

The collection and disposal of municipal solid waste in Spain

By Timothy Byrne



I have been interested in the Collection and Disposal of Municipal Solid Waste MSW, since I was a small boy. Primarily my interest only related to the UK until I got older and started going abroad on my annual holidays with my family where I spent my holiday time researching the collection and disposal of MSW.

I have carried out my research in the Balearics, Gran Canaria, Tenerife, the City of Barcelona and Huelva in Southern Spain. My research has also taken me to many places in Greece including Cyprus as well as Tunisia and Italy. In the latter two countries my research has mainly been into the collection of MSW.

I am a member of the Chartered Institution of Wastes Management (CIWM) and am also a member of the International Solid Waste Association (ISWA). I am a Technician Member of CIWM and have also passed my International Waste Manager Qualification Technical Level recently with ISWA. I have achieved this through demonstrating technical knowledge and understanding in the fields of Sustainable collection and disposal of MSW.

Before going into detail on the collection and disposal of MSW in Spain, I would like to point out that whilst collection is in the hands of both Private Companies and the Public sector, disposal is only carried out by the Private sector. The main

companies involved in both collection and disposal are Fomento De Construction Y Contractas SA (FCC), URBASER, CESPAS, ACCIONA AND SUFI and their subsidiaries.

The majority of the collection of MSW is carried out at night in Spain and its Islands. Collection of MSW normally commences between 22.00 hrs and midnight and continues until 06.00 hrs.

This night - time collection has several benefits. The warm climate makes it impractical to carry these tasks out in the daytime and tourists would not appreciate the sight of waste being removed from popular resorts. It also reduces the traffic congestion and reduces the likelihood of accidents involving children and other members of the public. Risks to the refuse collection operatives are also reduced by night time working.

In Spain waste is traditionally placed in plastic 1100 Litre (L) Euro containers which are located at communal collection points along the public highways. Other places include hotels, apartments, bars, restaurants and retail outlets. Multiple 1100 L containers are supplied because of the massive increase in MSW from the tourist industry.

During the tourist season, this increase in MSW means that the 1100L containers will fill very quickly, which leads to overfill and the MSW is placed next to the containers awaiting collection.

These containers are normally grey or green in colour so that residents, tourists, and the whole of the tourist infrastructure of hotels, bars etc. can easily identify and define the waste type and the correct container for it.

The number of waste containers in the communal waste collection point is dependent upon the method statement prepared by the Municipality and /or Private Sector Contractor after a review has been carried out to ascertain the amount of MSW being produced.

Within these communal points as well as the 1100L container for MSW there are also separate containers for paper, glass, plastic etc. Utilising the one communal point for the collection of all the defined waste types encourages members of the public, tourists and the retail industry to separate their waste at source. This gives the initiative of only depositing the residual and inert waste in the 1100L container defined for the collection of MSW.

Once the public has sorted out the waste which can be recycled any residual waste can be deposited in the 1100L container for MSW.

Waste collection is carried out by a traditional refuse collection vehicle (RCV) such as those produced by Ros Roca, Geesink Norba etc.

The crew of these vehicles comprises a driver and two loaders. The driver is responsible for his vehicle, the loaders and to ensure the collection operation is carried out in accordance to Health and Safety guidelines.

The driver is also responsible for ensuring the loaders wear their high visibility clothing and personal protection equipment (PPE) supplied by their employers.

The loaders empty the 1100L containers at the designated communal points along the roadside utilising Deutsches Institut for Normung (DIN) container handling equipment. DIN means the German Organisation for Standards, and is acknowledged as a national standards body in European and International Organisations. The 1100L container is positioned at the rear of the RCV and the two trunnion pins that are located on either side of the 1100L container are then pushed into the trunnion arms of the lift at the RCV to be emptied.

DIN container handling equipment guidelines are applicable to Spain. Earlier RCVs were supplied with DIN 30700 equipment. This is a purely trunnion type lifting equipment. However, more recently Spain has invested in new RCVs which are to DIN 30740 standards. This means the lifting gear is transversant with a comb bar consisting of eight teeth as well as the trunnion arms complying with the earlier DIN 30700 standard.

Trunnion type arms are moveable, via a spring, and are left out when container emptying commences and then folded in whilst the vehicle is in transit. These are susceptible to breaking off periodically and can be repaired by welding. Another disadvantage of trunnion arms is that sometimes operatives have difficulty in locating the trunnion pins on the sides of the 1100L containers which makes the collection operation difficult.

Spain, like the rest of the EU, is trying to meet waste targets based on Spain's waste strategy to reduce waste sent to landfill, and so therefore another collection option has been implemented.

This option involves the selective collection of MSW. A RCV is deployed which has its collection body as a split fraction. In this specialist RCV, there is a choice of the split fraction being 1) 50/50, 2) 60/40 or 3) 70/30. The contractor therefore has the choice of which split commodity best suits his operation determined by analysis of the quantity of recyclables and residual MSW being collected. This multi - purpose collection technique has the advantage of versatility in collecting residual MSW, organic waste or dry recyclables (paper, glass, plastic etc).

Economically this mode of operation is also very efficient since it reduces the amount of emissions as well as reducing its carbon footprint. The crew of the RCV are able to collect this type of material in a comingled form prior to delivery to the materials recycling facility (MRF) or the anaerobic digestion plant (AD).

Another advantage of this system is that since the RCV has two separate split tailgates whilst the body has a split fraction, the recyclable material remains free from contamination by the residual MSW.

Sometimes in communal collection points, paper is stored in a paper bank and not a 1100L container. In this case, it will be emptied by a tipper vehicle with a crane and lifting gear. It will then be transported to the paper processing facility.

Another collection method, introduced in the mid 90s, utilises a side loader RCV. This was first implemented in Cordoba by private contractor SADECO. This method of collection has steadily grown in popularity and is now used in most major cities e.g. Madrid, Barcelona, Seville and Valencia. It is also gaining ground in the smaller towns as well as the Balearics and Canary Islands.

The side loader is more cost effective as it reduces labour costs because it only needs a driver for its operation. Its efficiency is further increased by the introduction of Geographical Information System (GIS) so the driver simply follows an electronically planned route on a daily basis. This can also be monitored at the vehicle's base by management while the vehicle is carrying out its route. This helps to improve the productivity of the refuse contract in general.

The capacity of the containers distributed along the road side are 1200L - 3200L. These are lifted and emptied by the side loaders' lifting arms into the charge - box of the side loader where the waste is then compacted. A major advantage of this system is the ability of the side loaders lifting arms to partially rotate the container in the discharge position to prevent any objects, such as cardboard boxes, remaining in the containers. The driver is able to view the operation from the cab of his vehicle through Closed Circuit Television (CCTV) cameras.

These side loaders are manufactured in Italy by OMB, Farid, (sold in Spain by Ros Roca), AMS and Mazzocchia. Their equipment is also used in Rome and Naples.

Side loaders can also be fitted with bodies which incorporate split fraction design. These are empty side loader containers but with a split proportion for either organic matter or dry recyclables. Barcelona also uses this type of equipment to collect selected organic and residual MSW matter.

Another collection method of MSW is using a container placed below ground level with the aperture for receiving MSW at street level. The Spanish people as well as tourists and the retail industry can deposit their MSW into this street level aperture which looks like an ordinary litter - bin.

This underground collection system can also be integrated at a communal collection point with several containers for MSW, glass, paper and plastic etc.

The containers are emptied by an RCV with a crane mounted behind the cab. These are normally supplied by Geesink Norba Spain. The driver can automatically lift the lid which contains the aperture via the remote controls which also operate the truck mounted crane.

Once the aperture is open, the driver of the RCV can lift the container up from below ground level which can then discharge its contents into the hopper of the RCV for compaction. The driver returns the container to ground level for refilling of MSW or recyclables prior to closing the loading aperture and then the RCV drives on to the next communal point.

The other option is having the 1100L containers positioned below ground level out of sight and the loading apertures at ground level of litter bin origin. The communal point for this option normally consists of three apertures to load waste into and allows members of the public, tourists, retail industry to separate at source.

When the RCV begins its operational round the loading aperture is electronically opened via electric controls on the RCV and the containers are electronically lifted to ground level. This is possible based upon the fact that the 1100L containers are placed on a steel floor which hydraulically brings them to ground level for subsequent emptying via the RCV. The loading aperture is electronically closed via the electronic controls on the RCV after collection has taken place.

Another method of underground waste collection is by utilising a roll on off container. This system works by means of a roll on off container sitting below ground level at a shallow depth. Access is gained by hook lift vehicle exchanging the full container with an empty one.

Loading of the container for MSW is carried out through apertures in a large hydraulic door made to the dimensions of the roll on off container. When the container is exchanged for an empty one, the driver of the hook lift vehicle lifts the hydraulic door of the loading aperture via controls that are connected to the communal collection point.

Then he reverses the hook lift vehicle into position to retrieve the full container before dismounting the full container at the roadside, lifting the empty exchange container and lowering it into position. He shuts the hydraulic door with the loading apertures so that loading by the public can recommence.

The full container's load is covered in netting to prevent materials from the MSW escaping while the hook lift vehicle is in transit to the disposal point.

Another way of reducing emission levels and the carbon footprint adopted by several key Spanish cities is using the Envac Pneumatic system. This includes the cities of Madrid, Barcelona, Seville, Valencia, Palma De Mallorca etc.

All that is visible to the human eye is a communal point at ground level. Members of the public place their MSW into what is best described as a litter bin.

After their waste has been separated at source it is put inside the various litter bin type designed apertures. The waste in its defined types falls into a separate set of pipelines. Each one of these is for a different type of waste.

Control of the Envac system is carried out at the centrally located collection point by one operative.

At selected intervals the operator will extract the MSW and the separated recyclables by suction through a series of pipes. They are compressed into hermetic sealed roll on off containers of the defined waste types for subsequent recycling or disposal.

This system is very economical as it saves on using RCVS as well as reducing the CO₂ produced which would cause pollution in the already air polluted inner cities as well as reducing the carbon footprint.

This system also saves on labour costs as in many cases an RCV with a crew of three may have been utilised to collect the MSW. With this system it only requires a roll on off vehicle with a driver to collect and exchange the roll on off containers maybe once a week or twice a week at the most dependent on the size of the conurbation in question.

In the past Spain has relied upon the use of sanitary landfills like most EU Member States. Although there are still a few sanitary landfills in operation e.g. Garraf (a district of Barcelona), Murcia, Alicante, Arico (Island of Tenerife) and Juan Grande (Island of Gran Canaria), Spain has adopted alternative treatments. This is to comply with the EU Landfill Directive by the reduction of Biodegradable MSW to 35% from landfill diversion.

Spain has utilised Energy from Waste Plants (EFW) for the combustion of MSW for the last four decades which it is a much better alternative than burying the MSW at Landfills. This is because the majority of the Spanish EFWS are of the mass burn type similar to the EFW plants operated in other EU Member States.

The design of the technology is by the following manufacturers Martin, Von Roll Inova or Babcock Volund. All of the grates follow a similar principle with the grate designed in a stepped inclination and as a reverse acting stoker grate or moving grate formation. This particular technique is considered the best for the combustion of MSW because as the grate moves it agitates the existing MSW on the bed of the combustion grate to make sure that the MSW has been totally combusted. The first stage of the grate is defined as drying the MSW, the second stage full combustion and the last stage burnout and production of Incinerator Bottom Ash (IBA).

The roller type grate consists of six hollow rollers, each moving at its geared ratio of the total hourly throughput of MSW on the grate. The first two rollers dry and remove the humidity of the MSW while the centre two rollers carry out total combustion of the MSW and the later two rollers are for burnout and processing Incinerator Bottom Ash (IBA) into the water quench bath for cooling.

These mass burn grate types of both moving and roller grate technology are able to handle the wide range of calorific values which exist in the MSW. The grates of both types are able to handle and process MSW with a water content as high as 75%.

Spain has plants of this type operating in City Of Barcelona, Mataro (a district of Barcelona), Gerona, Tarragona, Bilbao and the Island Of Mallorca. All of these plants also produce Combined Heat and Power (CHP) from the combustion process which subsequently supplies electricity to the National Grid.

This renewable source of fuel is a good alternative to building coal fired power stations and burning fossil fuels of which there is a finite supply.

Previously the Incinerator Bottom Ash (IBA) has been used as an aggregate substitute for the Construction Industry. Due to possible forthcoming EU legislation regarding IBA being classed as a Hazardous bi product, the reusing of this material may all have to change.

Tests have been carried out on IBA through various EU Member States and IBA has been found to contain mercury, lead etc. This deems the IBA to be classed as an active waste which falls under the classification of Hazardous Waste. This means that its reuse may have to be re-examined.

Spain is already complying with legislation regarding these possible changes and IBA currently produced by Spain's EFW Plants is being land filled at hazardous waste landfills at the cost of £150.00 Euros per tonne.

There is also a Fluidised Bed incineration plant in operation in Madrid combined with supplying CHP. This plant has a grate which consists of a bed of hot sand and the MSW being combusted above it. The bed of hot sand is the grate bed and flames penetrate up through the bed of hot sand to combust the MSW.

This plant is also integrated to a MRF as the disadvantage of using Fluidised Bed technology is that the grate bed can only handle certain combustible materials. This is opposed to the Mass Burn grate design which can handle all types of MSW.

Recyclable and non combustible materials are separated at the MRF prior to being burnt inside the furnace grate.

This particular type of grate technology is more compatible with combusting MSW that has been treated through the Refuse Derived Fuel / Secondary Recovery Fuel (RDF / SRF) route. This initial process involves the MSW being separated through a MRF and then the inert MSW being produced into fuel pellets. These pellets are known as RDF / SRF. They can then be combusted on the grate of the fluidised bed.

RDF / SRF pellets can also be exported to Industry for combustion in cement kilns or boilers supplying heat to factories. This is also a viable alternative to using coal and the world's limited supply of fossil fuels.

However this type of combustion technology does have its disadvantages. Due to the economic downturn there is not much requirement for the SRF pellets due to the decrease in economic activity.

Spain also utilises Anaerobic Digestion AD as another treatment process. This relates more to the Biodegradable fraction of MSW. Anaerobic Digestion is a process by which plant and animal material (biomass) is converted into useful products by micro - organisms in the absence of air. Naturally occurring anaerobic micro – organisms digest the biomass, releasing biogas which can be used to provide heat and power. The material left over at the end of the process is rich in nutrients, so it can be used as a direct replacement for mineral fertilisers and soil improvers for agriculture, landscaping and regeneration.

Mechanical Biological Treatment (MBT) is also another alternative. This process is combined with a MRF to remove non biodegradable MSW from the biodegradable MSW.

Once the dry recyclables and inert MSW have been removed for reprocessing, the biodegradable content is subject to a mechanical biological breakdown. This then produces compost after the material has gone through the treatment process. CHP can also be generated from this treatment process. Any inert MSW can then be land filled or sent to an EFW facility for further treatment.

Most of the MSW delivered to the above treatment plants may be delivered direct to the facilities by RCV.

As well as this option Spain has built up a massive infrastructure of waste transfer stations over the years. The size of these is dependent on an analysis of MSW production in the area. In the largest waste transfer stations up to four static compactors are required. These have a hopper aperture to receive MSW delivered by RCVS. The RCV when arriving at one of these waste transfer stations will first be weighed. Next it will drive to the first static compactor available, reverse up to it and deposit its load.

The MSW falls into the charge box of the static compactor which is of the Marrel or Kiggen type, it is then compressed, into enclosed roll on off compaction containers which are hermetically sealed. The containers capacity is normally around 25,000 kgs of MSW.

The containers move on a traverse moving frame. Once one container is full it moves to the right for collection via a hook lift vehicle with a GVW of 44,000 kgs. This type of vehicle normally comprises a hook lift semi trailer and tractor unit with the necessary hydraulics to operate the hook lift equipment. The full container of MSW is then transported to the disposal plant.

The empty roll on off container moves from the left and lines up with the aperture of the compactor to recommence loading.

As these waste transfer stations are normally operational at night high visibility lights are erected around the entrance, and the perimeter of the facility. This enables good visibility for the operatives on site as well as the drivers of the RCVS delivering their loads.

These facilities are normally open from 22.00 hrs. until 08.00 hrs. in the morning to cater for all MSW being delivered to the facilities by RCVS at night.

Collection and Disposal Operations Urbaser in partnership with GIAHSA (Gestion Integral De Agua Costa De Huelva SA) Huelva Southern Spain.

In the summer months when the population increases due to tourism Urbaser assist GIAHSA in this Province. GIAHSA is responsible for the collection of MSW throughout the Province of Huelva and is also responsible for the supply and purification of water for the Province.

GIAHSA has a contract with Urbaser to collect MSW from three towns in Huelva in the summer season. They are Lepe, La Antilla, and Islantilla. The contract commences each summer season from 1st June and runs until the end of September to help GIAHSA with the massive influx in MSW production from these three tourist areas.

As part of the contract Urbaser supply three RCVS for their operation. These normally are of the Ros Roca, Geesink Norba or Faun type. Chassis types used are Iveco, Renault and Mercedes Benz in two and three axle configurations.

The collection of MSW starts at midnight by Urbaser and GIAHSA and the vehicles are manned with a driver and two loaders. The collection normally finishes at 08.00 hrs. in the morning. They empty the 1100L containers for MSW into the RCV by lifting gear and normally collect two loads of MSW at night.

It is a policy of this contract that the employees of Urbaser and GIAHSA are paid to work an eight hour shift. This is compliant with the EU working directive. If one RCV has completed its collection round before another it is agreed that the RCV that has finished will go and help the other two RCVS working in Lepe, La Antilla or Islantilla.

This shows that Spain's private contractors employ best practise by not having the RCV operatives working on a 'Task and Finish' basis. This alleviates the possibilities of accidents happening. This option also gives a far better collection service. The operatives also work as a team helping each other when one RCV has completed its route.

When full the RCVS make their way to the waste transfer station between Lepe and Isla Cristina. The operating concession of these facilities is held by RETINOD SRL for the province.

This particular waste transfer station has one Marrel static compactor to receive MSW from the deliveries by RCVS.

This waste transfer station receives MSW from Urbaser, GIAHSA, and INIMA the (Municipality of Ayamonte).

The MSW is compressed into hermetically sealed roll on off containers. It is then transported via one of the RETINOD SRL hook lift semi trailer vehicles to Punta Umbria to a MRF that sorts MSW for reprocessing in a commingled form.

This waste transfer station is operational from midnight until 08.00 hrs. seven days a week.

Collection of MSW in the Municipality of Santanyi Island of Mallorca by FCC Fomento De Construction Y Contractas SA

The Municipality of Santanyi encompass - Santanyi and Cala Dor, a series of coves developed as tourist resorts.

The collection is carried out on the Santanyi contract with four RCVS of the Ros Roca and Geesink Norba type. Chassis types used are Scania in two and three axle configuration.

Collection is carried out from 14.00 hrs. until 22.00 hrs. The collection consists of MSW and cardboard. The cardboard is collected in bundles, while the MSW is collected by 1100L container.

While the above collection schedule utilises two RCVS, another two RCVS commence operation at 22.00 hrs. This utilises one of the latter RCVS from the afternoon collection shift. These two RCVS collect MSW via 1100L container until 05.00 hrs.

The RCVS of both shifts collect two loads each of MSW which may increase to three loads in the height of the tourist season. The RCV collecting cardboard collects one load on the afternoon collection shift delivering this material to a paper / cardboard re processors.

Waste Transfer Station Operations and EFW Plant SON REUS ISLAND OF MALLORCA

The MSW is delivered to the Campus waste transfer station which is operated by TIRME SA. This company was set up in 1992 to provide five waste transfer stations for the Island of Mallorca. They accept MSW from Municipalities and private contractors (working on behalf of the Municipalities).

While TIRME SA holds the operating concession these facilities are also financed by FCC and Urbaser.

The Campus waste transfer station receives waste from FCC Municipality of Santanyi and from Cespa Municipality of Felanix.

The waste transfer station has one Marrel static compactor with a receiving hopper for the MSW. It is open 24 hours a day as the main influx of MSW is delivered from 19.00 hrs. to 06.00 hrs. In the daytime the waste transfer station does receive some MSW from smaller private sector contractors.

Once the RCV arrives on site it precedes to the Weighbridge. After it has been weighed it drives up an elevated concrete road to the hopper of the static compactor. The RCV reverses up to the hopper and discharges its load into the hoppers charge box.

The MSW is compacted into hermetically sealed roll on off containers. Once the container is full it moves on a traverse moving frame to the right for collection via a hook lift semi trailer.

The empty roll on off container moves from the left and lines up to the aperture of the compactor to recommence loading.

The full roll on off containers which are hermetically sealed are collected by Alcudia SA.

This contractor has an operating concession with TIRME SA to transport the MSW to the EFW Plant SON REUS in Soller – City of Palma.

All of the MSW from the five waste transfer stations on Mallorca - Campus, Calvia, Benisalem, Alcudia and Monacor - are transported to the EFW Plant SON REUS.

The EFW Plant SON REUS was built as part of the contract signed in 1992 with the Consell of Mallorca. This was in conjunction with construction and operation of the five waste transfer stations. The EFW Plant is operated by TIRME SA in conjunction with FCC and Urbaser.

On arrival the MSW is weighed and the hook lift vehicles enter the reception hall of SON REUS for delivering their MSW. They reverse up to the MSW receiving pit at SON REUS and discharge their loads.

The facility has two overhead gantry cranes with Pell grabs. One is on permanent standby in case the other is not in use for maintenance reasons. The Pell grabs lift the MSW into the MSW receiving hoppers of the two Babcock Volund Roller Type Grates. These grates have an hourly throughput of 18,750kgs per hour and an annual throughput of 400,000kgs per annum. The MSW is subsequently

combusted with all ferrous and non ferrous metals recovered from the combustion process for reprocessing. The IBA by product produced is mixed in mortar to stop the spread of disease. It is then land filled at sites in Soller and Monacor. CHP is produced through the combustion of MSW at this facility and supplied to the national grid to supply electricity. A sister EFW Plant is being built now at Soller – City of Palma which will utilise Von Roll Inova moving grate technology and will supply CHP to the district heating network.

Collection and Disposal of MSW in the City Of Barcelona and subsequent disposal

Collection of MSW is carried out by four main contractors for the inner city districts of Barcelona. The contractors who carry out this work are FCC, Urbaser, Cespa and CLD (COMSA).

Collection of MSW commences at 22.00 hrs. and finishes at 06.00 hrs.

The collection system deployed in Barcelona consists of rear and side loader operation. The standard RCVS consist of the Ros Roca and Geesink Norba body types. Side loader equipment is of the OMB and Farid type.

Suction vehicles are also used for collection of MSW in conjunction with the Envac pneumatic system. This system, consisting of a series of pipelines and communal apertures for depositing MSW is also used in the City of Barcelona. The MSW is sucked through the series of pipes at selected intervals to the central collection point of the MSW. These vehicles collect the MSW via suction equipment to transport the MSW to its designated point of disposal.

All chassis types used for collection of MSW in Barcelona are Iveco, Renault, Mercedes Benz, Volvo, and MAN. The engine types for these chassis are a mixture of diesel and natural gas.

Rear loaders use 1100L Containers for MSW whilst Side loaders use the static type 1200L and 3200L.

Barcelona also carries out the selective collection of MSW. This is achieved through using a 1500L container. It gives a 1000L proportion for MSW while retaining a 500L proportion for biodegradable MSW.

In conjunction with the containers utilised for side loader collection, the City of Barcelona is also using split fraction side loader containers. These come with either a 600L or 1600L proportion split for biodegradable MSW while the latter proportion is retained for non biodegradable MSW.

The equipment used to empty the 1500L containers is a Brivio Selecto RCV with a rear loading split of 60/40. The MSW is emptied into the 60% fraction while the biodegradable MSW is emptied into the remaining 40% fraction.

For the split fraction side loader containers the type of equipment utilised is an OMB side loader with a 50/50 split fraction for both the MSW and biodegradable MSW.

All of the RCVS used in the City of Barcelona and operated by FCC, Urbaser Cespa and CLD (Comsa) have GIS fitted. This is fitted in both RCVS of rear loader and side loader and provides data relating to the vehicles' course, position and speed. The route that the collection vehicle takes can be reproduced showing accurate time data of the vehicle's position while carrying out the collection of MSW and the time of specific collections. This is also a useful tool when the regular driver is on holiday and a spare driver is allocated to a specific round. All he has to do is follow the route which the regular driver takes on a daily basis and he can utilise a printed copy of the GIS map produced from the vehicle's base to follow that route.

The RCVS working in the City of Barcelona collect three loads of MSW a night. A large proportion of this MSW is delivered to Ecoparc 2 in Sant Adria Del Besos. This facility consists of a MRF, MBT and EFW Plant. Approximately 600,00kgs of MSW is delivered to the MRF and MBT Plant while 900,00kgs is delivered to the TERSA EFW plant every night. This Ecoparc disposes of a proportion of the MSW produced by 1.5 million inhabitants of the City of Barcelona.

The TERSA EFW Plant is of the mass burn type and consists of three furnace lines of the Von Roll Inova type (moving grate). It processes 14,500kgs of MSW per hour with an annual throughput of 393,120kgs per annum.

Ferrous and non ferrous metals are recovered for subsequent resale and processing

The IBA by product is delivered to a hazardous landfill site at the cost of 150.00 Euros per tonne.

CHP is produced from the combustion of the MSW and then supplied to the district heating network for conversion into electricity.

As well as Ecoparc 2 there are also other Ecoparcs around the City that are MRFS, AD and MBT Plants.

Collection of MSW by Marcos Gorrin Linares SL MGL Santiago Del Teide On The Island Of Tenerife

Marcos Gorrin Linares SL MGL is the contractor which collects MSW from the Municipality of Santiago Del Teide and its associated tourist resorts. These are Santiago Del Teide, Los Gigantes, Puerto Santiago, and Playa de la Arena.

The collection of MSW commences at 22.00 hrs. using three RCVS. These are of the Ros Roca and Geesink Norba type. The chassis types utilised are Renault and are of two and three axle configuration.

MGL use 660 litre containers as, although there is a massive tourist influx in the summer season, space is limited to store multiple numbers of 1100L containers. The 660L containers used can be supplied in greater quantity but take up less space as the capacity of the containers is smaller than the traditional 1100L container.

The operatives of the RCV consist of a driver and one loader. The driver is also paid to help the loader as this collection mode normally utilises two loaders. As the collection route of the RCV is not big in comparison to that of Urbaser / GIAHSA collection routes in Huelva and of FCC in the Municipality of Santanyi / Mallorca, it was decided that it was not always necessary to employ two loaders on this contract. When the tourist season is at its peak the requirement is there to utilise another operative but out of season the collection routes only require a driver and a loader.

Of the three RCVS, one is operational in Santiago Del Teide, one in Los Gigantes, and one in Puerto Santiago and this RCV also covers the area of Playa de la Arena.

There is a roll on off hook lift vehicle which also collects a full container of MSW and delivers an empty one to the UWS utilised in Playa de la Arena.

This principle works via having a roll on off container sitting below ground level at a shallow depth. Access is gained by lifting the hydraulic door which covers the circumference of the roll on off container. This door has apertures at ground level where tourists, members of the public and retailers may deposit their MSW.

Once the driver of the hook lift vehicle opens the hydraulic door via controls that are in situ connected to the communal collection point he then retrieves the full container via hook lift.

After he dismounts the full container and covers the load with a net, he collects and dismounts the empty container into position and closes the hydraulic door so that loading of MSW can recommence.

The collection of MSW finishes in this Municipality between 01.00 – 03.00 hrs. It is a policy of MGL that all RCVS finish together. If one RCV is finished before the latter two the driver and loader then has to go and help the other two RCVS help finish their collection round.

The RCVS working for MGL in Santiago Del Teide all do two loads in the summer season and, out of season, one load. On the basis of the latter option once all RCVS have finished their collection routes they will all drive in convoy to the waste transfer station. The three RCVS and the Hooklift carry the roll on off container from the Underground Waste System (UWS).

Waste Transfer Station Operated by Vertresa (Urbaser) Buzanada Island of Tenerife

The MGL collection vehicles drive to the waste transfer station operated by Vertresa a subsidiary of Urbaser at Buzanada. The waste transfer station opens at 02.00 hrs. and closes at 09.00 hrs.

This waste transfer station receives MSW from the following contractors: MGL Santiago Del Teide, FCC for the Municipality of Guia De Isora encompassing the tourist resorts of San Juan and Alcala, Rodriguez Trujillo for the Municipality of Costa Adeje encompassing Playa De Las Americas and Camilo Alvarez Sanchez (CAS) or better known as Canaries Limpieza Urbana SA (CLUSA). This contractor carries out collection of MSW in both rear loader and side loader modes in Los Cristianos.

This waste transfer station consists of two Marrel static compactors. The Buzanada plant is known as PT-3. This is because Vertresa hold the operating concession for the operation of the four waste transfer stations on the Island Of Tenerife. The other waste transfer stations are located at La Guancha PT-1, Jardin Botanica PT-2, Buzanada PT-3 and San Matias PT-4.

The RCVS enter the weighbridge and proceed to one of the two hoppers of the compactors. They reverse into position and discharge their load of MSW into the hopper. The MSW is subsequently compacted into an enclosed hermetically sealed roll on off container.

Once the container is full it progresses similar to the other waste transfer stations inspected in the case studies as it moves to the right on a traverse

moving frame. A fresh roll on off container lines up with the aperture of the static compactor for loading of MSW to recommence.

The full roll on off containers are collected with one of the fleet of hook lift semi trailers that Vertresa operates. The container once loaded onto the hook lift transfers the MSW to the sanitary landfill site operated by Vertresa at Arico located in the South of the Island. This landfill site receives MSW from the four waste transfer stations located around the Island of Tenerife.

Conclusion

From the studies which I have carried out it clearly shows that Spain has very efficient operating practises for the collection and disposal of MSW. Through its main private sector contractors there has been a lot of investment into implementing up to date collection techniques for MSW including the use of Natural Gas engines in RCVS and also the Envac Pneumatic Underground Waste System (UWS). This helps with dealing with emissions and reducing the carbon footprint. These contractors have also invested heavily in the infrastructure for the disposal of MSW in each major Spanish city and its associated Islands.

With Spain using alternative treatment technologies to sanitary landfill in most cases I believe that Spain is on the road to meeting full compliance with the EU Landfill Directive, both present and future.



