Work has been done throughout the year on a series of actions that can be broken down into: Large format, medium format and small format.

1.Large format: The following are highlighted:
- — Extension and update of the corporate identity manual.
- — all elements of the 4th phase.
- — Proposal on the style and topographic manual of Mou TV.
- — Proposals on the local district bus service.
- — Redesign of safety and emergency videos.
- — Christmas Campaign,*Subtravelling*2016 and Short stories 2016.
- — Updating of the Metro and Bus rules of use.
- — Updating of Metro and Bus fare panels.

2. Medium format: The following are highlighted:
- — 2016 transport ticket leaflet.
- — Redesign of signals inside buses (rules of use).
- — Blood donation campaign.
- — TMB News campaign.
- — Hola BCN in hours.
- — Style review document of the TMB website.
- — New webiste project of club JoTMBé.
- — New tourist bus map
- — Modification of the corporate identity in corporate documents.

3. Small format: The following are highlighted.
- — Graphic support to the website in header images and*banners*.
- — Updating of maps.
- — Presentation model of various documents.
- — Design of various invitations.
- — Information leaflets.

Internal communication.

Following the technical instructions of the Technology Division, a new system has been started up to send emails. This system has a *tracking* device to be able to identify informative consumer habits.

Throughout the year, support has continued to business areas in internal communication of negotiation process of collective agreements (Metro and Bus). A proposal for a *Family Day* was prepared for the Metro, and another to present the new image of Barcelona Bus Turístic vehicles.

The internal CSR action "Tria la teva causa 2016" (Choose your charity 2016), along with the internal communication campaign that resulted, "Mou-te pels drets dels infants" (Move for children's rights) were some of the highlights this year.

The following details summarise the annual activity of Internal Communication:a) Corporate information:

1. Corporate information: 86 TB notices and 140 Metro notices have been published this year.

2. Publications A total of 156 articles have been written and published concerning GenTMB.

3.TMB channel and mailboxes: 53 weekly programming operations carried out. Responses are also given to different corporate mailboxes from Internal Communication.

4. The *GenTMB Club* has reached 3.759 members this year, with an average of almost 47 connections per user per year. The department maintained contact with various suppliers, three of whom have signed agreements with the club, either financial or for the exchange of services. As a result of these agreements, promotions and raffles have been done, aimed at increasing club members.

5. Participation campaigns(aid to courses, sports tournaments, etc.) charity campaigns (party of the NGO Conductors Solidaris de Catalunya (Supportive Drivers of Catalonia), volunteering, Barcelona magic Line, Tria la teva causa (Choose your charity), etc.

6.Communication Plan from the Internaional Business Division: a consultancy project was drawn up for the Malaga transport company (EMT), which has finally been assigned to TMB. This will be carried out in coming months.

Digital communication

Working directly and jointly with other departments, the Department of Digital Communication develops the company's digital communication strategy. It is responsible for managing the corporate website and for overseeing the on-line identity of the brand and the company's involvement in on-line projects.

1. The new corporate website

On 5th September 2016, the new TMB website was published, to replace the previous one started-up in 2011. The purpose was to improve user experience to facilitate easy, intuitive browsing.

—Information on transport services and commitment to the city

The new portal gives priority to public transport users and offers available information in a more efficient way, because routes can be selected to easily and quickly reach the destination. The new webiste improves access to routes of lines, times and fares, which is done easily from the home page. Enquiries can also be made on the status of the service and transport recommendations regarding city events.

The planning tool "Vull anar" (I want to get to) has been updated with significant operation innovations, such as a new search engine, with more flexible answers and more efficient use of maps.Predictive search has also been incorporated, at the place of departure and arrival. This facilitates entering data and avoids possible errors.
The portal also includes wide information on company activities, which actively collaborates in promoting the use of public transport, preservation of the environment and projects of the TMB Foundation.

—Organization of the website area and the new TMB Foundation website.

The website facilitates access to all digital areas of TMB, by means of a new upper browser bar, used in all areas of the TMB website. The bar can be used for cross browsing between areas, starting from the corporate website as the central core and the structuring point of all the website area.

Apart from the corporate website, the project also developed a specific website for the TMB Foundation, designed to provide information on the permanent action of the company in fields of heritage and social responsibility.

—Publication in phases and ongoing development

On 12th July, the website was opened to the public during the test phase, in parallel with the previous website and with a temporary address, to enable users to become accustomed to the change and facilitate the transition between areas,Previously, on 20th June, it had been made available to all TMB employees to try out and for the same purpose.: to connect to the structure and browsing system, but above all, to learn about the new area before anyone else, and to make contributions.

The website management approach is an ongoing improvement and also the new portal, which has taken on continuous development in a context of constant innovations.In this way, team work is carried out to incorporate updates, minor improvements and more significant changes.

After production, work is being done on this evolutionary perspective.

—Management

In 2016, efforts were focused on starting up the new TMB website, in collaboration with other units involved in the project. This was started in 2013, and continued through 2014 and 2015 to its implementation and publication in 2016. During this time, work has been done on conceptualization, design and the construction of the new area.

—Migration plan of contents

Between 2015 and 2016, the migration plan of contents was designed and implemented. This work process included key aspects for successful transfer, such as: the revision and adaptation of all contents, the transfer of libraries, the application of accessibility criteria and positioning, the generation of instructions and manuals and the identification of training needs for the set of editors. A functional review of all templates was done to guarantee the correct operation of pages and understandable browsing.

—Management model

At the same time, in 2016 the management Model of the new website was also developed, in order to revise and update the model valid up to that time. This work was used to clarify the map of responsibilities, analyse and collect management processes, and describe the different roles and functions involved in website management, portraying the administration area and the map of management department relations.

—SEO migration plan (Search Engine Optimization)

In the latest phases, a migration plan of positioning strategy (SEO) was studied and designed. The forwarding strategy of pages was decided (in order to avoid a breakdown in links), communication was planned with the main domains of reference, and the indexing process, analytical implementation and later positioning assessment was undertaken.

—Editors training and management platform
Another management block was the training of editors in dynamic contents of other departments, and the creation of the corresponding management documentation. At the same time, a new contents manager was assessed, which collected and managed functional improvement proposals.

—Project monitoring and improvement

During and after the implementation and migration process, regular work sessions were held to tackle all points of the project under development. This included a block of improvements, results of the test phase with employees, users, editors and the website management team.

2.Digital commission

This forum meets every month to assess management questions, analyse strategy issues and track indicators, innovations and trends in the digital field. The commission continued working until the first half of the year, as a discussion area between departments, which manage websites or social profiles in TMB, led by the Digital Communication department.

3. Transparency portal

In March, the company opened its transparency Portal, hosted within the TMB website, and with its own sub-domain. transparencia.tmb.cat. The start-up of this new area is contextualized in Law 19/2014, dated 39th December, on transparency, access to public information and good governance. The area gives access to available corporate, economic and legal information, through a set of links and updated documentation. It reports on the organization and the institutional, economic and regulatory framework of the company. It is considered an expanding area, which should progressively incorporate new records.

Press Office

During the year, TMB have appeared in the media on 12,409 occasions. 18.6% of them were in favour of the company approaches, 20% of them were against, and 61.4% are considered neutral.

One of the issues that most appeared in the media concerned strikes (4,872 news articles, 39.3% of the total), which group the news articles on the TMB labour dispute, particularly of the Metro Company. References to Lines 9 and 10 of the metro also stood out for their volume (1,311 news articles, 10.6%), as a result of the start-up of the south section of Line 9 and also on the project as a whole.

21.8% of the items published originated in the TMB Press Office, which 20.4% initiated jointly in the press office and other institutions or organizations. Barcelona City Council and other municipal bodies accounted for 6.9% of information items and the Government of Catalonia and its organisations accounted for 8.1%. Media treatment of information issued by the TMB Press Office was favourable in 29.9% of cases originating from the TMB Press Office.

The proactive work of the Press Office produced and issued 206 press releases and dossiers in the year, and also maintained 28 contacts with the media. A total of 892 requests for information and statements were processed, as well as 366 permits for media recordings.

Regarding the TMB News web, which includes a virtual press room, 802 news articles were published, which have received 623,460 visits. The management of corporate profiles in social networks*Twitter* and *Facebook* involved the publication of 3,180 tweets and 1,177 posts respectively..

For the active listening service and analysis of brand presence on internet, a permanent monitoring service of internet and social networks has been contracted, to extract qualitative and qualitative information. The purpose of this is to improve daily management of digital channels, obtain indicators to outline the digital global strategy, and to have tools for communication crisis management.

Information and customer service (IAC)

1. Information and signage:

—Bus campaigns and actions

— Informative campaign to prolong lines 122 and V13 (and the modification of interchange signalling).
— Information campaign on the Sunday and public holiday service of the Local District Bus
— "Mou-te a l'estiu en bus" summer campaign.
— Campaign on new articulated hybrid, 4-door buses.
— New "regulations of use" sticker: change in the design and implementation in all the fleet.
— Electric buses: special exterior coverage (plug campaign) on the first 2 vehicles.
— Modification of TMB and AMB logos in all the fleet.
— Removal of the exterior NXB image and updating of signalling in 36 vehicles.
— new edition of the NXB pocket map (August edition).
— New editions of the foldable bus map (February and March edition).
— New manual of stops: creation of the first bus infrastructure manual.
— Updating of Fares in all the bus fleet.
— New BBT image: study of points susceptible to identity change.
— Implementation of the copy in Braille.
— Study of signalling and implementation of the new bus network (phase IV).
— Informative campaign on the modification in the line 165 service.
— WiFi: exterior and interior signalling in all vehicles and informative campaign on operation with a metro guide edition.

—TMB information and signalling projects

Study on the Metro-Bus integration of information.
Collection of information and signalling criteria of the Metro and Bus.
Start of a study to change graphic material in all informative elements.

Civic Awareness plan: Improvement in signalling reserved seats and areas in bus and metro, and the priority of use of lifts in stations.

2. Information and digital attention:

Actions carried out throughout the year by the Information and digital attention department are grouped in various sections:

—Publication of service information on digital channels:
Service changes and recommendations affecting the network were coordinated, managed and published via the following channels: the website / website for mobiles, JoTMBÃ©, TMB App and TMB Maps, *Twitter* and MouTV/Transmet.

An analysis was done on the activities and impacts in public transport, in order to inform passengers on possible alterations and the recommended alternatives. Coordination was also done of messages and graphic materials for all digital channels, guaranteeing their coherence.

Another task was the study of the main events in the metropolitan area, in order to give recommendations regarding public transport, and the coordination and contrast of information to be issued, with operational centres (Operation Regulation Centre, Bus Information Centre and User Information Centre).

The main actions at channel level were:

—**TMB website:**

— Publication of over 500 alerts in the service Status section and informative pages, that accumulate over 800,000 visits, with information on alterations and city events.

— Over 1,000 planned alterations of the bus lines, with line diversions, change of stops and others.

— Monitoring in real time and the publication of programmed information in traffic lights. on the state of traffic, which appears in the home page.

—**JoTMBé:**

Over 3 million e-mails with service alerts sent to club members based on their profile and interests (segmented by line, post code, etc.). These increased by 100% over the previous year, owing to information sent on transport strikes, which have seriously affected the service.

—**APPS:**

— The Technology Division has prepared a document with features to improve the information and customer service provided by the App, following technological trends. These should be considered in future *releases*, where emphasis is made on personalization and georeferencing.

—*Assistance via digital channels:*

The figures for the year are summarised below:

1) WEB: Response to over 7,000 enquires made by customers through the web form, and responses to over 10,000 enquires received regarding lost property on Metro and Bus premises.

2) BACKOFFICE: The main improvement in the *backoffice*, regarding digital attention, was the implementation of the *ticketing* tool,*Zendesk*. Productivity of this management has been increased with the tool, reducing time spent on each enquiry, and speeding-up its registration and classification, to extract later statistics and conclusions.

3) SOCIAL NETWORKS: The channel has achieved 10,000 followers in the third year, ending the year with 25,300 *followers*. It had an average *klout* score (tool that measures social influence through social networks) of 60-62 (ranging from 0 to 100 points). The higher the score, the more influence in networks.

From March, the operation of the *Twitter* channel was physically done from the Metro Control Centre. This has led to improvement in the speed and quality of information on the service in real time.

The level *of engagement* (interaction with the brand) and impressions have increased considerably, owing to the inclusion of new, more visual and dynamic ways of presenting information on the service, along with the use of new features and innovations developed by the platform itself.

There were over 9,300 conversations in 2016, with customers in the channel,
43% more interactions than the previous year.

—Operation of the MouTV channel:

— Publication of planned service changes and service information in line with other channels. Additionally *scroll* communications, explicative diagrams on metro shutdowns or other incidents, in order to warn users of any alteration to the service and offer transport alternatives.
— Information in real time of events with a high number of passengers, such as the Mobile World Congress (MWC), the national day of Catalonia, the Mercè festivals, in order to facilitate public mobility.
— Operation of the channel and daily updating of news, service information, corporate information and advertising to over 2,800 *players*, installed in the metro and bus network.
— Validation and programming of over 3,000 clips to the MoutTV contents manager.
— Monitoring of the status of *players* and the resolution of incidents.

—Management of the Transmet Information Centre (afternoon shift):

Management of the Transmet Information Centre from 12 to 19h, focusing information on incidents in real time during this timetable, from different operators of the Metropolitan Area , in order to make radio connection with agreed channels, and updating of the *online* newsletter.

—Special information systems for the MWC, National Day of Catalonia and La Mercè festival:

Preparation of specific materials and extraordinary informative devices, along with the extension of usual service timetables, in order to cover events with a high number of passengers on public transport.

—In-person service. TMB Points

Activities of TMB Points have been addressed to meeting the needs of the customer service, resulting from a growing demand, caused by the application of social policies to facilitate public transport.

1: Improvements to the management of processes:

— The installation of a queue manager (Q-Matic) at the Diagonal Point, which has contributed to the organization, classification and registration of actions done with customers. Together with Universitat, there are now two Points that can have quantitative data on the volume of activities performed. This helps to improve the organization of the service. This measure will be extended to the Sagrera Point in 2017.

— Work has been done on adjusting the required conditions for wireless credit card terms at TMB Points, to facilitate sales operations.

2. Improvement of TMB Information Points: the refurbishment and extension of the management meeting points of Diagonal, and air conditioning of the Universitat Point has been reinforced.

3.One of the training courses in staff training was the Speech Therapy course to improve and at the same time protect the voice.

All activities of the Information Points come within procedures collected by their Quality System. This year, the standard ISO 9001 was again certified.

Commercial management has increased by more than 5%, both in the sale of integrated and social tickets.

The *Call Centre,* the customer phone service, has increased considerably in the number of calls attended, 16.3% compared to the previous year. A similar figure has been maintained of the call service index, at 96.3%. The types of calls attended are similar to 2015, with no noteworthy differences.

Calls	**2016**	**2015**	**% Δ**
Incoming calls	70,957	60,404	17.5%
Calls attended	62,714	53,913	16.3%
Missed calls	1,030	1,132	-9.0%
Out-of-hour calls	4,805	3,173	51.4%
% of calls attended	96.37%	96.13%	0.2%
Average time per call (minutes)	0:03:04	0:02:36	

Other management data indicate a sharp reduction in the number of processed claims, as a result of the application of clear, firm criteria regarding their assessment. On the other hand, there was a significant increase in the volume of management of finds.

Customer service management	**2016**	**2015**	**% Diff.**
Claims managed	2,481	2,611	-5.0
Statements processed	1,898	2,589	-26.7
Lost property management (items found)	24,236	20,016	21.1
Management of withdrawn travel cards	6,871	6,784	-1.3

Finally, TMB Points have participated in various communication and advertising campaigns, promoted by the TMB, underlining the participation in the awards and informative management of competitions and promotions of the JoTMBé club.

—Handling complaints, claims and suggestions (QRS):

Definition of goals for this year have been addressed to developing the following lines of work:

— Start-up of the global process revision of QRS cases, jointly with the units involved.
— Analysis and management of replies received by the Unit, concerning the answer to QRS cases started.
— Design of features and requirements of a new application to manage cases.

With the aim of not losing sight of these premises, the following has been carried out:

— Training and recycling sessions of units consulted, with the collaboration of the Quality Department, aimed at optimizing management of QRS cases.
— Definition of new quality indicators that can detect other weak points of the process.
— Drawing up of functional and technical specifications to acquire a new tool to facilitate the management of QRS cases in all units involved.
— The following objectives have been agreed for 2017:
— Redefinition of the contingency plan designed for compromised situations.
— Implementation of the new computer tool.

This year, quality indicators defined by TMB have been maintained at acceptable global levels (Average Response Time: 13,93 days and Responses within Deadlines: 85.50%), although there have been some decreases, owing to a lack of human resources. Also, the fact that the number of QRS received increased by over 20% compared to 2015, has led to some compromised situations, similarly to previous years. These two indicators, of which the QRS Management Unit and the Operational Areas of Bus and Metro are responsible, form part of the commitment required by the Spanish standard UNE 13816.

The number of cases recorded in the year fell by 23% compared with 2015, especially regarding bus services (25% down). It should be considered that this increase is caused basically by the implementation of the 4th phase of the NXB, for the start-up of L9 South and for the Metro labour dispute.

Regarding communication input channels, the use of digital media has been established over the presentation of QRS by our customers in-person. Users accordingly presented more than 57% of complaints, claims and suggestions via digital channels, while face-to-face presentation accounted for 21% of the total. The register of telephone communications is maintained at 4%-5%.

A result of the excellent work of the team was the renewal of the ISO 9001:2008 Quality Certification, without any Non-Conformities to the process. An example of the commitment taken on by the Unit with the Quality System (certification obtained in June 2015, is the permanent work to develop the synergies required for ongoing improvement of the System, processes and organization activities.

—TMB fraud management and antisocial behaviour

The efficiency of fraud management has improved this year, through the new computer application, which automates part of the functions included in the process. This has lead to reductions in time needed for the various tasks, resulting in increased quality in management and a decrease in delays in answering claims presented.

The direct line of communication between the Ombudsmen and TMB. The direct involvement of the Catalan and Barcelona ombudsmen in matters related to the handling of fraud or anti-social behaviour cases by TMB staff has made it possible to detect weaknesses in the service and actively improve it.

The claim presentation system through the website has been in operation since January 2016, although customer response has been lower than expected. For this reason, a communication campaign was implemented from the end of the year, to promote the use of this tool. The main stakeholders in fraud management participated in the campaign.

Direct dialogue has continued with the AMB, and relations have been established with counterpart departments of other operations like Ferrocarrils de la Generalitat de Catalunya and the TRAM.

It should be pointed out that there were 3.3% more fraud cases started than in 2015. There has been an increase of 6.3% in Metro, while Bus has decreased by 17.7%.

The time spect and interventions have dropped considerably. In Metro, there have been 36.7% less interventions, which results in better efficiency as the opening of cases has increased. In Bus, the number of interventions has dropped by 10.5% compared to the previous year.

Collection of fraud cases has increased over 2015, along with the number of cases received. The number of fraud cases transferred to the Administrations was similar to the previous year.

Finally, this year 3,971 antisocial behaviour cases have commenced, representing an increase of 24.5% over 2015.

Business Area

The most outstanding aspect during the year was the bidding and development of consultancy tasks of the TMB Marketing Plan. The successful bidder announced in July 2016 was *Deloitte Daemon Quest*, a company specializing in marketing. In September, the plan was started and will be completed at the end of February 2017. The strategic and tactical objectives of the plan are summarized below.
Strategic objectives:

— To define a new model of products that fits in with all moments of the customer life cycle.
— Revise the strategy of the brand to adapt to the new context.
— Align the challenge of digital transformation to the income expectations the business requires.
— Develop the management model of the TMB Executive Marketing Management, plus the impact it may have on the remaining organization.
— Define the global improvement of the current value proposition to ensure the generation of revenue and the long-term sustainability of the business, facilitating the step forward to become an integral mobility operator.
— Tactical objectives are the following:
— Have in-depth knowledge of TMB customer and non-customer segments (expectations, needs, behaviour).
— Identify improvements in current products and needs that are not covered and which could become a source of income.
— Identify opportunities regarding aspects such as: the brand, price management, model of relation, distribution and communication.
— Identify possible *partnerships*, which could provide support at product level, thereby collaborating in the diversification process.
— Define a road map for the development of initiatives and projects defined at two levels: *quick wins* and future monetization projects.
— Draw up a scorecard of the defined new plan.
— Define the optimum organization chart (roles and responsibilities, that ensure the correct monitoring of the defined plan.

This Marketing Plan is implemented in various phases:
1. Diagnosis and identification of opportunities.
2. Alignment of customer elements, value proposition, business.
3. Development of the Plan: prioritization of initiatives, development of projects and road map, and preparation of the *Business Case* and governance model.

The most significant actions of the year are given below, within each unit that forms the Business Area.

1. Project and Analysis Unit

— Preparation and follow-up of the budget according to items and Area units and project monitorying, providing support to Units in all phases.
— Weekly monitoring of "Hola BCN!" ticket sales in channels of dispensing machines and *E-commerce*, in order to track the impact of different actions of the campaign on these transport tickets.
— Monthly and accumulated monitoring of invoicing of the*E-commerce* platform (sales of the Bus Turístic, Hola BCN! and the Montjuïc Cable Car).
— A computer application has also been designed to automate the whole generation process of the Profit and Loss Account of automatic sales channels.

2.TB exclusive advertising management unit.

A source of income for Transports de Barcelona is the graphic and static outdoor advertising of buses. The exclusive operator is Promedios Exclusivas de Publicidad, S.L. Advertising in the interior of vehicles is also handled exclusively by Promedios Exclusivas de Publicidad, SL.

This year, a computer application has been designed to manage a Database with a high volume of information and a high level of automation, to generate weekly indicators. This tool can monitor a series of indicators of Bus advertising supports.

3. Business and Retail Unit

—Shops:

A project to achieve the development of the *Retail* business has been done throughout this year. The project comprises 5 stages.

1.Inventory: used to obtain data on the real situations of retail outlets and find new premises with high marketing possibilities.

2. Public bidding: design of a public bidding system through the TMB website, displaying all available outlets with the individual features of each one, the participation terms and bidding criteria.

3.New contract template that enables greater control of commercial and concessionaire actions.

4. Internal regulations: implementation of regulations for Metro shops, These include the obligation for concessionaires to maintain the image and cleanliness of retail outlets, correct waste management and to manage customer complaints correctly in accordance with current regulations.

5. Implementation of an auditing system to control the situation of retail outlets and to guarantee that the terms established in the contracts are met.

—Vending Business

Income from the *vending* business this year has increased compared to previous years, totalling 762 thousand euros (including phone charging billing).

—Telecommunications:

Revenues from mobile phone coverage contracts and the cession of fibre optic cables on the metro network remained stable, in line with the agreements reached with operators.

—Special services:
In special services, 2016 has not been as exceptional as the previous year, but higher than other previous years.

—Points of sale

During the first six months of the year, a pilot test was carried out for the installation of points of sale in the Metro network. These have been very positive. Specifications are now being drawn up of a public bidding to award the commercial exploitation of these points of sale.

4. Sales Channel Management Unit

This year the Unit has focused on the analysis and development of different projects aimed at developing sales channels and their products. At the same time, coordination tasks have been carried of different sales channels with remaining areas. The most outstanding actions have included the following:
— Collaboration in sizing the number of ticket dispensing machines which were set up in the South section of L9 of the Metro.
—Supply, installation and set-up of Bus dispensing machines (DA) in Passeig de la Zona Franca.
—Migration of KDE ticket readers to H&S in the DM2 DAs model: analysis of the problems with KDE readers installed in DAs and the decision to replace them by Hopt & Schuler models. Coordination with various TMB departments on the implementation of H&S readers.
—Definition of the new design of the DA navigation screens.
—Migration to the new Iecisa server (payment gateway).
—Change of telephony operator (from Movistar to Vodafone) with the adaptation of sales equipment.
—Study on the obsolescence of various DA components.
—Standardization of the sales area of Ëspanya station of L1, lobby 0.
—HOLA BCN and T-Dia projects with validity by times.

5. Product Management Unit

This unit was created in 2016, for the purpose of preparing and implementing marketing plans. It is divided into two departments addressed to resident public and non-resident public.

— Resident public

The most highlighted action was the integral communication plan of the start-up of the new section of Line 9 South, which connects the current metro network to the airport and to other municipalities.

The core concepts of the communication plan were:

— Creativity of L-9 to place our and third party Illuminated Advertising Panels. .
— Agreements with town councils and institutions to grant the use of communication areas.
— Agreements with major companies (Mercabarna), which could benefit from the new section of L9 South.
— Free tickets for the opening, in order for customers to test the product.
— Presence of the campaign in local media.
— Direct marketing actions.
— In October a communication plan was drawn up by the Bus Business Area. This has not yet been applied pending the new reorganization.

— Non-resident public

The actions of this area were the following:

— e-commerce platform
During 2016, the *e-commerce*platform of TMB (www.barcelonasmartmoving.com), positioned as a benchmark for tourist mobility in Barcelona. Various tourist products of the company are marketed here (Barcelona Bus Turístic, HolaBCN and the Montjuic Cable Car). It has continued to grow with sales exceeding the Business Plan. Sales of the *online* channel have increased by 82% in revenue, compared to 2015.

— Hola BCN!
Results of *HolaBCN* tourist tickets have been excellent, reaching a net income figure of over 19 million euros, exceeding the figure achieved in 2015 by over 3 million euros.

A new communication campaign has been implemented reinforcing the new product attribute (access to the airport), with the aim of maximizing income. Agreements have also been reached with international *tour* operators to extend the potential markets to market the product.

It is also important to underline the commercial agreements signed between major institutions and companies of Barcelona (Fira de Barcelona, Barcelona Serveis Municipals and Futbol Club Barcelona, to promote and market Hola BCN tickets.

Future challenges of this product are: firstly to continue boosting marketing and extending potential customers. The second goal is to develop products and transform them into joint mobility solutions for non-residents. Finally, implement the transformation of the product, which currently functions in calendar days, to become a ticket in hours, hence providing greater flexibility and making it more attractive to tourists.

Communication, customer service, marketing and FMB business

Corporate communication, advertising and corporate identity

—Corporate identity

Work has been done throughout the year on a series of actions that can be broken down into: Large format, medium format and small format.

1. Large format: The following are highlighted:
— Alerts on service shutdowns in various metro lines. .
— 90 years of Transversal Metro.
— Civic awareness in the metro campaign.
—
— Updating of Metro and Bus usage regulations.
— Updating of Metro and Bus fare panels.

2. Medium format: The following are highlighted:
— Basic data of 2016, Summary of 2015 management and transport tickets 2015.
— Flu vaccination campaign.
— 2016 transport ticket leaflet.
— Redesign of the *interface* of ticket dispensing machines (DA).
—
Video of L9 (night access to the airport, airport ticket, etc).
— Hola BCN in hours.
— Alerts of works or events in various metro stations.

3. Small format: The following are highlighted.
— Creativity of the Metro guide.
— Presentation model of various formats.
— Design of various invitations.
— Information leaflets. Informative
— *mailing* of Hola BCN for the tourist office.

—Internal communication

In 2016, the south section of the metro L9 and the department of internal communication, were assigned to organize the load test required prior to the start of the new section.

—Customer Services and Information

Information and signage:

— *Metro campaigns and actions:*
— Start of the L9 South service and follow-up in terms of information and signage.
— CAE management to change signage of the metro network as a result of the new L9 south and to control signage quality.
— CAE management and coordination of signage for the Mobile World Congress (MWC).
— Updating of office maps (February editiion).
— Various editions of the metro guide (February, March, June and November editions).
— CAE management and coordination of signage for the Zurich Barcelona Marathon.
— Updating of maps inside the whole fleet of trains (March edition).
— Signage for metro shutdowns for planned actions of L4 between La Pau and Selva de Mar, and in L11 between Trinitat Nova and Can Cuiàs. Signage for metro shutdowns owing to planned actions in L2 between La Pau and Pompeu Fabra, and signage for metro shutdowns owing to planned actions in L9 South and L5.

— Needs assessment of TMB Points and cost of incorporating track identification in lines L9 North and L10.
— *WiFi*: signage of stations provided with wifi and an informative campaign on operations with a metro guide edition (September edition).
— Signage of refurbishment of Passeig de Gràcie station of L3, Paral·lel station of lines L2 and L3, Besòs de Mar station of L4, Universitat station of L1 and Fondo station of L1 (commencing in November).
— Updating of all metro area maps (ending in November).
— Updating of help desks of TMB Points and Universitat and Diagonal, to complete the operation of the Qmatic system of shifts.
— Updating of metro fares.
— Start of a study on a new metro map.
— Proposition to resolve the problem detected of people with reduced mobility in Avinguda Carrilet and Santa Eulàlia stations.

— Business Area

Exclusive advertising management unit

In the case of Ferrocarril Metropolità de Barcelona, a source of income from the exploitation of graphic, static and audiovisual advertising in virtual spaces and/or future areas of the metro network (lines 1,2,3,4,5 and 11). The exclusive company is *JC Decaux España SLU.*


13
TMB Foundation

Public Relations, cultural projects and protocol

1.Public Relations, protocol and cultural projects

In TMB Culture, a set of activities was programmed, some organized by the Foundation, and the majority in collaboration with associations and institutions of Barcelona and the Metropolitan Area. These activities are carried out on metro and bus networks. The majority of own activities are financed by sponsors.

The main goals of this programme are to boost the image of TMB, provide added cultural value to public transport users and the creation of synergies with cultural entities, associations and institutions of Barcelona and its Metropolitan Area.

Details of the main cultural projects this year are given below:

— Own cultural projects

— "Musicians in the Metro":
This was set up by Public Relations in 2001, with the collaboration of the Association of Street Muscians (AMUC), the Catalan Institute of Culture of the Barcelona City Council and the District of Ciutat Vella. Since then, over 600 bands have performed at authorized points of the undeground installations. The most important differential element is that it is the only initiative of this type in the world..

Last June, the 8th edition of the Festival of Musicians in the Metro was held. Performances could be enjoyed for 12 hours by members of the association, plus around 30 15-minute performances, with a variety of rhythms and styles.

— "Subtravelling":
This is the Fundació TMB International Festival of Short Films. A pioneer festival where public transport takes the leading role. The 7th edition of the *SUBTRAVELLING* short film festival was held with the special participation of the SMIFF festival of the Seoul Metro, which for the first time, started an international collaboration in this cultural project, sharing contents and disseminating it on the metro screens of Barcelona and Seoul.

— "TMB action" travelling exhibition".
By adapting the exhibition "TMB in Action: A Sustainable Journey", TMB raised environmental awareness, to summarize the main environmental problems of today. Details were given on what public transport is doing in Barcelona to face and achieve a better future.
The following venues were selected for the itinerary of this exhibition:

— Janurary/February at the Fira station, on the occasion of visits from institutions and entities to the line 9 South.
— From 25th to 28th April, on the occasion of the presentation of the "Mobility Plan" of Universitat Pompeu Fabra.
— From 28th to 29th May, on the occasion of the vehicle exhibition of the classic bus rally.
— On 11th June for the Bona Nit Barcelona sustainable festival.
— In the month of September for Mobility Week.

—Espai Mercè Sala

The Espai Mercè Sala, located in the subway connecting lines 3 and 5 of Diagonal Station, is a temporary exhibition room which TMB has opened for the creativity of entities and artists, so that all public transport users can enjoy the exhibitions.

6 exhibitions were held in 2016.

— 1st February to 24th March: “Vida tòxica” by Álvaro Soler Arpa and *Plastic Pollution Coalition*:
A selection of photographs of sculptural pieces that condemn human impact on the environment.

— 11th April to 6th May. “Col·lecció Joan Miró: fes-te-la teva”:
The exhibition displayed a selection of new images, with which the Fundació Joan Miró celebrated the new collection.

— 18th May to 2nd September: “M” de Misha Pedan:
L’Espai Mercè Sala has formed part of Docfield 2016. *“Europe: lost in translation“*. The "M" exhibition is a poetical chronicle of the soviet socialist republic of Ukraine. It is a collection of photos taken secretly by the photographer on his journeys by metro in the city of Khàrkov between 1975 and 1986. This exhibition was also relocated in 15 vinyls at different stations of the metro network.

— Participation in the Museum evenings on 21st March with the exhibition "M" by Misha Pedan.

— From 12th September to 7th October. *“Swab Stairs”*: six years of underground art.
This was a retrospective exhibition of works that had been exhibited in *Swab Stairs 2016* and a selection of propositions from previous editions, since the start of the project in 2011. The documentary video "*Swab Stairs, before dawn*" was also presented, which shows the assembly of stairs during the night, while the Rome metro was closed.

— 17th October to 11th November: “Petjades de riure”:
A photo exhibition of clowns was held, within the Cornellà Clown Festival. The photos captured a variety of expressions of these artists.

— 21st November 2016 to 29th January 2017: “Metropoli Verda”:
This exhibition, by the Metropolitan Area of Barcelona, focused on a variety of open metropolitan areas with more accessible, healthy and inhabitable land; a metropolis that is now conceived as a network of open spaces and green infrastructure, as common ground of the metropolitan landscape.

Finally, during this last year, Public Relations coordinated the organization of three international professional meetings, which took place in Barcelona and were hosted and organized by TMB.

Around 50 different types of institutional visits were coordinated, which were held at the company premises. These were organized by Public Relations, with the collaboration of the International Business department. The target public were national and international government representatives, other transport operators and various associations and organizations.

2. TMB Educa

The project started up in 2008 in 4 lines of action:
1.School visits.
2Educational back-up activities to dissemination actions.
3. Educational activities for social interest groups.
4. Back-up activities to educational research.

During the year, there have been 295 school visits with a total of 7,187 students from different levels of education (Special Education, Preschool, Primary, Secondary, Sixth-Form and University).

The structure of the educational project consists of:
—38 monitors at 18 TMB operational points and 16 educational activites.
—Education collaboration agreements with 6 municipalities of the Metropolitan Area of Barcelona.
—Education collaboration agreements with the Barcelona Provincial Council, the Consortium of Education and the Barcelona Professional Training Foundation and the Barcelona City Council.
—Collaboration agreement with MAGM, Association for the promotion of youth research, and ELISAVA, Design School of Barcelona.

The main highlights of the year are indicated below:

—Continuous training of TMB Educa monitors: The IX Training Day for monitors of the TMB Educa project was held, given by technicians of Fundación Pere Tarrés, in accordance with the collaboration agreement.

—Educational back-up activities to dissmination actions: Participation in educational activities in various events, such as: Education for safe mobility (Guàrdia Urbana), the VII Internationl classic bus rally, educational activities of the PAE Progrramme of the Municipal Institute of Education (IMEB), the Espai Mercè Sala and in educational activities of the Sant Adriá de Besòs Festival

—Educational activities for social interest groups: 38 actions for special interest groups, with the participation of 1,263 people. These included: TMB es mou per l'educació "I tu, com et mous?, "TMB a prop teu", "TMB va a l'escola", "Ens mou la gent gran" and "TMB obert per vacances".

—Support activities to education research: these included the collaboration with the Genomic Regulation Centre, to carry out a study and analysis of biological samples collected from the air of metro stations. We also participated in the XVIII Exporecerca Jove at La Salle Campus –Universitat Ramon Llull (MAGMA) and as member of the Jury for the Barcelona Research awards (Education Consortium of Barcelona – IMEB).

Noteworthy this year was the attainment of the Seal of Quality for the pedagogic contribution of TMB to the education community, with Education Quality accreditation of the Pedagogic Coordination Council.

3. Corporate Social Responsibility (CSR)

The following actions can be highlighted within this area.

—Presentation of the development strategy of the Social Responsibility and Sustainability Plan, together with the account based on the suitability and opportunity of its implementation in TMB. It is a proposition of challenges and commitments, under the perspective of sustainable development objectives defined by the UN. From its different fields of action, it should be conducted by the organization, along with a proposal of governance and participation structure.

—Campaigns and actions within the TMB Civic Awareness Plan and Antisocial Management. A systematization plan was presented, with actions to be developed to promote considerate and pacific behaviour in TMB premises and installations, prioritizing the development of a marketing campaign and the incorporation of civic awareness agents.

—Technical collaboration agreement with the Catalan Committee of Representatives of People with Disability (COCARMI). This is currently being drawn up.

—Pilot testing of the homologation process of electric, scooter-type vehicles in the access to public transport. An agreement will be signed between the Catalan Regional Government (Secretariat for accessibility), the Barcelona City Council (IMD), AMB and TMB.

—Development of “Tria la teva causa and Mou-te 2016”.For the sixth consecutive year, company employees have chosen a charity, which has led to the main TMB charity campaign this year. With 32% of votes, people with disability was chosen. Together with COCARMI, a programme of awareness actions was designed during the last quarter of the year. Various activities have revolved around 3 core topics: sport as a means of inclusion, women with disability and the 10th anniversary of the international convention on the rights of people with discapacity.

—32 special charity bus services have been done, with the participation of 12 voluntary drivers who have invested a total of 162 hours to benefit 532 people.

—Dissemination collaboration with social entities. 52 collaboration actions were agreed, to disseminate knowledge about initatives, events and campaigns of 3rd sector social entities, through the provision of space and dissemination support under TMB Recommends.

4. Historic heritage

The following actions are highlighted in this area:

—*Maintenance of historic vehicles*
Vehicles of the Foundation require constant maintenance and conservation work which is carried out at the Triangle Ferroviari Bus and Metro workshops.

—*Marketing of historic vehicles*
Work is done to increase rentals of historic vehicles, which have been fully repaired and serviced for maximum availability.

—*VII International classic bus rally*
This event, held on 28th and 29th March was organized by Fundació TMB, the company Sagalés and the Association for the Recuperation and Preservation of Buses (ARCA).

—*Commemorative events of the 50th anniversary of the articulated bus in Barcelona.*
Travellling exhibition of this commemoration from June to December.

TMB Culture

Within TMB Culture, a series of varying activities were programmed, some organized by the Foundation and the majority in collaboration with institutions and associations of Barcelona and the Metropolitan Area. These activities are carried out on metro and bus networks. The majority of own activities are financed by sponsors.

The main goals of this programme are to boost the image of TMB, provide added cultural value to public transport users and the creation of synergies with cultural entities, associations and institutions of Barcelona and its Metropolitan Area.

Details of the main cultural projects this year are given below:

—Commemorative events of the 90th anniversary of the Transversal Metro

The following commemorative events of this anniversary have been celebrated.
— *Night ride on a historic train:* on the evening of 4th March at 00.30h, the series 300 historic train made the journey from Sagrada Familia to La Pau stations to celebrate this anniversary. An exhibition of photographs of the age of transversal constructions was also held. QR codes were installed in the commemorative section stations of L1 with the history of evolution of each one. A new route was created by Cultruta, to learn about the history of the Barcelona metro.
— *Presentation of the book "El metro transversal de Barcelona 1926-2016":* Presentation by the author Joan Alberich at Universitat Station. A photography exhibition was also held on the anniversary in the station lobby.
— *Travelling exhibition of historic photographs* on the construction of the Transversal Metro, which accompanied the commemorative events of the celebration
— *Transversal Journey:* Travelling in a train decorated with original vinyl, which ran from La Bordeta station to Universitat station.

—Corporate Social Responsibility (CSR)

The following actions have taken place in this area.

— Third edition of the metro blood donation campaign during three consecutive days (4, 5 and 6 October) and at three places simultaneously (La Sagrera L1, Universitat L2 and Diagonal L5), in collaboration with the Catalonia Blood and Tissue Bank. A total of 837 donations were received, underlining that this was the first time for 46% of people.

—Development of 12 workshops to promote autonomy in the metro. 16 volunteer guides took part, dedicating a total of 48 hours, which has benefitted 122 people with disability. Specific activities were organized during the last quarter of the year, to explain the new L9 South section.

— Heritage

The following actions have taken place in this area.

— Maintenance of historic vehicles

Vehicles of the Foundation require constant maintenance and conservation work which is carried out at the Triangle Ferroviari Bus and Metro workshops.

— Marketing of historic vehicles

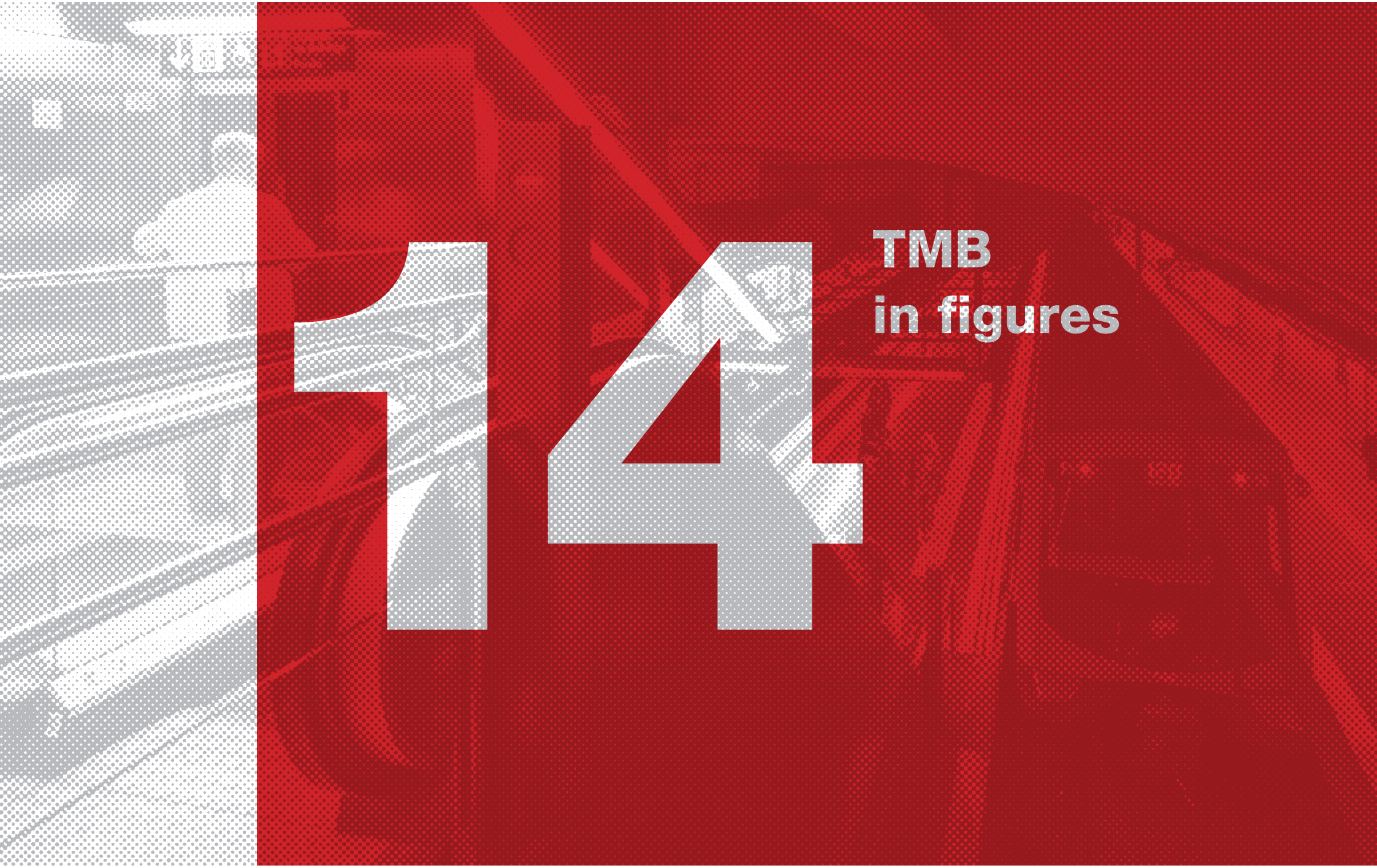
Work is done to increase rentals of historic vehicles, which have been fully repaired and serviced for maximum availability.

— Historic railway heritage of Catalonia

A catalogue of historic railway material of Catalonia was prepared, and we participated in the V Historic Railway Heritage Event on 4th October, with the paper "The Gaudi station".

— Vintage train runs

On Wednesday, 4th March, the annual historic train series 300 journey took place from Sagrada Familia to La Pau. This event was the opening of the commemoration of the 90th anniversary of the Transversal metro with a photographic exhibition.


14
TMB
in figures

Bus network figures

Network figures at 31 December	Total
Number of lines (*)	99
Length of the network (*)	857.06
Number of stops (*):	**2,529**
with bus shelter:	1,338
with bus stop pole:	1,191
Kilometres of bus lane	172.22

(a) Excluding special Bus Turístic and Tramvia Blau services and lines 80, 81, 82 and 83 which are contracted out to Sagalés.

Fleet figures at 31 December, 2016	Number of vehicles
Standard buses:	**603**
Diesel:	232
CNG:	244
diesel and electric hybrids	112
GNC and electric hybrids	13
Electric only:	2
Articulated buses:	**301**
Diesel:	144
CNG:	128
Diesel and electric hybrids:	27
Electric only:	2
Midibusos	**25**
Diesel:	24
Diesel and electric hybrids:	1
Midibuses (diesel):	
Double-decker buses (diesel):	**67**
Open-top buses (diesel):	**6**
Double-articulated buses (diesel and electric hybrids)	**3**
Total fleet	**1,060**

Fleet breakdown by fuel type:	Number of vehicles
Diesel buses:	**528**
CNG buses	**372**
Hybrid buses	**156**
diesel and electric hybrids	143
GNC and electric hybrids	13
Electric buses	**4**
Total fleet	**1,060**

Buses adapted for people with limited mobility	1,060
Buses equipped with air conditioning [(a)]	1,056
Fleet required for service (weekday rush hour, winter) [(b)]	834

Notes:
(a) The difference with the fleet total is due to 4 open-top buses.
(b) The difference between total vehicles and the fleet required for service (which excludes the Bus Turístic service) corresponds to the operational fleet in reserve and vehicles undergoing maintenance or official vehicle roadworthiness tests (ITV).

Bus lines in service at 31.12.2016

Line	Route	Distance in km (*)
6	Manuel Girona - Poblenou	8.12
7	Fòrum- Zona Universitària	10.60
11	Trinitat Vella - Roquetes	13.53
13	Mercat de Sant Antoni - Parc de Montjuïc	6.91
19	Urquinaona - Sant Genís	10.51
20	Estació Marítima - Pl. Congrés	6.42
21	Paral·lel - El Prat	16.91
22	Pl. Catalunya - Av. Esplugues	5.46
23	Pl. Espanya - Parc Logístic	7.08
24	Paral·lel - El Carmel	8.93
26	Poblenou - Barri del Congrés	7.39
27	Pl. Espanya - Roquetes	11.46
32	Estació de Sants - Roquetes	11.62
33	Zona Universitària - Verneda	10.86
34	Pg. Manuel Girona - Pl. Virrei Amat	10.54
36	Pg. Mar. - Can Dragó	11.90
37	Hospital Clínic - Zona Franca	7.91
39	Barceloneta - Horta	12.02
40	Pl. Urquinaona - Trinitat Vella	11.14
41	Pl. Catalunya - Pl. Francesc Macià	4.57
42	Pl. Catalunya - Santa Coloma	12.73

Line	Route	Distance in km (*)
45	Pg. Marítim - Horta	12.00
46	Pl. Espanya - Aeroport BCN	17.85
47	Pl. Catalunya - Canyelles	9.47
50	Collblanc - Trinitat Nova	14.04
51	Pla de Palau - Ciutat Meridiana	12.03
54	Estació del Nord - Campus Nord	10.80
55	Parc de Montjuïc – Pl. Catalana	10.75
57	Collblanc - Cornellà	7.42
59	Poblenou - Pl. Reina Maria Cristina	11.07
60	Pl. Glòries - Zona Universitària	16.85
62	Pl. Catalunya - Ciutat Meridiana	13.38
63	Pl. Universitat - Sant Joan Despí	12.43
65	Pl. Espanya - El Prat	12.52
66	Pl. Catalunya - Sarrià	7.66
67	Pl. Catalunya - Cornellà	13.13
68	Pl. Catalunya - Cornellà	13.88
70	Rambla de Badal - Bonanova	4.30

Bus lines in service at 31.12.2016

Line	Route	Distance in km (*)
76	Sant Genís - Ciutat Meridiana	11.85
78	Estació de Sants - Sant Joan Despí	14.26
79	Pl. Espanya - <M> Av. Carrilet	8.66
91	Rambla - La Bordeta	4.87
92	Gràcia - Pg. Marítim	11.30
94	Barri Almeda - Fontsanta	4.32
95	Barri Almeda - Pl. Fontsanta	5.33
96	<M> La Sagrera - Montcada i Reixac	12.48
97	Fabra i Puig - Vallbona	5.08
100	Bus Turístic South	11.95
101	Bus Turístic North	8.99
102	Pl. Eivissa - Cementiri de Collserola	10.45
103	Montcada i Reixac - Cementiri de Collserola	12.38
104	Fabra i Puig - Cementiri de Collserola	10.78
107	Interior Cementiri	4.00
109	Estació de Sants - Polígon Ind. Zona Franca	11.18
110	<M> Av. Carrilet - Polígon Ind. Zona Franca	8.76
111	Tibidabo	3.20
113	La Mercè	3.42
114	Gràcia - Can Baró	4.40
115	La Bordeta	2.98
116	La Salut	3.63
117	Guinardó	5.06
118	Mas Guimbau	8.61
119	La Teixonera	5.20
120	El Raval	5.13
121	Poble Sec	2.63
122	Turó de la Peira	5.26
123	Bonanova Alta	3.87
124	Penitents	2.64
125	La Marina	5.01
126	Sant Andreu	5.56
127	Roquetes	5.96
128	El Rectoret	8.51
129	El Coll	2.53
130	Can Caralleu	3.68
131	El Putxet	2.50

Bus lines in service at 31.12.2016

Line	Route	Distance in km (*)
132	Torre Llobeta - Prosperitat	3.39
143	La Pau - Sant Adrià	5.36
150	Pl. Espanya - Castell de Montjuïc	5.09
155	Can Cuiàs - Sta. M. de Montcada	10.15
157	Collblanc - Sant Joan Despí	7.52
165	Pratexprés	10.18
185	<M> Canyelles - Sant Genís	8.34
192	Hospital de Sant Pau - Poblenou	4.73
194	Tramvia Blau	1.27
196	Pl. Kennedy - Bellesguard	2.12
V3	Zona Franca - Can Caralleu	8.67
H4	Zona Universitària - Bon Pastor:	14.85
H6	Zona Universitària - Fabra i Puig	9.66
V7	Pl. Espanya - Sarrià	5.04
H8	Camp Nou - La Maquinista	12.88
H10	Badal - Olímpic de Badalona	13.16
V11	Estació Marítima (WTC) - Bonanova	6.87
H12	Gornal - Besòs Verneda	11.28
V13	Pla de Palau - Av. Tibidabo	7.52
H14	Paral·lel - Sant Adrià	10.03
V15	Barceloneta - Vall d'Hebron	10.21
H16	Passeig de la Zona Franca - Fòrum	12.10
V17	Port Vell - Carmel	8.73
D20	Pg. Marítim - Ernest Lluch	9.25
V21	Pg. Marítim - Montbau	9.45
V27	Pg. Marítim - Canyelles	11.03

(*) Based on the average of the outward and return journeys.

Main actions of the bus network

Work has been done throughout the year on the following street actions, as a result of refurbishment or infrastructure works of the city of Barcelona:

—Changes in bus routes and stops, owing to the start-up of the Poblenou "super isle".
The changes in mobility as a result of the experimental super isle of Poblenou, meant that lines H14, 6, 40 and 42 slightly changed their route to skirt the pacified traffic area. As a result of this, two stops inside the pacified traffic area were cancelled, and replaced by three already existing stops, which were used by other routes, located in Carrer de Pujades and Carrer d'Àvila.

Changes only affected lines H14, 6, 40 and 42 direction Llogregat, as seen in the graph:

— *Definitive work*
— The most important work has been the implementation of the 4th phase of the New Bus Network, which was done in February, with the start-up of the new H4, V11 and V13 lines.
— Modification of departure and arrival locations of line 33 and 195-196.
— Modification of the bus routes of lines 20, 60, 22, 40, 42,97, V13, 57-157,165

—*Provisional work*
— Works in the railway tunnels of Plaça de les Glòries.
— Redevelopment of Travessera de Dalt (Plaça Lesseps and Carrer Escorial).
— Redevelopment of Carrer Pere IV (Roc Boronat and Bilbao).
— Redevelopment of Carretera de Ribes and Pont Sarajevo (Trinitat Vella District).
— Districlima Network (pipelines) at Hospital del Mar (C/ Àvila-Av. Icària-C/ Marina-C/ Doctor Aiguader).
— Resurfacing of the mountain side of Gran Via (Amadeu Oller-Pl. Cerdà).
— Resurfacing of the bus lane in Av. Diagonal (Pius XII-Pl. Reina Mª Cristina).
— Resurfacing of the bus lane in Carrer París (Urgell-Casanova).
— Resurfacing of the bus lane in Carrer Rosselló (Girona-Bailén).
— Resurfacing of the bus line in Carrer Valencià (Castillejos-Dos de Maig).
— Resurfacing of the bus lane in Carrer de Sant Antoni Mª Claret (Sardenya-Roger de Flor).
— Resurfacing of Carretera de Montjuic.

—*Actions as a result of Events*
— Modifications in Plaça de Catalunya owing to Sant Jordi and La Mercè
— Festival. Modifications in Av. Reina Mª Cristina for Trade Fairs, events, etc.

—*Special measures*
— FGC shuttle (3 shuttles).
— Shuttle of Line2.
— Shuttle of Line 4. Shuttle of Line 11.<1>Shuttle for the MWC (2 shuttles).
— Shuttle of Line 11.
— Shuttle for the MWC (2 shuttles).

Special bus services

Special service		Start date	Duration (days)	Hours in service
Trade fairs	Northern shuttle MWC 2016	22/02/2016	4	467:20
	Southern shuttle MWC 2016	22/02/2016	3	150:56
	EASL Congress	13/04/2016	5	88:22
	Biocultura Exhibition	05/05/2016	4	85:00
	2016 CPhI Exhibition	04/10/2016	3	23:00
				814:38
Metro substitute services	Shuttle <M> L4 La Pau - Selva de Mar	19/03/2016	10	995:52
	Shuttle <M> L11 Trinitat - Can Cuiàs	19/03/2016	10	214:33
	Shuttle <M> L4 La Pau - Pompeu Fabra	01/08/2016	28	6222:03
	Montjuïc cable car (breakdown)	01/01/2016	115	4858:54
	Shuttle <M> L5 Can Boixeres - Cornellà	01/12/2016	9	1195:39
				13487:01

Special service		Start date	Duration (days)	Hours in service
Otros servicios	Shuttle Club Super3 2016	22/10/2016	2	353:26
	Shuttle Club Super3 2016 carpark	22/10/2016	2	115:43
	FGC - Provença-Sarrià	29/7/2016	20	535:44
	FGC - Replacement of Cable Car	01/08/2016	15	887:22
	FGC - Sarrià-Vallvidrera	05/08/2016	7	602:47
	Primavera Sound 2016	02/06/2016	2	107:23
				2602:25

A number of special services were studied and designed during the year for events affecting TMB (Fira de Barcelona events, events at Montjuïc, city events such as the Mercè and Gràcia festivals, and Christmas). Special services consisted on renting rolling stock and installations for shuttles, filming and advertising sessions.

Noteworthy this year was the special programmed service during the summer months, to support various routes of the FGC during the improvement works of its facilities.

—Reinforcement of the 2016 beach service
From the start of July to 15th August, demand increased by 150,000-200,000 ticket validations/week compared to the same period in 2015. This has meant that the estimated supply was very tight. The beach routes were structurally reinforced, and articulated buses were allocated, where routes permitted, to provide greater capacity. These lines were the following: D20, H16, V15,V 21, V27, 36, 39, 45 and 59
In mid-July, line V13 was prolonged from Drassanes to Pla de Palau, thereby reinforcing transport in the Barceloneta area.

— Other service changes provided in the bus network during 2016.
Apart from the implementation of Phase IV of the New Network and the recuperation of the Local District Bus service at weekends, the following modifications were done.

— Reinforcement of the Line 114 service, which had been pending from the 2015 Improvement Plan. Route change of line 165 with transit in August.

Metro network figures

The main data of the Metro network at 31st December 2016 are detailed below:

Line	km(*)	Number of stations	Trains programmed in rush hour	Rush-hour service frequency
1	20.2	30	26	3'44"
2	12.8	18	19	3'28"
3	17.8	26	26	3'21"
4	16.5	22	19	4'03"
5	18.6	26	30	2'58"
L9 North/L10	10.4	12	6 i 4	3'00''
L9 South:	19.7	15	9	7'19''
11	2.3	5	2	7'30"
Cable car	0.7	2	2	10'00"
Total network	**119.0**	**156**	**143**	

Line 11 has three trains each with two coaches and the other lines have five-coach trains. Funicular: 2 trains with 3 coaches.
The 'interval de 3'00" corresponds to the common section of L9 and L10. In individual sections, the interval is 6'00"

**(***) New measuring criteria to adapt to international railway transport standards, which measure the distance, bearing in mind the commercial service.

Of the network's 156 stations, including the Montjuïc funicular railway, 108 are non-interchange stations, 18 allow passengers to change to one other line and 4 allow them to change to two others.

Metro rolling stock (excluding funicular) at 31 December 2016 consisted of 168 five-coach trains and 3 two-coach trains. This represents a total of 846 coaches, of which 678 are engines and 168 are trailers. The following table gives a breakdown by series:

	Engines	Trailers	Total coaches	Total trains	
2000-series	24	6	**30**	**6**	
2100-series	60	15	**75**	**15**	
3000-series	72	18	**90**	**18**	
4000-series	96	24	**120**	**24**	
5000-series	156	39	**195**	**39**	
6000-series	40	10	**50**	**10**	
9000-series	224	56	**280**	**56**	
Series 500 (*)	6	0	**6**	**3**	
Total coaches	**678**	**168**	**846**	**168**	**five-coach trains**
				3	**two-coach trains**

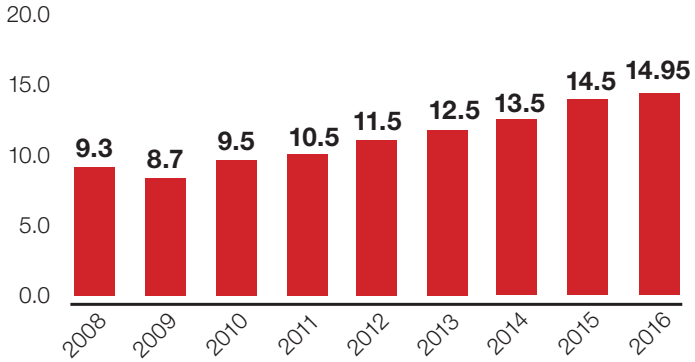
(*) 500-series trains have two coaches

The Montjuïc funicular has two units, each consisting of three coaches.23

The average age of the rolling stock was 14.95 years in 2016 (the lifespan of a train is around 30.35 years). Once a train reaches 20-25 years, it is remodelled, involving technical, aesthetic and equipment changes.

The average age of the trains varies according to the line. Although the oldest units are on L1 and L3, the trains in the 4000 and 3000 series running on these lines were remodelled in previous years, which has enabled their working life to be extended.

Evolution of the average age of trains (Years)



Average train age by line (2016)

	L1	L2	L3	L4	L5	L9 North/ L10	L9 South	L11	Total
Average train age (years)	22.4	9.6	24.0	13.8	10.5	7.6	4.4	13.0	**14.95**

Note: does not include the two trains of the Montjuïc funicular railway.

Barcelona Bus Turístic and Tramvia Blau

The Barcelona Bus Turístic is a joint initiative of Transports Metropolitans de Barcelona (TMB) and Turisme de Barcelona, created in 1987, to provide a regular, practical, sustainable and attractive service for people wishing to see the city at their own pace. There are now 45 stops over three routes, the blue and red route throughout the year, and the green route which in 2015 operated from 18th March to 6th November. This route has an audioguide service in 15 languages and also a guide from Turisme de Barcelona on board the bus to provide back-up to customers. It includes a guide of the itineraries and a discount card, which covers unique transport systems such as the Tramvía Blau, the Montjuïc cable car and the Catalunya Bus Turístic, along with museums, emblematic buildings, cultural centres and leisure in the city.

During the year, cultural and restaurant offers have continued to be extended with new collaborators. Commercial actions have also been undertaken at various Tourism fairs and national and international *workshops*
(WTM of London, Fitur Madrid, Buy Catalunya, etc).

In September 2015, the *online* sales platform was set up, called*Barcelona Smart Moving* (www.barcelonasmartmoving.com), in 6 languages. This has promoted leisure transport in Barcelona and the sale of products, which has consolidated during 2016.

The Barcelona Bus Turístic has its own website (www.barcelonabusturistic.cat) and *comunity management* of social networks through *Facebook*, *Twitter*, *Instagram* and Tripadvisor. This has formed a commitment for the *online* channel with promotional actions to develop a better knowledge of Barcelona and to optimize website positioning in the main internet browsers. This year, improvements have been made in the structure of sales links in the website and the generation of traffic to the TMB website and other Leisure Transport websites.

A change in the design of the *wifi landing page*present in all vehicles of Barcelona Bus Turístic to generate more *leads* to social networks. Regarding the multi-language information system for customers (SIM), this year the analogue system to digital has continued in the bus fleet.

From 3rd June to 18th September, the Barcelona Night Tour has been in operation, with a ride through the city showing the most emblematic illuminated buildings plus the Montjuïc Fountains. This is the tenth year it has been in operation. One of the highlights this year was the inclusion of the *online Barcelona Smart Moving*

sales platform. The Barcelona Bus Turístic achieved a certificate of excellence for the fourth year running, from TripAdvisor, the international website. The award recognises excellent hospitality and is granted to businesses that receive very favourable reviews from travellers. In a recent survey, passengers of the Barcelona Bus Turístic gave it an average score of 8.2 over 10, similar to last year. This is the maximum score achieved so far.

This initiative forms part of the campaign called "Des de Barcelona: cuidem el planeta" (From Barcelona: we care for the planet)- This campaign was set up in June by Turisme de Barcelona, to generate environmental knowledge and awareness. It had the collaboration of Fundació Rubricatus, a special work centre for people with disability. It started off with the installation of litter bins in the entire fleet of buses

with the message "Recicla aquí els teus auriculars. Gràcies!" (Recycle your headsets here.. Thank you!), in three languages, which can also be heard through the audioguide system.

In 2016, new VOLVO vehicles were incorporated, which had been acquired from the Sercar bodywork company for the Barcelona Bus Turístic fleet. They include USB connectors for customer use. These vehicles are Euro environmental category 6 (hybrid or electrical monitorization is not available commercially for these models on the local market. The 14-metre length double-decker buses have 83 seats, 69 on the top deck (35% more that the previous vehicles of the fleet). 10 more vehicles with Ayats bodywork and 88 seats (65 on the upper deck) have also been acquired. They also include USB connectors in all seats.

The image renovation project of the Barcelona Bus Turístic was started, which will be completed at the beginning of 2017.

There was a shutdown in the electrical service of the Tramvía Blau from 29th August to 9th September 2016, as required by the Barcelona City Council, owing to power track works.

During the year a viability report was carried out on the layout and installations of the Tramvía Blau in order to define a short and long-term service continuity strategy.

This year the Tramvía Blau is celebrating its 115th anniversary, as it was opened as an electric tram on 29th October, 1901.

TMB Workforce

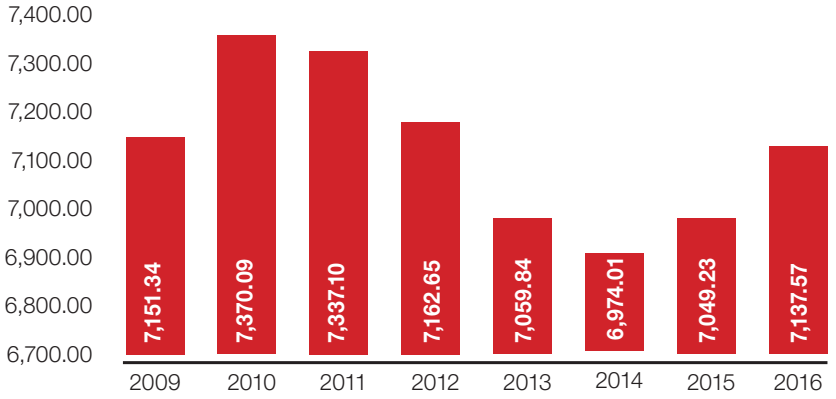
At 31 December 2016 the total active TMB workforce (excluding the company which operates the Montjuïc cable car) was 7,744. By company, the figure for FMB was 3,567 and for TB 4,179. The numbers include 407 partially retired employees whose jobs are linked to relief contracts.

Standardized average workforce (excluding Montjuïc cable car)

	2016	2015	Diff.	%
FMB	3,203.09	3,140.45	62.64	2.0%
TB	3,934.48	3,908.78	25.70	0.7%
TMB	**7,137.57**	**7,049.23**	**88.34**	**1.3%**

TMB's standardized average annual workforce in 2016 (as measured by hours per employee/year), excluding the Montjuïc cable car and TMB SL, was 7,137.57, a decrease of 88.34 compared with the previous year. The increase in staff is the result of extensions in 2016 to the two networks explained above.

Average standardized workforce in TMB
(excluding Montjuïc cable car and TMB, SL)



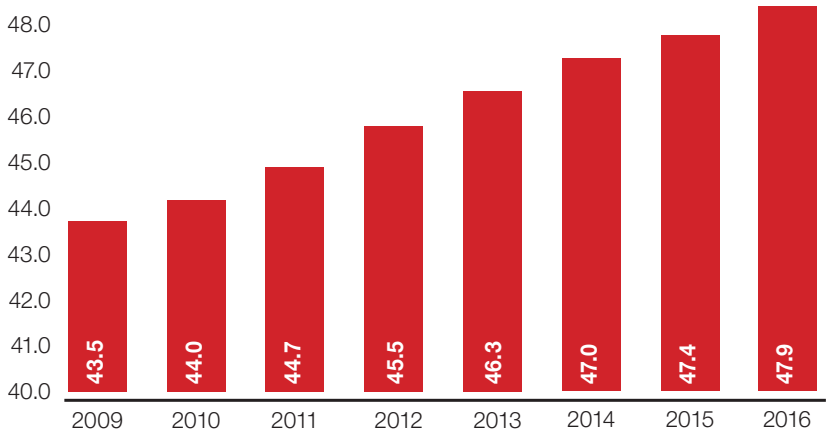
The graph shows the evolution of the average workforce in recent years, where a decrease can be observed from 2010 to 2014. This tendency ended in 2015, when the TMB workforce started to increase again. FMB's standardized average workforce was 3,203.09, an average increase of approximately 63 people compared with the previous year.

This growth is due mainly to the staff hired to bring the new section of L9 from Zona Universitària to airport Terminal T1 into service on 12 February 2016.

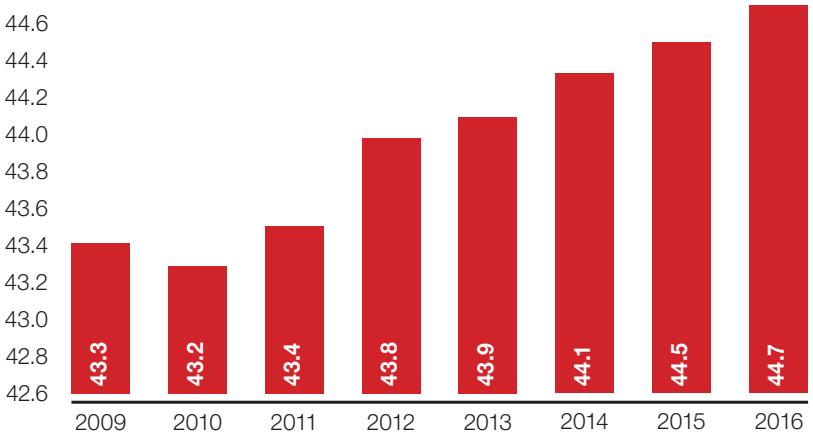
The standardized average workforce of Transports de Barcelona was 3,934.48, a year-on-year increase of 25.7. This increase has been mainly in drivers and is the result of the increased offer from actions described above.

The average age of the active FMB workforce was 44.73, while the average age of TB was 47.90 years at 31st December, 2016. The reduction in staff numbers in recent years has been accompanied by a progressive ageing of the workforce in both companies..

Change in average age of TB workforce



Change in average age of FMB workforce



TMB Workforce

TB workforce at 31st December

The active workforce of Transports de Barcelona at 31st December, 2016, was 4,179. This number includes 169 partially retired employees whose jobs are linked to relief contracts.

If the annual average workforce (average staff in terms of hours employed per year) is considered, this figure was 3,934.5 employees, 25.7 more than the previous year.This increase has been mainly in drivers and is the result of the increased offer from the start up of services in public holidays and local routes (in September 2016) and the Bus Quality Improvement Plan that commenced in the first quarter of 2015.

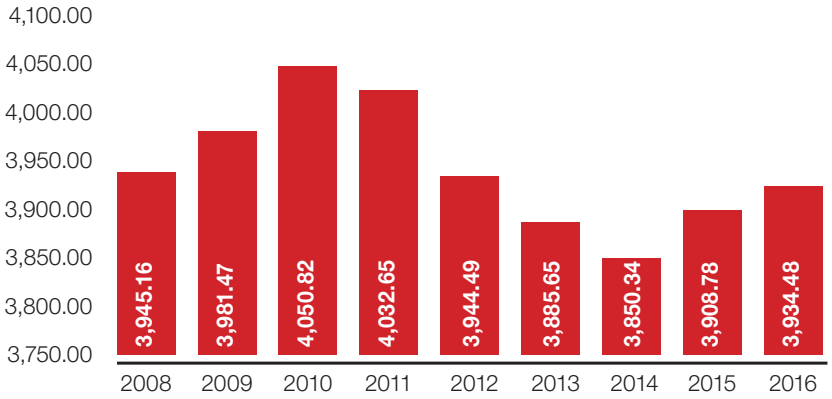
TB average standardized workforce at 31 December

	2016	2015	Diff.	%
Average standardized workforce (*)	3,934.48	3,908.78	25.70	0.66%

(*) Average annual workforce by hours per employee/year.

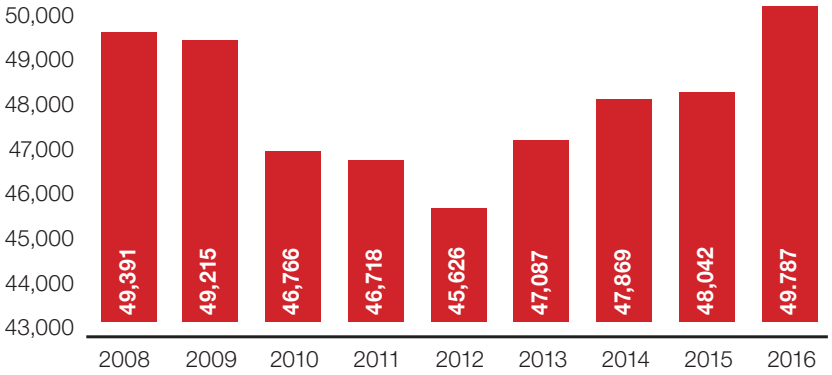
As can be seen in the following graph, since 2010 the workforce was reduced, particularly after 2012. This was the result of the Rationalization Plan that was implemented that year. This tendency was reversed in 2015 with the implementation of the Offer Improvement Plan at the start of the year. In 2016, the workforce has continued to grow with the return of the public holiday service of local lines, which had been cancelled in 2012.

Evolution of the TB standardized, average workforce.



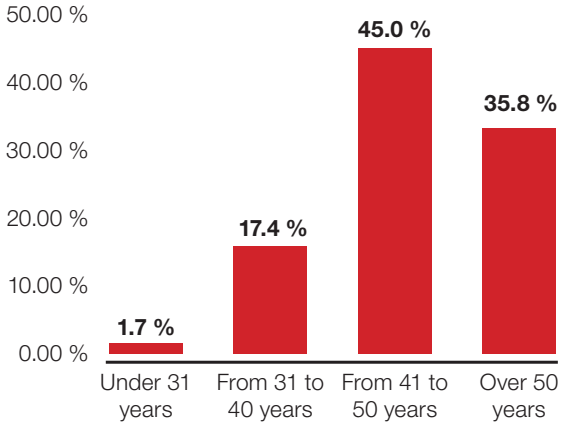
The start-up of measures to adjust the supply of services to the demand in recent years, has led to an improvement in the ratio of passengers per TB employee. Since 2012, this indicator has increased each year, reaching 49,787 passengers per employee in 2016, the highest figure in the past 10 years.

Change in no. of passengers per TB employee



The following chart shows the breakdown of the workforce by age at 31 December 2016. The greatest number of employees, 45% of the total workforce, is concentrated in the 41 to 50 year age bracket.

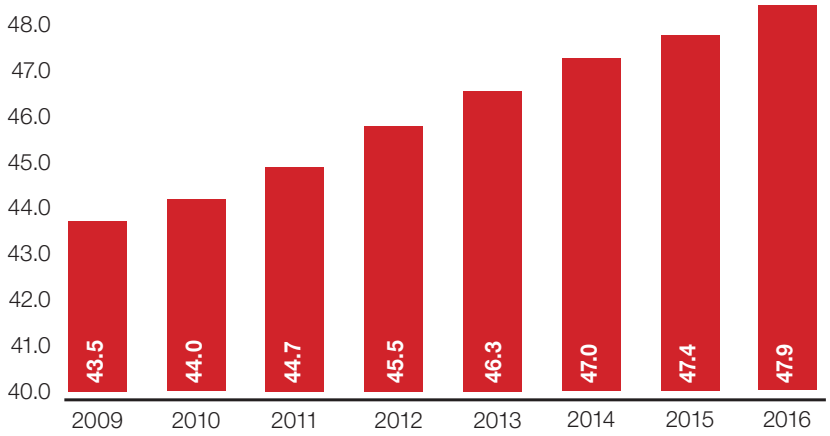
Age breakdown of TB workforce (2016)



TMB Workforce

The average age of the active workforce at 31 December 2015 stood at 47.4 years, slightly higher than the figure for the previous year (47.0 years).

Change in average age of TB workforce



The drop in staff occurring from 2010 to 2014, was accompanied by the progressive ageing of staff. The average age of the workforce increased by 5.1 years in the period from 2008 to 2016. In 2008 44.9% of the workforce was under the age of 41 and by 2016 this figure had fallen to just 19.1%, a drop of 25.8 percentage points in 8 years.

FMB staff at 31 December

The total active workforce of Ferrocarril Metropolità de Barcelona, SA had a total of 3,567 employees at 31st December 2016. This number includes 238 partially retired employees whose jobs are linked to relief contracts.

When considering the average annual standarized workforce (the workforce in terms of hours employed/year), this figure increased in 2016 by 62.64. This increase was mainly due to new staff hired for the new line 9 South and maintenance of its rolling stock.

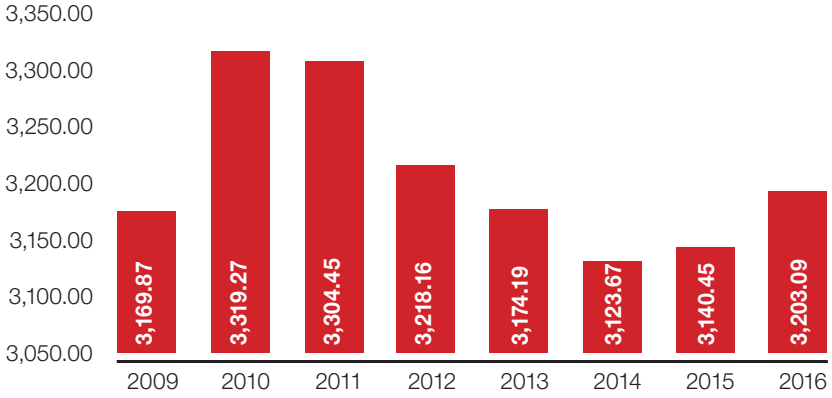
Ferrocarril Metropolità de Barcelona, SA average standardized workforce

	2016	2015	Diff.	%
Average standardized workforce (*)	3,203.09	3,140.45	62.64	1.99%

(*) Average annual workforce by hours per employee/year.

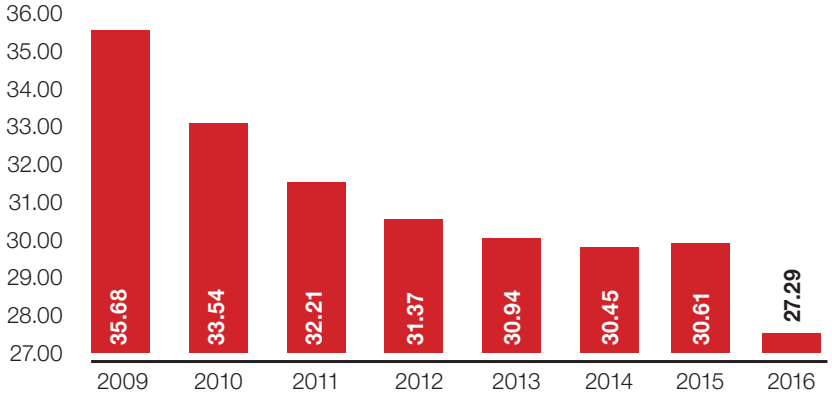
The average annual standardized Metro workforce decreased from 2010 until 2014. The decrease was more pronounced after 2012 as a result of the resource rationalisation plan launched that year. Since 2015, and particularly in 2016, the workforce has increased to provide service to the new section of L9 South.

Development of the FMB average standardized workforce.



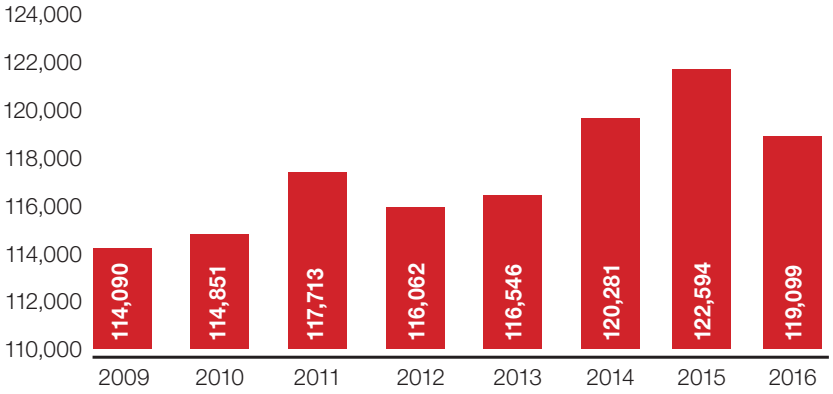
The start-up of Line 9 South in February 2016 has meant the ratio of employees per km of network decreased considerably, down to 27.29, because the line is automatic.

Employees per km of metro network



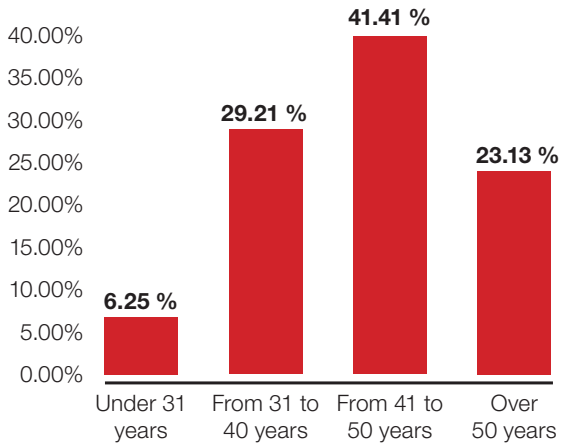
The strikes and the new Line 9 South (which has a lower occupancy rate than the average of traditional lines), have meant that the index of passengers per employee has decreased by 2.85 compared to the previous year.

Change in no. of passengers per metro employee

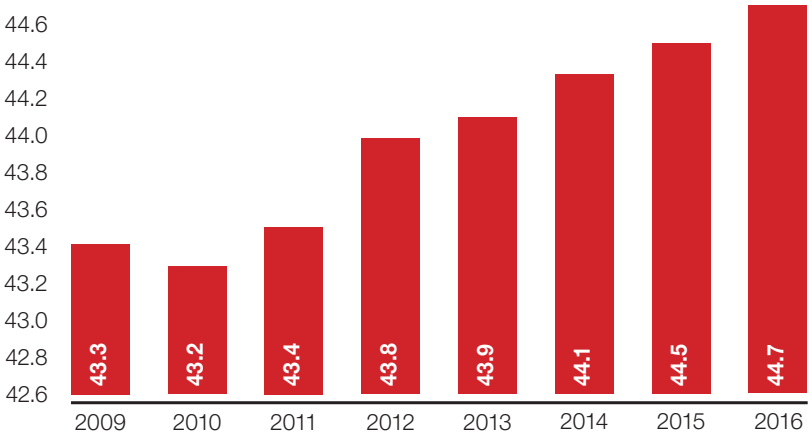


The average age of staff has increased since2010 to 44.73 years during this last year. The greatest number of employees, 41.4% of the total workforce, is concentrated in the 41 to 50 year age bracket.

Metro workforce breakdown by age (2016)



Change in average age of FMB workforce



Montjuïc cable car workforce

Main figures of the Cable Car

Length (metres):	**752**
Slopes (metres):	**84.55**
Number of supports:	**12**
Number of cabs	**55 (all glass covered)**
System capacity (people/hour):	**2,000**
Minimum distance between cabs (metres):	**48**
Speed (metres/second):	**2.5 - 5.0**
Traction (kVA):	**400**
Counterweight	**Hydraulic tension**

At 31st December 2016, staff of the cable car totalled 24 people (6 head drivers and 18 auxiliary drivers), who provide the service to customers in different work shifts.

In 2016, an auxiliary coverage process was carried out for the cable car to cover summer workforce needs. 149 people replied to the job advertisement, of which 9 were selected to carry out training (also selective training). Finally 7 people were recruited to work during the summer.


15
Economic
measures

Investment in TB

Investments in 2016 increased considerably with respect to the previous year (+104%), to a total of 40.25 million euros. This was mainly due to the purchase of buses. These can be broken down into: 2.43 million euros were in intangible assets. 38.51 million euros in PP&E and a balance of 1.73 million euros in PP&E variations in progress. By volume, the most significant investment was in the following areas:

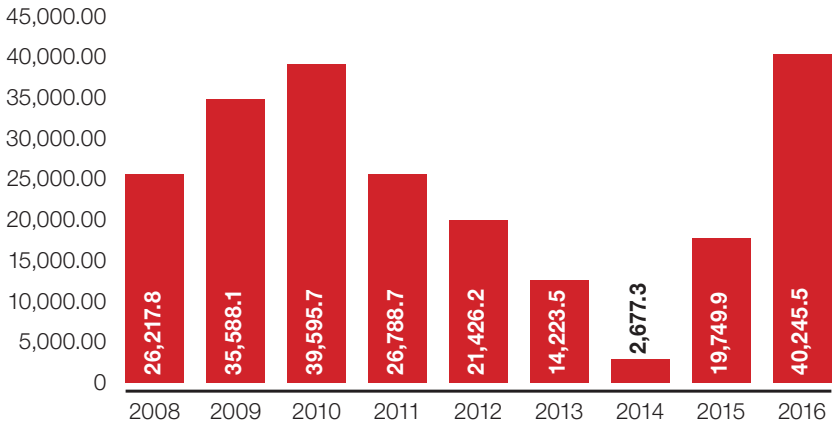
Item	Thousands of euros
Intangible assets:	**2,426.3**
Industrial property rights	2.4
Computer software	2,423.9
Property, plant and equipment:	**36,085.0**
Buildings and constructions	259.0
Machinery, equipment and tools	2,849.3
Furniture and fittings	87.9
IT equipment	122.7
Vehicles	32,763.6
Spare parts	2.5
Subtotal	**38,511.3**
Change in PP&E in progress	1,734.2
Total	**40,245.5**

—Computer applications: corresponding to *Windows Server* and *SAP Business Objects* licences.
—The section on buildings and other constructions basically includes the investments made in various aspects of the Zona Franca depot.
—Investments in machinery, equipment and tools correspond mainly to the installation of public *wifi* in the bus fleet, the fire-fighting and air-conditioning systems of the Horta CON, work on purifiers and air-conditioning of the Ponent and Triangle Ferroviari centres.
—Investments made in transport elements were basically 16 double-decker buses, 40 articulated hybrid vehicles, 10 standard hybrid vehicles, 18 standard CNG vehicles and electrical vehicles for maintenance.

The balance of 1,734.2 thousand euros of PP&E variations in progress corresponds basically to investments made in:
the security control centre of the Triangle CON, investments in the Zona Franca CON facilities, the new mobility sales system of the Barcelona Tourist Bus, and the adaptation of the Tramvia Blau sub-centre.

The chart shows investment by Transports de Barcelona for 2008-2016, with a clear decline from 2010.2014 This drop was due to economy measures designed to reduce the company's financing needs, obliging them to prioritise investment and postpone others. The level this year 2016 has exceeded 2010, showing a new maximum within this series, as a result of the purchase of vehicles to renew the bus fleet.

Development of TB investments
(thousands of euros)



Investment in FMB

Investments made throughout the year total 43.28 million euros, meaning a growth of 68% over the previous year. These investments are broken down into: 2.43 million euros were in intangible assets (computer software).22.47 million euros in PP&E and 18.49 million euros in pp&e variations in progress.

Item	Thousands of euros
Intangible assets:	**2,322.6**
Studies and projects	0.0
Computer software	2,322.6
Property, plant and equipment:	**22,467.9**
Land and natural assets	0.0
Buildings and constructions	455.6
Fixed installations	11,577.3
Machinery, equipment and tools	4,735.1
Sub-stations	12.0
Furniture and fittings	149.1
IT equipment	959.3
Vehicles	2,572.3
Spare parts	2,007.2
Subtotal	**24,790.5**
Change in PP&E in progress	18,493.2
Total	**43,283.7**

The most significant investments for their amount, were the following:

— *Investments in intangible assets:*
– The Windows Server and *SAP Business Objects*licences are included in computer software, together with the migration of the operating system of the DA and *Nodes* to *Windows 7*.

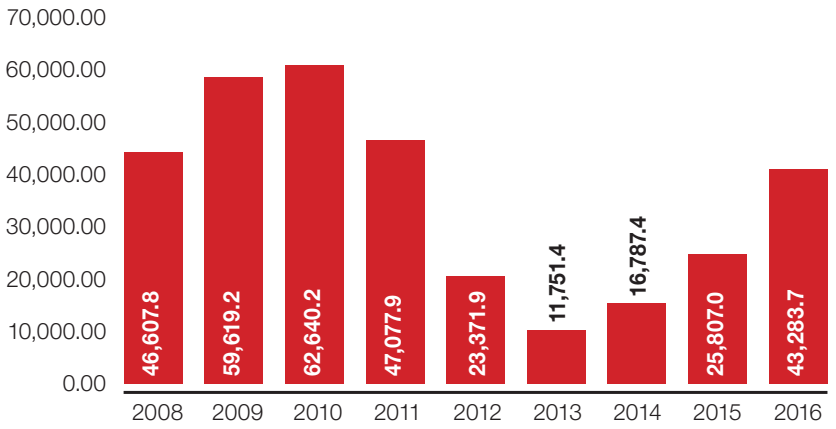
— *Investments in PP&E (Property Plant and Equipment):*
– Significant investment in buildings and other constructions, include the Can Boixeres walkways and the consolidation of the Roquetes workshop façade.
– The most important investments in Fixed Installations include the superstructure of the Verneda - Pep Ventura section of L2, the renovation of the section between Cornellà and Gavarra stations of L5. the renovation of the Montjuïc funicular, the renovation of El Fondo, Hospital de Bellvitge, Sant Antoni and Tetuan, anti-vibration mountings and the change of pointer of the access to the workshop, plus the end-of-track buffer of the Vilapicina workshop.
– One of the most important investments in machinery, equipment and tools are the network analysers on conventional lines, their renewal on the Funicular, the MPLS communication rooms, *bogies* cleaning equipment at the Sagrera workshop, the IP voice telephony system, the installation of public *wifi* in 16 stations and works in the Sant Genís workshop (fire-fighting system).
– An important investment in fittings and utensils was in photocopiers. Another significant investment in information processes includes the renovation of computers.

– Investment in transport elements refers mainly to improvements in track machinery, the refurbishment of series 2000 trains and investments in electric maintenance vehicles. Most of the expenditure under the spare parts heading was on parts for trains.

The change in PP&E (Property Plant and Equipment) in progress corresponds mainly to movements in the balances for this account. They refer mainly to investments in: safety improvements in escalators, refurbishment of series 2000 trains, the renovation of the Barceloneta – Ciutadella track, the refurbishment of various stations, the DMR radiocommunications system in conventional lines and L11, the renovation of lifts and interlocking of L1 and L3, plus others.

The following graph shows the development of investments in the Metro in recent years, where a clear decrease can be seen from 2010. This drop was due to economy measures designed to reduce the company's financing needs, obliging them to prioritise investment and postpone others. However, from 2014, investments started to increase up to 42.28 million € this last year. This figure is a little nearer to levels before the crisis.

Development of investments in FMB
(thousands of euros)



Investment in the Montjuïc Cable Car

Investments made in the company during 2015 totalled 147.9 thousand euros. The items with the highest amount correspond to:
—Computer applications: *software* of the point of sales terminal.
—machinery, equipment and tools: Investments for the reactive power compensation switchboards,
— PP&E (Property Plant and Equipment) variation in progress: correspond basically to the development of *Ociweb*.

Item	Thousands of Euros
Property, plant and equipment:	**28.0**
Computer software	28.0
Property, plant and equipment:	**79.3**
Buildings and constructions	0.0
Fixed installations	0.0
Machinery, equipment and tools	69.2
Furniture and fittings	1.0
IT equipment	9.1
Vehicles	0.0
Spare parts for PP&E (Property Plant and Equipment)	0.0
Total	**107.3**
Change in PP&E in progress	40.6
Total	**147.9**

Consolidated income statement of the TMB GROUP

The 2016 financial year passed wiin a situation of positive economic growth of both Catalan and Spanish economies, in which TMB has operated within a stable financial framework, represented by the Programme Contract 2014-2017 and the 2014-2031 Framework Plan from Financial Rehabilitations of the Public Transport System of Debt Refinancing, passed on 6th March 2014 by the ATM Management Board.

2016 has also been marked particularly by the start-up of the new line 9 south section of the Metro on 12 February 2016. This has had an effect on the Income Statement of the TMB Consolidated Group.

The evolution of revenue and operating expenditure is analysed below:

—Operating revenues:

The total revenues of the TMB consolidated group (excluding service subsidies) increased by 16.7 million euros (4.0%) on the previous year. This is the result of: firstly an increase in sales revenue by 11.0 million euros (2.8%), owing to the increase in passengers in the TMB as a whole, and secondly, an increase in accessory revenue of 5.7 million euros (27.3%). This second increase is due basically to revenue from invoicing services to the public administrations, arising from infrastructure maintenance work done by TMB on lines 9 North/ L10, which this year have increased as a result of the incorporation of the new line 9 South. However, special subsidies decreased by 47 thousand euros (-0.5%).
Finally, Subsidies of the service have increased by 33.7 million euros (10.4%) chiefly due to the start-up of line 9 South.

—Operating expenses:

The new line 9 South explains the increase in operating expenditure before amortisations, which has increased by 51.9 million euros (+7.8%) compared to the previous year. However, if the charges of lines 9 North/L10 and L9 South are excluded, along with the leasing of trains (which have increased by 42.8 million euros as a whole), the increase of expenditure would be 9.0 million euros, meaning an increase of 1.7% over the previous year.

The items that have increased the most were: Supplies increased by 412 thousand euros (2.3%), operative staff expenses, which increased by 7.4 million euros (2.0%) and particularly External Services, which increased by 52.2 million euros (+23.5%). Out of this, 42.8 million correspond to the increase in charges of Line 9 North/L10 and 9 South, and the leasing of trains, plus 9.4 million euros corresponding to the remaining items grouped within External Services. Within these expenses, the items that have increased the most are the following: repair and preservation expenses of transport, machinery and fixed installation elements, security and surveillance, expenses in the Tourist Bus informers, expenses in computer work and cleaning of vehicles, buildings, plus others.

Staff expenses have grown by 7.4 million euros (+2.0%), as a result of a staff increase for the new line 9 South, and increased provisions of the bus network mentioned above, and for the application of the new collective Agreement of the bus, signed in 2016.

There was a reduction of 3.6 million euros (-7.3%) in the costs of fuel and energy compared with 2015. The decrease occurred both in the cost of diesel and natural gas in buses and electricity in Metro. In the first case, this was owing basically tor a decrease in the average price of fuel, and in Metro, for a drop in the average price of kWh and for the decrease in the consumption of electrical energy.Regarding buses, on 1 August 2016, a coverage of 20% of the diesel oil consumption was contracted for the fleet with diesel engines, with a deferred start on 1 January 2017 to 31 December 2017.

Variations of provisions have dropped by 1.9 million euros. Within Other Results there is a payment of 2.1 million euros received from the Tax Agency for the refund of the health tax on retail sales of certain hydrocarbons (IVMDH) of the 2011 and 2012 financial years.

—*Other expenses:*

Net depreciation and amortisation (after capital subsidies transferred to the year) fell by 0.94 million euros (+1.7%) compared to the previous year and financial expenses decreased by 1.8 million euros, thanks to the reduction of structural financial expenses.

Finally the Result after Corporate tax was 4.3 million euros, representing a decrease of 0.98 million euros compared to the previous year.

Consolidated income statement of the TMB group (in thousands of euros)			2016	2015	Difference	% Diff.
A) CONTINUING OPERATIONS	**Revenues**	Sales	397,704	386,685	11,018	2.8
		Other operating revenues	26,738	20,999	5,740	27.3
		Special subsidies	9,445	9,493	-47	-0.5
		Service subsidies	356,948	323,267	33,681	10.4
	Total Revenues		**790,835**	**740,443**	**50,392**	**6.8**
	Operating expenses	Supplies	18,319	17,907	412	2.3
		Electricity/fuel	45,266	48,826	-3,559	-7.3
		Operations personnel	376,766	369,406	7,360	2.0
		Contribution to the supplementary pensions system	555	657	-102	-15.6
		Supplementary Retirement Contingency Pensions System	*0*	*0*	*0*	
		Supplementary Risk Contingency Pensions System	*555*	*657*	*-102*	*-15.6*
		Personnel in regulatory process	749	616	132	21.5
		External services	274,279	222,064	52,214	23.5
		Taxes	988	786	203	25.8
		Changes in provisions	272	2,174	-1,901	-87.5
		Impairment and Gains from PP&E sales	115	875	-760	-86.9
		Other results	-2,129	0	-2,129	
	Total expenses before depreciation and amortisation		**715,181**	**663,311**	**51,869**	**7.8**
		Amortisation and depreciation	65,931	64,170	1,760	2.7
		Subsidies in capital allocated to profits and loss	-10,673	-9,853	-820	8.3
	Net amortisation		**55,258**	**54,318**	**940**	**1.7**
	Total financial expenses		**770,439**	**717,629**	**52,810**	**7.4**
	Financial expenses:	Financial expenses for CP writedowns	16,657	16,014	643	4.0
		Structural financial expenses	-228	2,218	-2,446	-110.3
	Total financial expenses		**16,429**	**18,232**	**-1,803**	**-9.9**
	Share in profits of consolidated companies		**435**	**672**	**-238**	**-35.4**
	Total profit before tax		**4,401**	**5,254**	**-853**	**-16.2**
	Corporate income tax		**-124**	**4**	**-127**	**-3,494.5**
	Profit for the year from continuing operations (after corporate income tax)		**4,278**	**5,258**	**-980**	**-18.6**
B) DISCONTINUED OPERATIONS	**Profit for the year from discontinued operations (after corporate income tax)**		**0**	**0**	**0**	
PROFIT / LOSS FOR THE YEAR			**4,278**	**5,258**	**-980**	**-18.6**

TB income statement

The 2016 financial year passed wiin a situation of positive economic growth of both Catalan and Spanish economies, with GDP increases of over 3%, in which TMB has continued operating within a stable financial framework, represented by the 2014-2017 Programme Contract and the 2014-2031 Framework Plan from Financial Rehabilitations of the Public Transport System of Debt Refinancing, passed on 6th March 2014 by the ATM Management Board. .

The evolution of revenue and expenses of the Profit and Loss Account of the year is commented below. Operating revenues:

Comparison between 2016 and 2015

Annual revenues (excluding service subsidies) have increased by 6.26 million euros, representing an increase of 4.4%. This was mainly as a result of an increase of 8.55 million euros in the sale of tickets, which has grown by 6.3% This good result in sales is chiefly due to the increase in passengers, and to a lesser extent, to the positive evolution of the average fare per passenger, in spite of the freezing of fares in 2016.

Detail of revenue (in thousands of euros)	**(1) 2016**	**(2) 2015**	**Difference (1) - (2)**	**(%)**
Sales	145,254	136,703	8,551	6.3
Commissions and rebates	-11,232	-9,618	-1,614	16.8
Non-operating income	6,325	6,804	-479	-7.0
Pension plan revenues	286	530	-244	-46.0
Special subsidies	6,222	6,181	41	0.7
Service subsidies	145,171	158,998	-13,827	-8.7
Revenues before service subsidies	146,855	140,601	6,255	4.4
Service subsidies	145,171	158,998	-13,827	-8.7
Total Revenues	**292,026**	**299,599**	**-7,573**	**-2.5**

Commissions, discounts and rebates increased over the year by 1.6 million euros (+16.8%) .

The reduction in accessory revenue by 7% is important to underline, mainly owing to the drop in revenues from advertising charges, and also for the reduction in revenues from shuttle lines and other services.

Special subsidies have been similar to the previous year, with an increase of 0.7%.
Finally, income from pensions, which does not affect the result of the Income Statement, decreased by 244 thousand euros over the previous year.

—Operating expenses: Comparison between 2016 and 2015

Operating Expenses before amortisations have decreased by 2.5% with respect to the previous year, as a result of decreased expenses in Fuel and the Changes in Provisions (the latter by 5.7 million euros), plus the reduction in expenses from Other results. Regarding Fuel expenses, there has been a reduction both in diesel oil and natural gas expenses, although greater consumption of fuel compared to last year, because of increased mileage owing to a wider offer. The reason for this saving has been a drop in the annual average price of diesel oil and natural gas over 2015. It should also be borne in mind at on 1 August, a coverage of 20% was contracted of the diesel oil consumptions of the fleet with diesel engines, with a deferred start on 1st January 2017 to 30th December 2017. Also in 2016, 2.13 million euros have been received corresponding to the refund of health tax on retail sales of certain hydrocarbons (IVMDH) from 2011 and 2012.

The growth in Staff expenses is the result of increased staff to cover the wider offer, and the application of the new collective Agreement signed in 2016.

External Service have increased by 0.76 million euros (+ 2.2%) compared to last year.The items that have increased the most are the following: repair and preservation expenses of vehicles, expenses of Tourist Bus informers, cleaning expenses of vehicles, buildings, and back-up services of the organization.

Detail of operating expenses (in thousands of euros)	**(1) 2016**	**(2) 2015**	**Difference (1) - (2)**	**(%)**
Supplies	9,954	9,800	154	1.6
Electricity/fuel	18,485	20,629	-2,144	-10.4
Personnel	209,069	207,331	1,738	0.8
Contribution to the supplementary pensions system	286	530	-244	-46.0
Supplementary Retirement Contingency Pensions System	0	0	0	
Supplementary Risk Contingency Pensions System	286	530	-244	-46.0
External services	34,735	33,975	759	2.2
Taxes	784	576	208	36.2
Changes in provisions	-1,671	4,025	-5,697	
Impairment losses and gains/losses on disposal of assets	321	-9	330	
Other results Refund of IVMDH	-2,129	0	-2,129	
Total expenses before amortisation	**269,835**	**276,859**	**-7,024**	**-2.5**
Amortisation and depreciation	29,017	27,154	1,864	6.9
Capital subsidies allocated to profits and losses	-4,849	-4,818	-32	0.7
Net amortisation	**24,168**	**22,336**	**1,832**	**8.2**
Total operating expenses	**294,003**	**299,195**	**-5,192**	**-1.7**

Regarding the remaining entries, expenses in supplies have increased by 154 thousand euros and taxes by 208 thousand euros. Net amortisation (after subsidies in capital transferred to the year) have increased by 1.83 million euros (+8.2%) over the previous year, because of the increase in amortisation allowances of transport elements and machinery, installations and tools.

Other expenses Comparison between 2016 and 2015

Another item that has reduced considerably has been Financial Expenses by 2.38 million euros compared to the previous year. This has been mainly due to the increased dividends of associated companies. Also in 2016, 407 thousand euros was received from the Tax Agency corresponding to interest in the delay of IVMDH from the financial years 2011 and 2012.

Finally, the fact that in 2016 there was a significant increase in revenues, and also the moderation in the development of operating expenses, along with the refunds from the Tax Agency for the amount paid in IVMDH, has meant that overall, the service subsidies required to balance the Income Statement of the year, have decreased by 13.8 million euros, that is 8.7% with respect to 2015.

Income statement (in thousands of euros)

			(1) 2016	(2) 2015	Difference (1) - (2)	(%)
A) CONTINUING OPERATIONS	**Revenues**	Sales	145,254	136,703	8,551	6.3
		Commissions and rebates	-11,232	-9,618	-1,614	16.8
		Non-operating income	6,325	6,804	-479	-7.0
		Pension plan revenues	286	530	-244	-46.0
		Special subsidies	6,222	6,181	41	0.7
		Service subsidies	145,171	158,998	-13,827	-8.7
	Total Revenues		**292,026**	**299,599**	**-7,573**	**-2.5**
	Operating expenses	Supplies	9,954	9,800	154	1.6
		Electricity/fuel	18,485	20,629	-2,144	-10.4
		Personnel	209,069	207,331	1,738	0.8
		Contribution to the supplementary pensions system	286	530	-244	-46.0
		Supplementary Retirement Contingency Pensions System	0	0	0	
		Supplementary Risk Contingency Pensions System	286	530	-244	-46.0
		External services	34,735	33,975	759	2.2
		Taxes	784	576	208	36.2
		Changes in provisions	-1,671	4,025	-5,697	-141.5
		Changes in provisions	321	-9	330	
	Total expenses before depreciation and amortisation		**269,835**	**276,859**	**-7,024**	**-2.5**
		Amortisation and depreciation	29,017	27,154	1,864	6.9
		Capital subsidies allocated to profits and losses	-4,849	-4,818	-32	0.7
	Net amortisation		24,168	22,336	1,832	8.2
	Total financial expenses		**294,003**	**299,195**	**-5,192**	**-1.7**
	Financial expenses:	Financial expenses for CP writedowns	-407	0	-407	
		Structural financial expenses (including leases)	-1,570	404	-1,973	-489.0
	Total financial expenses		**-1,977**	**404**	**-2,380**	**-589.7**
	Total profit before tax		**0**	**0**	**0**	
	Corporate income tax		0	0	0	-
	Profit for the year from continuing operations (after corporate income tax)		**0**	**0**	**0**	
B) DISCONTINUED OPERATIONS	**Profit for the year from discontinued operations (after corporate income tax)**		**0**	**0**	**0**	
PROFIT / LOSS FOR THE YEAR			**0**	**0**	**0**	

FMB Income statement

The 2016 financial year passed wiin a situation of positive economic growth of both Catalan and Spanish economies, with increases in the GDP of over 3% in which TMB has operated within a stable financial framework, represented by the Programme Contract 2014-2017 and the 2014-2031 Framework Plan from Financial Rehabilitations of the Public Transport System of Debt Refinancing, passed on 6th March 2014 by the ATM Management Board.

This year e FMB (Barcelona Metropolitan Rail) service has been particularly marked by the start-up of the South Section of the Metro Line 9 on 12th February 2016, which has had considerable impact on the Income Statement of the year.

—Annual revenues Comparison between 2016 and 2015

Total revenues of the year, excluding service subsidies, have increased by 8.9 million euros, representing a rise of 3.3% compared to the previous year. This increase has mainly been owing to the increase in tickets and accessory revenues. Income has risen by 2.3 million euros (+0.3), owing to the increase in average fares per passenger (in spite of the fare freeze), which has compensated the decrease in passengers owing to the labour dispute. The increase in the average revenue per passenger can be explained by the new single ticket to the airport of line 9 South (which is higher because part of the price is to finance maintenance charges of the stations of the line), and to the increased sale of HOLA BCN tickets by 22.3%.

Detail of revenue (in thousands of euros)	**(1) 2016**	**(2) 2015**	**Difference (1) - (2)**	**(%)**
Sales	256,916	254,604	2,312	0.9
Commissions and rebates	-2,422	-2,817	395	-14.0
Other operating revenues	21,801	15,748	6,053	38.4
Pension plan revenues	269	127	141	111.1
Special subsidies	3,223	3,311	-89	-2.7
Revenues before service subsidies	**279,786**	**270,973**	**8,901**	**3.3**
Service subsidies	43,121	33,775	9,346	27.7
Service subsidies for train leases and L9/L10 charges	168,656	130,494	38,162	29.2
Total Revenues	**491,562**	**435,241**	**65,223**	**15.0**

Another item that has increased significantly were the accessory revenues of the year, which have risen by 6.05 million euros (+34%) compared to the previous year. The reason is mainly increased billing of services to Public Administrations, owing to the infrastructure maintenance works carried out by FMB on lines 9 North/10 and 9 South. Other items that have also increased were the revenue from advertising charges and from the inspection and intervention of passengers.

Special subsidies have dropped by 83 thousand euros (-2.7%) basically because of the decrease in the subsidy received from projects. Revenue from pensions, which have a neutral effect on the Income Statement, have grown by 141 thousand euros.

—Operating expenses: Comparison between 2016 and 2015

Total operating expenses before amortisation and depreciation increased by 58.38 million euros (15.1%) over the previous year. If the charges of line 9) North/L10 and L9 South and the leasing of trains is excluded, the increase was 15.5 million euros (+6.1%), mainly as a result of the start-up of L9 South.

The items that have increased most were Personnel expenses by 5.7 million euros (+3.5%), changes in provisions (an increase of 3.8 million euros) and external services (without charges and leasing of trains), which grew by 8.3 million euros (+14.0%).
The growth in Personnel expenses is owing to the extra staff contracted to provide the line 9 South Service, and the salary increase on account of the coming Collective Agreement. This is now under negotiation, as a result of the agreement reached at the beginning of July, between the Company Management and the Works Council, to continue negotiating the agreement and put an end to the labour dispute.

Within External Services, the items that have experienced most growth included: repair and preservation expenses of fixed installations, transport elements and machinery, security and surveillance expenses, computer work, cleaning of stations and trains, and the invoicing paid to Transports de Barcelona for bus services during the shutdown in service occurring in the metro lines.

Detail of operating expenses (in thousands of euros)	**(1) 2016**	**(2) 2015**	**Difference (1) - (2)**	**(%)**
Supplies	8,050	7,871	178	2.3
Electricity/fuel	26,660	28,072	-1,412	-5.0
Personnel	167,450	161,769	5,681	3.5
Contribution to the supplementary pensions system	269	127	141	111.1
Supplementary Retirement Contingency Pensions System	0	0	0	
Supplementary Risk Contingency Pensions System	269	127	141	111.1
External services	240,529	189,424	51,106	27.0
Renting of trains	75,028	74,646	382	0.5
L9 North/L10 and L9 South charges	98,302	55,848	42,454	76.0
Other external services	67,199	58,930	8,270	14.0
Taxes	166	183	-18	-9.7
Changes in provisions	1,945	-1,851	3,796	-205.1
Impairment and gains from PP&E sales	-206	884	-1,090	
Total expenses before amortisation	**444,862**	**386,479**	**58,383**	**15.1**
Amortisation and depreciation	36,164	36,256	-92	-0.3
Capital subsidies allocated to profits and losses	-5,823	-5,035	-788	15.7
Net amortisation	**30,340**	**31,221**	**-881**	**-2.8**
Total operating expenses	**475,202**	**417,700**	**57,502**	**13.8**

One of the items that has decreased most is Energy, which has dropped by 1.41 million euros (-5.0%) as a result of reduced energy consumption, both in train traction energy (owing to a decrease in the number of coaches-km travelled) and remaining energy (low voltage). As mentioned above, this year work has continued on applying measures to save electricity consumption to lower the energy costs.

Pension expenses for risk contingency grew by 141 thousand euros, but as indicated above, these do not have any effect on the Income Statement.

Amortisation (amortisation less capital subsides transferred to the year) have decreased by 881 thousand euros, -2.8% compared to the previous year (basically owing to the growth of 788 thousand euros in capital subsidies).

– Other expenses: Comparison between 2016 and 2015

Total financial expenses have decreased by 1.18 million euros as a result of the reduction in structural financial expenses.

Finally, in spite of the increase in revenue, the Service Subsidy of the year (excluding subsidies for leasing of trains and L9 North/L10 and L9 South charges), needed to balance the Income Statement, has increased by 9.3 million euros over the previous year, basically owing to the start-up of Line 9 South. For the same reason, subsidies allocated to leasing of trains and charges of L9 North/L10 South have risen by 39.2 million euros, mainly because of the incorporation of charges of the latter. It should be underlined that 4.57 million euros have been applied to new fare revenue, associated with the connection to Barcelona airport of the new L9 South, which reduces the subsidy required for charges.

Income statement (in thousands of euros)

			(1) 2016	(2) 2015	Difference (1) - (2)	(%)
A) CONTINUING OPERATIONS	**Revenues**	Sales	256,916	254,604	2,312	0.9
		Commissions and rebates	-2,422	-2,817	395	-14.0
		Non-operating income	21,801	15,748	6,053	38.4
		Pension plan revenues	269	127	141	111.1
		Special subsidies	3,223	3,311	-89	-2.7
		Service subsidies	43,121	33,775	9,346	27.7
		Subsidy for the leasing service of trains and L9 North/L10 and L9 South charges	168,656	130,494	38,162	29.2
	Total Revenues		**491,562**	**435,241**	**56,321**	**12.9**
	Operating expenses	Supplies	8,050	7,871	178	2.3
		Electricity/fuel	26,660	28,072	-1,412	-5.0
		Personnel	167,450	161,769	5,681	3.5
		Contribution to the supplementary pensions system	269	127	141	111.1
		Supplementary Retirement Contingency Pensions System	*0*	*0*	*0*	
		Supplementary Risk Contingency Pensions System	*269*	*127*	*141*	*111.1*
		External services	240,529	189,424	51,106	27.0
		Taxes	166	183	-18	-9.7
		Changes in provisions	1,945	-1,851	3,796	-205.1
		Impairment and gains for PP&E sales	-206	884	-1,090	
	Total expenses before depreciation and amortisation		**444,862**	**386,479**	**58,383**	**15.1**
		Amortisation and depreciation	36,164	36,256	-92	-0.3
		Capital subsidies allocated to profits and losses	-5,823	-5,035	-788	15.7
	Net amortisation		**30,340**	**31,221**	**-881**	**-2.8**
	Total financial expenses		**475,202**	**417,700**	**57,502**	**13.8**
	Financial expenses:	Financial expenses for CP writedowns	16,657	16,014	643	4.0
		Structural financial expenses (including leases)	-297	1,527	-1,824	-119.5
	Total financial expenses		**16,360**	**17,541**	**-1,181**	**-6.7**
	Total profit before tax		**0**	**0**	**0**	
	Corporate income tax		**0**	**0**	**10**	
	Profit for the year from continuing operations (after corporate income tax)		**0**	**0**	**0**	
B) DISCONTINUED OPERATIONS	**Profit for the year from discontinued operations (after corporate income tax)**		**0**	**0**	**0**	
PROFIT / LOSS FOR THE YEAR			**0**	**0**	**0**	

Note: External Services include train lease expenses totalling 75,028 thousand euros in 2015 and 74,646 thousand euros in 2015. This amount also included 98,302 thousand euros for charges for L9/10 and L9 South, and 55,848 thousand euros in 2015 for the same concept.

Income Statement of Projectes i Serveis de Mobilitat, SA

Total results for the year after tax was 5.57 million euros of profit, an increase of 0.65 million euros over the previous year (+13,1%) This good result is owing to an increase of 836.7 thousand euros (+11.3%), considerably higher than operating expenses, which have grown by 54.6 thousand euros, that is 2.2%.

The increase in revenue is mainly owing to travel tickets, which have risen by 11.7% mainly as a result of the increase in passengers this last year(+8.7%).

Operating expenses before amortisation, have risen by 4.8% as a result of the increase in Supplies, Personnel and External Services items (with an increase in repair and presentation expenses of transport elements. On the other hand, Electricity expenses have decreased.

Amortisations have reduced by 4.0% owing to the decrease in amortisation allowances of machinery, installations and tools.

Finally, the financial result has become negative this year, basically owing to the effect of the regression in dividends of TMB France, corresponding to 2014.

Income statement of Projectes i Serveis de Mobilitat, SA (in euros)

			2016	2015	Difference	% Diff.
A) CONTINUING OPERATIONS	**Operating revenues**	Sales	8,003,216.97	7,164,212.15	839,004.82	11.7
		Other operating revenues	206,573.19	208,870.01	-2,296.82	-1.1
	Total Revenues		**8,209,790.16**	**7,373,082.16**	**836,708.00**	**11.3**
	Operating expenses	Supplies	106,326.09	35,793.84	70,532.25	197.1
		Electricity/fuel	121,011.89	124,648.85	-3,636.96	-2.9
		Operations personnel	877,303.12	866,593.38	10,709.74	1.2
		External services	751,650.56	745,078.01	6,572.55	0.9
		Taxes	1,699.38	1,346.12	353.26	26.2
		Results from PP&E sales	-923.70	-813.25	-110.45	13.6
	Total expenses before depreciation and amortisation		**1,857,067.34**	**1,772,646.95**	**84,420.39**	**4.8**
		Amortisation and depreciation	716,421.94	746,267.71	-29,845.77	-4.0
	Total financial expenses		**2,573,489.28**	**2,518,914.66**	**54,574.62**	**2.2**
	Net operating income		**5,636,300.88**	**4,854,167.50**	**782,133.38**	**16.1**
		Net financial income	43,357.70	-58,608.04	101,965.74	-174.0
	Profit / Loss from continuing operations (before corporate income tax)		**5,592,943.18**	**4,912,775.54**	**680,167.64**	**13.8**
	Corporate income tax		27,440.86	-7,560.00	35,000.86	-463.0
	Profit / Loss from continuing operations (after corporate income tax)		**5,565,502.32**	**4,920,335.54**	**645,166.78**	**13.1**
B) DISCONTINUED OPERATIONS	**Profit / Loss from discontinued operations (after corporate income tax)**		**0.00**	**0.00**	**0.00**	
PROFIT / LOSS FOR THE YEAR			**5,565,502.32**	**4,920,335.54**	**645,166.78**	**13.1**

Consolidated statement of financial position of the TMB group at 31 December

(in thousands of euros)		2016	2015	Difference
ASSETS	**Non-current assets**	**1,093,936**	**1,092,971**	**965**
	Intangible assets	15,393	13,815	1,578
	Property, plant and equipment	532,436	516,389	16,047
	Property investments	0	0	0
	Non-current investments in group and associated companies	3,441	4,916	-1,475
	Non-current financial investments	542,666	557,851	-15,185
	Current assets	**214,533**	**152,349**	**62,185**
	Inventory	9,337	9,195	142
	Trade debtors and other receivables	119,364	71,552	47,812
	Current financial investments	10,293	10,491	-198
	Current prepayments and accrued income	1,038	486	552
	Cash and cash equivalents	74,500	60,624	13,876
TOTAL ASSETS		**1,308,469**	**1,245,320**	**63,149**
EQUITY AND LIABILITIES	**Equity**	**353,258**	**377,534**	**-24,276**
	Capital and reserves:	294,753	290,476	4,278
	Authorised capital	*18,642*	*18,642*	*0*
	Reserves	*271,834*	*266,578*	*5,256*
	Prior year losses	*0*	*-2*	*2*
	Profit / loss for the year	*4,278*	*5,258*	*-980*
	Remeasurements	-42,841	-22,491	-20,350
	Subsidies, donations and legacies received	101,346	109,549	-8,204
	Non-current liabilities	**701,838**	**695,532**	**6,306**
	Non-current borrowings	701,838	695,532	6,306
	Current liabilities	**253,372**	**172,254**	**81,118**
	Current provisions	12,413	11,192	1,221
	Current borrowings	125,230	63,609	61,620
	Trade creditors and other payables	103,450	90,268	13,182
	Current prepayments and accrued income	12,281	7,185	5,096
TOTAL LIABILITIES		**1,308,469**	**1,245,320**	**63,149**

Treasury shares

The companies of the group do not hold any treasury shares. No transactions with own shares were carried out during the year.

Payment terms to suppliers

The average payment period to suppliers by Ferrocarril Metropolità de Barcelona, SA was 43 days in 2016, for Transports de Barcelona, SA it was 45 days, for Projectes i Serveis de Mobilitat, SA it was 70 days, and for TMB, SL it was 67 days.

Recently the three companies have been working to reduce supplier payment periods to bring the average payment period below the maximum specified in regulations on payment periods.

Statement of TB financial position at 31 December in (thousands of euros)

Transports de Barcelona, SA		2016	2015	Diff.
ASSETS	**Non-current assets**	**281,624**	**264,735**	**16,889**
	Intangible assets	9,772	8,932	840
	Property, plant and equipment	219,705	209,657	10,048
	Non-current investments in group and associated companies	5,536	5,572	-36
	Non-current financial investments	46,612	40,575	6,036
	Current assets	**63,813**	**49,170**	**14,643**
	Inventory	4,207	4,019	188
	Trade debtors and other receivables	44,721	42,572	2,149
	Current investments in group and associated companies	37	37	0
	Current financial investments	247	0	247
	Current prepayments and accrued income	420	43	377
	Cash and cash equivalents	14,181	2,499	11,682
TOTAL ASSETS		**345,438**	**313,905**	**31,532**
EQUITY AND LIABILITIES	**Equity**	**144,288**	**145,232**	**-945**
	Capital and reserves:	127,984	127,984	0
	Authorised capital	*8,415*	*8,415*	0
	Reserves	*119,569*	*119,569*	0
	Profit / loss for the year	*0*	*0*	0
	Remeasurements	216	-1,343	1,559
	Subsidies, donations and legacies received	16,087	18,591	-2,504
	Non-current liabilities	**120,150**	**102,721**	**17,429**
	Non-current borrowings	120,150	102,721	17,429
	Current liabilities	**81,000**	**65,952**	**15,048**
	Current provisions	6,739	7,224	-485
	Current borrowings	36,232	23,454	12,778
	Current payables to group and associated companies	0	0	0
	Trade creditors and other payables	30,714	31,161	-447
	Current prepayments and accrued income	7,315	4,113	3,202
TOTAL LIABILITIES		**345,438**	**313,905**	**31,532**

Treasury shares

The company does not hold any treasury shares. No transactions with own shares were carried out during the year.

Payment terms to suppliers

The average payment period to suppliers was 45 days in 2016.

Recently the Company has been working to reduce payment periods to suppliers to bring the average payment period below the maximum specified in regulations on payment periods.

Statement of financial position of FMB at 31 December (thousands of euros)

Ferrocarril Metropolità de Barcelona, SA		2016	2015	Difference
ASSETS	**Non-current assets**	**809,701**	**823,695**	**-13,994**
	Intangible assets	5,230	4,445	785
	Property, plant and equipment	303,458	296,919	6,538
	Property investments	0	0	0
	Non-current investments in group and associated companies	5,163	5,163	0
	Non-current financial investments	495,850	517,168	-21,318
	Current assets			**0**
	Inventory	117,220	71,076	46,144
	Trade debtors and other receivables	5,124	5,116	8
	Current investments in group and associated companies	80,616	29,999	50,617
	Current financial investments	0	0	0
	Current prepayments and accrued income	430	433	-2
	Cash and cash equivalents	618	443	175
TOTAL ASSETS		**30,432**	**35,086**	**-4,654**
EQUITY AND LIABILITIES	**Equity**	**167,322**	**194,931**	**-27,609**
	Capital and reserves:	125,121	125,121	0
	Authorised capital	*10,227*	*10,227*	*0*
	Reserves	*114,894*	*114,894*	*0*
	Profit / loss for the year	*0*	*0*	*0*
	Remeasurements	-43,057	-21,148	-21,909
	Subsidies, donations and legacies received	85,258	90,958	-5,700
	Non-current liabilities	**581,688**	**592,811**	**-11,123**
	Non-current borrowings	581,688	592,811	-11,123
	Current liabilities	**177,910**	**107,030**	**70,880**
	Current provisions	5,673	3,967	1,706
	Current borrowings	88,975	40,077	48,898
	Trade creditors and other payables	78,324	59,940	18,384
	Current prepayments and accrued income	4,938	3,046	1,892
TOTAL LIABILITIES		**926,921**	**894,771**	**32,149**

Treasury shares

The company does not hold any treasury shares. No transactions with own shares were carried out during the year.

Payment terms to suppliers

The average payment period to suppliers in 2016 was 43 days.

Recently the Company has been working to reduce supplier payment periods to bring the average payment period below the maximum specified in regulations on payment periods.

Statement of financial position of Projectes i Serveis de Mobilitat, SA at 31 December

(in euros)		2016	2015	Difference
ASSETS	**Non-current assets**	**9,829,366.14**	**10,207,887.29**	**-378,521.15**
	Intangible assets	269,625.33	300,167.63	-30,542.30
	Property, plant and equipment	9,269,240.30	9,807,219.66	-537,979.36
	Non-current investments in group and associated companies	90,500.00	500.00	90,000.00
	Non-current financial investments	200,000.51	100,000.00	100,000.51
	Current assets	**38,957,986.37**	**33,154,626.76**	**5,803,359.61**
	Inventory	5,559.65	59,829.70	-54,270.05
	Trade debtors and other receivables	140,089.87	359,755.46	-219,665.59
	Current investments in group and associated companies	50.10	178,345.42	-178,295.32
	Current financial investments	9,615,429.57	9,879,975.00	-264,545.43
	Cash and cash equivalents	29,196,857.18	22,676,721.18	6,520,136.00
TOTAL ASSETS		**48,787,352.51**	**43,362,514.05**	**5,424,838.46**
EQUITY AND LIABILITIES	**Equity**	**48,460,874.85**	**42,895,372.53**	**5,565,502.32**
	Capital and reserves:	48,460,874.85	42,895,372.53	5,565,502.32
	Authorised capital	*10,003,100.00*	*10,003,100.00*	*0.00*
	Reserves	*32,892,272.53*	*27,971,936.99*	*4,920,335.54*
	Profit / loss for the year	*5,565,502.32*	*4,920,335.54*	*645,166.78*
	Non-current liabilities	**0.00**	**0.00**	**0.00**
	Non-current borrowings	0.00	0.00	0.00
	Current liabilities	**326,477.66**	**467,141.52**	**-140,663.86**
	Current borrowings:	22,343.57	44,489.56	-22,145.99
	Borrowings from credit institutions	*0.00*	*0.00*	*0.00*
	Other financial liabilities	*22,343.57*	*44,489.56*	*-22,145.99*
	Trade creditors and other payables:	281,929.09	400,845.96	-118,916.87
	Suppliers	*35,249.02*	*17,589.96*	*17,659.06*
	Suppliers, group and associated companies	*103,422.83*	*206,075.09*	*-102,652.26*
	Sundry creditors	*65,627.01*	*93,427.71*	*-27,800.70*
	Personnel, salary payments pending	*20,287.93*	*19,560.85*	*727.08*
	Other payables to Public Administrations	*57,342.30*	*64,192.35*	*-6,850.05*
	Current prepayments and accrued income	22,205.00	21,806.00	399.00
TOTAL LIABILITIES		**48,787,352.51**	**43,362,514.05**	**5,424,838.46**


16
Holdings
in other
companies

Shareholdings in other companies of the consolidated TMB group

The shareholding of companies of the Consolidated Group of Transports Metropolitans de Barcelona in other companies, is detailed below:

- A shareholding of 8,806.14 euros in the company "Ensitrans, A.E.I.E". This amount represents 20% of its capital stock.

- A shareholding of 120,202.44 euros in "Barcelona Regional Agència Metropolitana de desenvolupament urbanístic i d'infraestructures SA",. This figure represents 7.84% of the capital stock of the company.

- A shareholding of 3,005.06 euros in “La Fundació per a la motivació dels recursos humans”. This amount represents 3.85% of its total capital stock.

- A shareholding in the company “Tramvia Metropolità SA” of 2,624,400.0 euros, which represents 2.50% of its capital stock.

- A shareholding of 513,000.0 euros in the company “Tramvia Metropolità del Besòs, SA”, representing 2.5% of its capital stock.

- A shareholding of 300,506.05 euros in Transports Ciutat Comtal, SA, representing 33.3% of its capital stock.

- A shareholding of 420.71 euros in "Promociones Bus SA", representing 0.37% of its capital stock.

- On closing the 2016 financial year, the company “TMB France, EURL unipersonal” forms part of “Grup de Projectes i Serveis de Mobilitat SA”.

On 21 October 2011 the company TMB France was constituted, in which Projectes i Serveis de Mobilitat SA owns 100% of the shares. The company's capital stock was 500 euros. Its registered address is in Perpignan and its purpose is the management, operation and organization of a public transport service and other ways of conveying people and goods and related concessions.

On 22 December 2011, a loan was set-up between Projectes de Serveis i Mobilitat, SA as lender and TMB France as borrower, for an amount of 105,000.00 euros at the Euribor rate (3m) +3.25% for a maximum term of 5 years. The purpose of this loan was to have a minority shareholding in the operating company of the metropolitan area of Perpignan (*Corporation Française de Transports Perpignan Méditerranée*).

On 31 December 2016, the payable amount pending with interest was 90,050.10 euros.

On 29 February 2014 a contract was signed between CFT Vectalia France, SAS, and Vectalia France SA, on the one hand, and TMB France on the other, under which TMB France acquired 5% of the capital stock of CFT Vectalia France through the purchase of 50 shares in Vectalia France, SA.

Given the lack of importance of TMB France in the group's accounts, it was not included in the TMB Group's consolidated accounts for 2016.

TB holdings in other companies

Transports de Barcelona, SA had the following interests in other companies
at 31 December:

- A shareholding of 300,506.05 euros in Transports Ciutat Comtal, SA, representing 33.3% of its capital stock.

- A shareholding of 420.71 euros in "Promociones Bus SA", representing 0.37% of the capital stock.

- A shareholding of 4,403.07 euros, in the company "Ensitrans, A.E.I.E.", representing 10% of its capital stock.

- A shareholding of 60,101.22 euros in "Barcelona Regional, Agència Metropolitana de Desenvolupament Urbanístic i d'Infrastructures SA", representing 3.92% of the company.

- A shareholding of 161,550 euros in the company "Transports Metropolitans de Barcelona, SL", representing 50% of its capital stock.

- A shareholding of 5,001,550 euros in Projectes i Serveis de Mobilitat, SA, representing 50% of its capital stock

FMB holdings in other companies

The shareholding of Ferrocarril Metropolità de Barcelona SA in other companies, on 31 December, is detailed below:

- A shareholding of 4,403.07 euros in the company "Ensitrans, A.E.I.E" , representing 10% of its capital stock.

- A shareholding of 60,101.22 euros in "Barcelona Regional Agència Metropolitana de desenvolupament urbanístic i d'infraestructures SA", representing 3.92% of the capital stock.

- A shareholding of 3,005.06 euros in “La Fundació per a la motivació dels recursos humans”, representing 3.85% of its total capital stock.

- A shareholding in “Tramvia Metropolità SA” of 2,624,400.0 euros, representing 2.50% of its capital stock.

- A shareholding of 513,000.0 euros in “Tramvia Metropolità del Besòs, SA”, representing 2.5% of its capital stock.

- A 161,550 euro shareholding in Transports Metropolitans de Barcelona, SL, representing 50% of its capital stock.

- A shareholding of 5,001,550 euros in Projectes i Serveis de Mobilitat, SA, represenging 50% of its capital stock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Significant events after the close of the year

After e close of the year, there have been no remarkable events that are not included in the economic and operational plans forecast for 2017.

However, the Management Board of 'Autoritat del Transport Metropolità (ATM) agreed on 14th December to freeze transport fares of the Barcelona area (integrated tickets, single tickets, plus others), similarly to the previous agreement between the Catalan Regional Government, the Barcelona City Council and the Metropolitan Area of Barcelona (AMB). Other developments are: extension of the T-12 ticket to 16 years of age (which will be called T-16), the extension of access to allowances for the unemployed (the T-Trimestre quarterly ticket is replaced by a T-Mes montly card, for the price of a T-10 one zone card), which will come into force in March 2017. Also the creation of a special two-journey multi-personal card for the price of 1.8 euros. This can only be purchased and used on days when there is an environmental pollution episode.

This set of measures implies an increase in the deficit of the system of almost 20 million euros. The associated administrative bodies will increase their contributions by 9.75 million euros: The Catalan Government by 51%, the Barcelona City Council by 25% and the AMB by 24%. The State is also asked to provide 10 million euros more in 2017.

From 16 January 2017, the final information and debate process will start in districts regarding the proposal for new high-performance lines. Various meetings will be held between residents, entities and groups. The process will last for two months. Once it is over the final configuration of the new bus network will be closed along with the bus service in the city as a whole.

The proposal plans the implementation of 12 more lines of the new bus network -one horizontal, two diagonal and nine vertical-. Their development will be technically addressed jointly and will be implemented at two different times: Autumn of 2017 and Autumn of 2018. This will complete the most significant redevelopment of public surface transport of the city in recent years.


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Outlook
for 2017

Outlook for 2017

The goal of TMB goal in 2017 is to maintain the quality and levels of service achieved in previous years, in order to guarantee a sustainable transport service and contribute to the development of the region, making the most effective use of the available resources.

From the start of the current recession, and in light of the limited budgets of the public authorities, TMB has reduced investment spending to the minimum necessary to maintain its assets and guarantee safety, while keeping financing by the authorities within acceptable limits. Investments in recent years have been significantly lower than the depreciation charges recognised in those years.

The signing of a four-year programme contract is a positive step for TMB's financial stability and for the development of the strategy to be implemented in the coming years, as it allows medium-term investment plans to be drawn up that will enable the group to return to its previous levels of investment.

The aim of TMB for the 2017 financial year is to be able to provide the current level of provision of the metro network, under the best conditions. it also aims to consolidate the start-up of the Line 9 South section, between the Airport and Zona Universitària, open another phase of the New Bus Network planned for October 2017, consolidate the start-up of the Local District Bus Plan, not considered initially in the 2016 budget. Other aims include the recovery of the rate of investments started in 2016, and at the same time adjust them to financing resources determined in the ATM-TMB Programme contract 2014-2017.

The following strategic topics are underlined:
—To maintain the offer of the Metro network at a maximum level of quality and service efficiency.
—To continue with a higher level of investments, started in 2016, to perform actions so that facilities, infrastructures and the rolling stock can be upgraded to ensure a quality service in the future.
—To consolidate the start-up of Line 9 South from the Airport to Zona Universitària, opened in February 2016.
—To consolidate the Local District Bus Plan on public holidays, started in September 2016.
—Start-up of phase 5.1. of the New Bus Network planned for 1 October 2017.
—Carry out actions required by the whole organization to adapt TMB to the needs of the T-Mobility project, which will mean a change in future mobility management.

Significant events after the close of the year

On 1 January 2017 new fares came into force for the Montjuïc cable car.

In accordance with the planned schedule, the cable car will be closed to the public from 30 January to 19 February 2017 for annual maintenance and adjustments to components.

Outlook for the company and future projects

The number of passengers of the Montjuïc cable car in 2016 were highly satisfactory and the main goal for 2017 is to build on these good results.