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A PROPOSAL FOR A WASTE TYRE TREATMENT PLANT AND ITS ENVIRONMENTAL IMPACT ASSESMENT

Author

Maximiliano Tortello Branchi

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Director/s

Dra. María Ruiz Hernando

Departament of Chemical Engineering and Analytical Chemistry. University of Barcelona

Dr. Ricard Torres Castillo

Departament of Chemical Engineering and Analytical Chemistry. University of Barcelona

ABSTRACT

The annual generation of waste tyre (WT) in Catalonia is approximately 40,000 tons. The control of their disposal is an environmental issue due to their non-biodegradable components. In Spain the correct coordination and treatment of WTs is conducted by two integrated management systems (IMS), who were created from the requirement of the *Real Decreto 1619/2005*. Unfortunately, the IMSs estimate that an amount between 15% and 20% of WTs are not being declared, implying they are not receiving a proper treatment. The recycling of WTs, whose main materials are rubber, steel and textile can be conducted in two ways: using them as a tyre derived fuel (TDF) or as a tyre derived material (TDM). The WTs treatment plant planned in this study include mechanical treatments and size reduction technologies to obtain different sizes of TDM, with the purpose to comply with the different alternatives of applications, even as a TDF for cement industry. The pre-design of the plant was conducted considering the available technologies for its operation. The total occupied area of the plant will be approximately 7,500 m^2. The next part of this project focuses on determining the more suitable location for the WT treatment plant in Barcelona, according to the capacity of the designed plant. The planta was located in the Municipality of Viladecans. Finally, the Environmental Impact Assessment (EIA) of the plant was developed based on the location's and operation characteristics of the plant. According to *Ley 21/2013*, a simplified EIA was developed. Conesa's methodology was used to evaluate the importance of the environmental impacts of the plant. As a result, corrective measures were not mandatory, but some were considered in order to make the project more sustainable.

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1 INTRODUCTION

For convenience, and to facilitate its understanding, the introduction has been divided in three sections.

1.1 The current situation of waste tyres (WTs)

According to the World Business Council for Sustainable Development (WBCSD), approximately one billion tyres reach the end of their useful life every year globally (WBCSD, 2008). The annual generation of WTs in Catalonia is approximately 40,000 tons (Agència de Residus de Catalunya, 2017). A typical tyre involves dozens of different components made from more than 100 primary raw materials that must be precisely processed and assembled to achieve the right balance between many competing factors including safety, environmental impact and durability (WBCSD, 2008). A schematic illustration of a most common tyre is presented in Annex I

Considering the huge amount of tyres produced and that most of their components are non-biodegradable, the disposal of these wastes had become a major environmental issue.

The term waste tyre (WT from now on in this text) generally refers to an inflatable rubber tubular covering encircling the wheel of a vehicle (automobile, truck, bus or aircraft) that has been discarded because it is no longer suitable for its original intended use due to wear, damage or defect (Tchobanoglous, 2002).

According to the European Tyre Recycling Association (ETRma) the three main components we have to know to understand the potential of the tyre derived materials (TDM) are:

- Rubber

Natural rubber is the main component in tyres and represents 25% or more of their weight. A tyre may contain more than one type of rubber and, in turn, any rubber recovered from a tyre may contain an amalgam of different compounds.

- Steel

The steel recovered from all tyres is generally of an extremely high quality and is, when clean, in demand by the steel industry as crap feedstock for the production of new steel. The shredding processes are all designed to strip steel from the rubber and the more efficient the process is at removing the steel the cleaner the rubber will be, so the higher its value will be.

- Textile

The textile component of car tyres has always been a challenge for the tyre recycler. It is a hazard in the workplace if not managed as it creates a build-up of dust and fibre on and in machinery and in the atmosphere: this can result in all kind of problems from housekeeping issues through to potential health issues for operators.

Other materials commonly found in tyres are synthetics rubbers, lampblack, chemical agents, mineral oils and reinforcing fibers. Details of the components by tyre are presented in Annex II.

According to the European Waste Catalogue (EWC), WTs are classified as Non-hazardous wastes and have been assigned with the following code: 16 01 03 (Agència de Residus de Catalunya, 2017). This code means that the WTs have two main origins: from the reposition of a worn tyres of a vehicle and from the dismantling of an out of use vehicle. The entire life cycle of tyres consists of five main stages (Annex III): production, consumption (use), WT collection, reuse, and processing for recycling or disposal. According to Blanco et al. (2017), reuse is currently the best option for WT recycling. Specifically, the retreading permits the reutilisation of the tyre through the addition of a new tread. On the other hand, WTs are primarily recycled as liquids reservoirs, pavement for high performance roads base, playground cover or ground covers in sports fields (Blanco et al., 2017). Finally, although energetic valorisation of WTs is a widely used alternative due to their high calorific value, it represents several drawbacks, such as the higher operating costs, higher CO_2 emissions and the impossibility of the material recovery.

1.2 Legal framework for WTs management

The specific legislation for WTs in Spain (and also in the province of Barcelona) is defined by the *Real Decreto 1619/2005, sobre la gestión de neumáticos fuera de uso* (from now on *RD 1619/2005*). This regulation focuses on the reduction, reuse, recycling and other forms of recovery of the WTs in order to protect the environment, and attributes the responsibility of the proper management of WTs to the producers. At this point, it is important to highlight that, according to *RD 1619/2005*, the producer is the individual or legal entity that manufactures or imports tyres from other member states of the European Union. The *RD 1619/2005* also forbids the disposal of shredded WT on landfills since July 2006. In order to comply with the *RD 1619/2005*, the Spanish producers have been

organized in two integrated management systems (IMSs): Signus ECOVALOR S.L (SIGNUS) and Tratamiento de Neumáticos Usados S.L (TNU).

Unfortunately, it is important to highlight that these IMSs estimate that between 15% and 20% of the imported tyres in Spain are not being declared (Jornada "Gestión Fraudulenta de los Neumáticos Fuera de Uso", 2017), which means that nobody has paid for their treatment at the end of their useful life. Consequently, this result in huge quantities of WT that are not always receiving a proper treatment and therefore may cause sever environmental problems. For instance, in 2016 a big fire on a WT illegal deposit in Seseña (Toledo) was generated, resulting in emissions that affected approximately 9,000 people (El País, 2016).

Finally, it is worthwhile mentioning that tyres are also subject to general waste legislation, i.e., to the european *Waste Framework Directive 2008/98/EC*, the spanish *Ley 22/2011 de residuos y suelos contaminados*, complemented by the *Plan Estatal Marco de Gestión de Residuos (PEMAR) 2016-2022*, and the catalan *Decret Legislati 1/2009 Texto refundido de la Ley reguladora de los residuos*, also complemented by the *Programa General de Prevención y Gestión de residuos y recursos de Cataluña 2020 (PRECAT20).*

1.3 Overview of the Environmental Impact Assessment (EIA) procedure

Environmental Impact Assessment (EIA) is a procedure used to examine the environmental potential impacts, both beneficial and adverse, of a proposed development project and to ensure that these effects are taken into account in project design (Ahieng, 2007). These impacts may include all relevant aspects of the natural, social, economic and human environment. The study therefore requires a multidisciplinary approach and should be done very early at the feasibility stage of a project. In other words, a project should be assessed for its environmental feasibility (Ahieng, 2007).

The legal framework for EIA in Europe is regulated by Directive 2011/92/UE, which was transposed to the Spanish legal system by means of *Ley 21/2013, de evaluación ambiental*. On the other hand, due to the lack of an autonomous regulation in this matter, the current legal framework in Catalonia regarding the EIA is also regulated by *Ley 21/2013.*

According to Doughherti et al. (1995), the main steps of the EIA procedure are the following:

a) *Screening.* In this stage, it is decided whether a project must undergo to EIA or not, and, if so, of which type: simplified or ordinary. In the case of Spain, this could be check in the annexes of *Ley 21/2013*.
b) *Scoping.* It is the process of identifying the content and extent of the EIA study report to be submitted to the competent authority under the EIA procedure. In the case of Europe (and also Spain), this step is optional.
c) *Prediction and mitigation.* The purpose of this stage is the identification of all the potential impacts that could be caused by the project and, if needed, the proposal of changes in design or mitigation measures. At this point, those citizens directly affected by the project are allowed to make complaints and provide suggestions regarding the proposed project. As a result, the EIA study report is obtained, which afterwards will be evaluated by the environmental competent authority to finally determine whether the project should be approved or not. In case of being approved, the environmental competent authority will formulate a prescriptive report that must be complied with during the execution and exploitation of the project.
d) *Management and monitoring.* The aforementioned prescriptive report contains detailed information for managing and monitoring environmental impacts both during and after implementation.
e) *Environmental audit.* This is carried out some time after implementation.

2 OBJECTIVES AND JUSTIFICATION

Considering the existence of a large quantity of WT (and that possibly many of them are not receiving a proper treatment), the general objective of this project is to deliver an alternative to this problem by the proposal of a WT treatment plant in the province of Barcelona.

The specific objectives of the present study are:

- To review the main alternatives for WT treatment and select the more suitable one for the province of Barcelona.
- To carry out a pre-design of a WT treatment plant for the province of Barcelona.
- To conduct the EIA of the proposed WT treatment plant, in order to assess whether the impact of its construction would be acceptable enough to make the global project sustainable.

3 ALTERNATIVES FOR WT TREATMENT

WTs can be a low-cost source of fuel when located near a major fuel consumer, such as a power plant or cement factory (Blanco et al., 2017). Moreover, they can also be readily processed for a diverse range of construction projects, by using them either whole or shredded. Therefore, it is conceivable that substituting WTs in place of virgin raw materials or fuels will reduces both the environmental and economic costs derived from mining extraction (WBCSD, 2008).

According to the WBCSD, the most current uses for WTs are summarised in Table 1.

Table 1. Current Uses for WTs (WBCSD, 2008)

Recovery purpose	Current Use
Energy	Alternative fuel (mainly for cement kilns, paper/pulp mills, thermal power stations, industrial boilers, etc.)
	Substitute for coal in steel plants
Material	Construction material
	Crumb or ground rubber applications (including moulded products when combined with thermoplastics)

Similarly, Table 2 displays the two main management ways for WTs in Catalonia and their respective EWC codes.

Table 2. WTs management alternatives in Catalonia (Agència de Residus de Catalunya, 2017).

WTs Management Ways	EWC Code	Description
For Valorisation	V52	Related to the recovery of tyres
	V61	Use as a fuel
For waste treatment or disposal	T12	Non-special waste disposal
	T21	Incineration of non-halogenated waste

**EWC: European Waste Catalogue*

In the following sections it is reviewed the current processes for energetic valorisation and recovery/recycling of WTs.

3.1 Energetic valorisation of WTs

Tyre derived fuel (TDF), which is composed of shredded scrap tyres is compact and it has a consistent composition with low moisture content (Blanco et al., 2017). According to WBCSD (2008), tyres have a high energy content and TDF is an equal or better source of energy than other fuels (Table 3).

Table 3. High heating value (HHV) and CO_2 emissions from different fuels. Tyre data is displayed in orange (WBCSD, 2008).

Fuel	HHV (GJ/*t*)	Emissions	
		kg CO_2/t	kg CO_2/GJ
Coal	27.0	2,430	90
TDF	32.0	2,270	85
Petroleum coke	32.4	3,240	100
Diesel oil	46.0	3,220	70
Natural gas	39.0	1,989	51
Wood	10.2	1,122	110

As can be seen in Table 1, TDF is mainly used in cement kilns but also in thermal power stations, pulp and paper mills, steel mills and industrial boilers. In Europe, the cement sector is the main consumer of TDF. Kilns are increasingly being equipped to use WTs as supplementary fuel and still be in compliance with the atmospheric emission standards (WBCSD, 2008). According to the European Tyre & Rubber manufacturers association (ETRma, 2015), TDF can be used successfully as a 10-20% supplementary fuel in properly designed fuel combustors with good combustion control and add-on particulate controls, such as electrostatic precipitators, or fabric filters.

When tyres are burned in a controlled environment, TDF emissions are not greater than those produced by other fuels are. For instance, the carbon dioxide emission is lower when using TDF than when using coal or petroleum coke (Table 3), offering potential reductions in greenhouse gas emissions. In some situations, using TDF instead of virgin fossil fuels also reduces NOx and SO_2 emissions (WBCSD, 2008). Natural rubber content in tyres (which is 25% or more) is regarded as carbon neutral, as rubber plantations sequester carbon from the atmosphere during their life time. Any ash created generally contains fewer heavy metals than ash from coal combustion. In cement kilns the rubber provides energy and the iron and sulfur are incorporated into the cement (WBCSD, 2008). Even so, the energy recovery of WTs cause concerns because incineration is considered the most polluting energy conversion routes for this waste.

In Annex IV are summarised the current alternatives for the energy recovery of WTs.

3.2 Recovery and Recycling of WTs

Recycling rates for WTs are generally far higher than for other wastes. In fact, tyres are one of the most heavily recycled consumer products, with recycling rates about 84% in

well-developed markets (WBCSD, 2008). Figure 1 shows the recycling rates for different wastes.

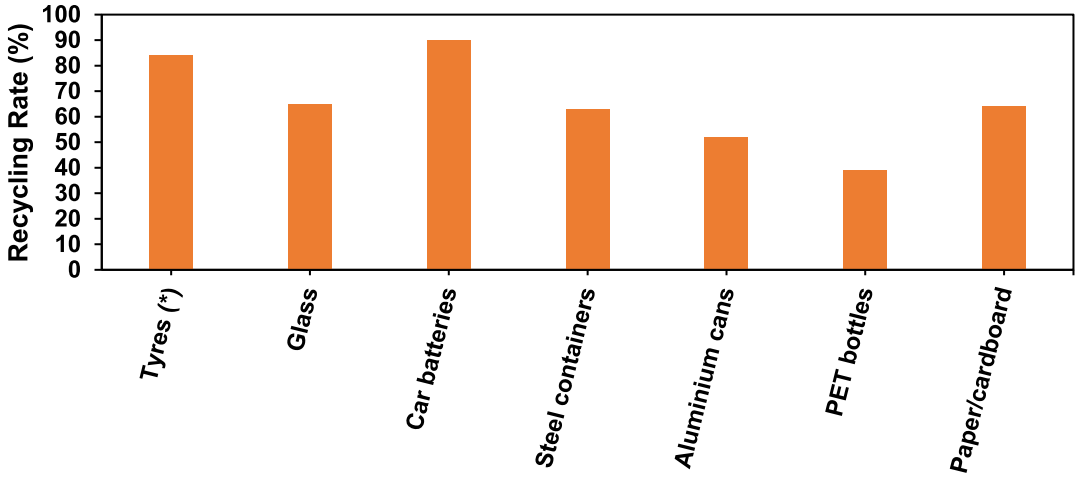


Figure 1. Comparison of tyres recycling rate with other goods in Europe (adapted from WBCSD, 2008). *(*) Estimated on the basis of declared tyres excluding destinated for export and retreat.*

3.2.1 WTs recovery and recycling technologies.

According to López (2017), the recovery and recycling technologies can be divided as follows:

- *Mechanical treatments:* mechanical process where the tyres are compressed, cut (cutting) or shredded (ripping) in irregular pieces.
- *Size reduction technologies:* it distinguishes between those performed at environmental temperature, cryogenic and damp.
- *Regeneration technologies:* consider devulcanisation, reclaiming of rubber and surface modification.

In Annex V is shown a schematic illustration of WTs treatment levels, which are: *Level 1* Structure tyre destruction, *Level 2* Tyre's components separation, *Level 3* Multi-treatment Technology, and *Level 4* Products optimisation.

Separating and devulcanising materials from the WTs to recover them is a complicated task. Thereby, the rubber in recycled tyres is often treated as a complex resource and recycled in its entirety as shred, crumb, granulate or powder. The different size of the materials obtained from WTs, according to the different technologies, are shown in Annex VI (ETRma, 2015).

3.2.2 Applications of tyre derived material (TDM)

- *Rubber in concrete applications*

According to ETRma (2015), besides the cement industry, the potential to use TDM in concrete applications is huge. The aim of rubber incorporation is to both lighten the concrete and increase its performances. Adding granulate obtained from WTs provides the concrete with increased durability, and a greater aptitude for absorbing mechanical vibrations, with no implementation difficulties.

- *Rubberised Asphalt*

The roads built with "modified asphalts" with rubber powder have many demonstrated advantages: high durability of the pavement and exceptional resistance to aging, with the resulting minimisation of maintenance and costs (ETRma, 2015). Other advantages include the appreciable reduction in noise, and excellent drainage in wet weather. Specifically, Spain has 1,170 km of rubberised asphalt road surfaces (ETRma, 2015).

- *Athletic tracks*

The companie Aliapur (2018), manufacturer of sports surfaces, have developed an innovative concept for the surface of athletic tracks made from granulate WTs.

- *Rail transport*

The use of rubber to mount the rails on tramways reduces noise and vibration, making them more acceptable in the modern city (ETRma, 2015). Rubber can also be used in pedestrian areas to provide shock absorbing surfaces, and in components for the vehicles used on the transport system. According to the EU Transport Pocket Book 2017, Europe has a considering improvements and upgrades on rail lines uses.

As previously stated, in Spain the different applications of the TDM are determined by their particle size. Some examples are detailed in Table 4.

Table 4. Rubber recovered from WTs applications according to their particle size (Lopez, 2017).

Applications	Particle size (mm)
Sports flooring	1.5 - 5.0
Artificial grass fields	0.5 - 2.0
Multi-purpose pavement	1.5 - 4.0
Safety floors	1.5 - 4.0
Acoustic and noise isolations	0.5 - 1.5
Athletic tracks	1.5 - 4.0
Rubber industry and modified asphalts	0.0 - 0.4

Regarding the cement industry, the technical specifications of the size of the TDM and their steel content is shown in Table 5.

Table 5. Technical specifications of TDM for their use as TDF for cement kilns (adapted from Lopez, 2017).

	Particle size	**Weight (%)**
Without steel wire	>125 mm	< 7
	35– 110 mm	> 70
	< 20 mm	< 10
With steel wire	< 20 mm	< 7
	Free steel particles	< 3

3.3 Selection of the more suitable WT treatment's alternative

Nowadays, the potential of the different applications of TDM are focused on the size reduction technologies at environmental temperature because the quality of granulate or powder from WTs do not justify the costs caused by cryogenic processes (López, 2017).

Moreover, the rubber powder used in the rubber asphalt preparation for highways construction will need a quantity of 1,000 and 7,000 tyres per highway kilometre, depending which means the rubber recovered and mixed to prepare asphalt or concrete it will be a great solution for WTs disposal problem (López, 2017).

As aforementioned, WTs valorisation involves a decrease in its size, which means that WTs need to be shredded before being introduce in cement kilns. For example, the Ciments Molins plant (Molins de Rey, Barcelona) used 10,527 tons of WTs as a fuel to produce cement during 2017; this amount represented the 13.52% of all the fuels they used that year (Ciments Molins, 2018).

The different types of technologies for the energetic valorisation of WTs as TDF require a great investment, and, besides the great risk of causing pollutant emissions during the process, which would increase the costs due to the need for the implementation emissions control systems of particles and gases.

Accordingly, the WTs treatment plant developed in this study will include mechanical treatments for recovery and recycling (Level 1) and size reduction technologies at

environmental temperature (Level 2). The purpose of these treatments is to obtain different TDM products, from slices (300 mm) to granulate product (1-10 mm).

These products could be used as fuel for the cement industry, so that, indirectly the plant will also generate TDF, considering that it will comply with what is set out in Table 5. The products of the plant could also be used for the production of sports flooring, multi-purpose pavement, safety floors and athletic tracks, based on Table 4.

4 PREDESIGN OF THE WT TREATMENT PLANT

4.1 Starting data

The estimation of the quantity of WT generation to be treated on this plant was based on the statistics from SIGNUS and TNU (SIGNUS, 2016; TNU, 2016). In Spain, an amount of approximately 34,000 tons of WTs was collected in 2016, of which 13.25% were derived to retreat (TNU, 2016). Accordingly, this last percentage will be discounted from the mass that will be received on the plant. On the other hand, the average of WT is growing above 8% during last four years.

The pre-design of the plant has been projected to three years from 2020. It has been taken into account the WT generation growth observed for the last four years and also the potentially increasing peaks after the period of operation time. For this reason, treatment‘s equipment were selected with a high capacity to ensure the plant could receive higher quantities of WTs in the future.

In this context, the intention of the plant would be to provide a competitive alternative of WTs treatment to the IMSs near to Barcelona. At present, there are only three WT treatment plants in the province of Barcelona, which two are located in Bages (65 km from Barcelona) and Barcelonés (45 km from Barcelona) (Figure 2). Moreover, this plant could help to treat the currently non-declared WTs, which, as aforementioned, correspond to the 15%-20% of the imported tyres in Spain. (Annex VII).

Initially, the plant will focus on the most unfavourable scenario: the treatment of only the 15% of the total amount of WTs collected from the IMSs. Nevertheless, it is expected to be able to compete with other facilities in the province of Barcelona in a medium-long term. For this reason, it has been considered a plant oversizing margin of 20% in order to face up the peaks variation of WTs arrivals.

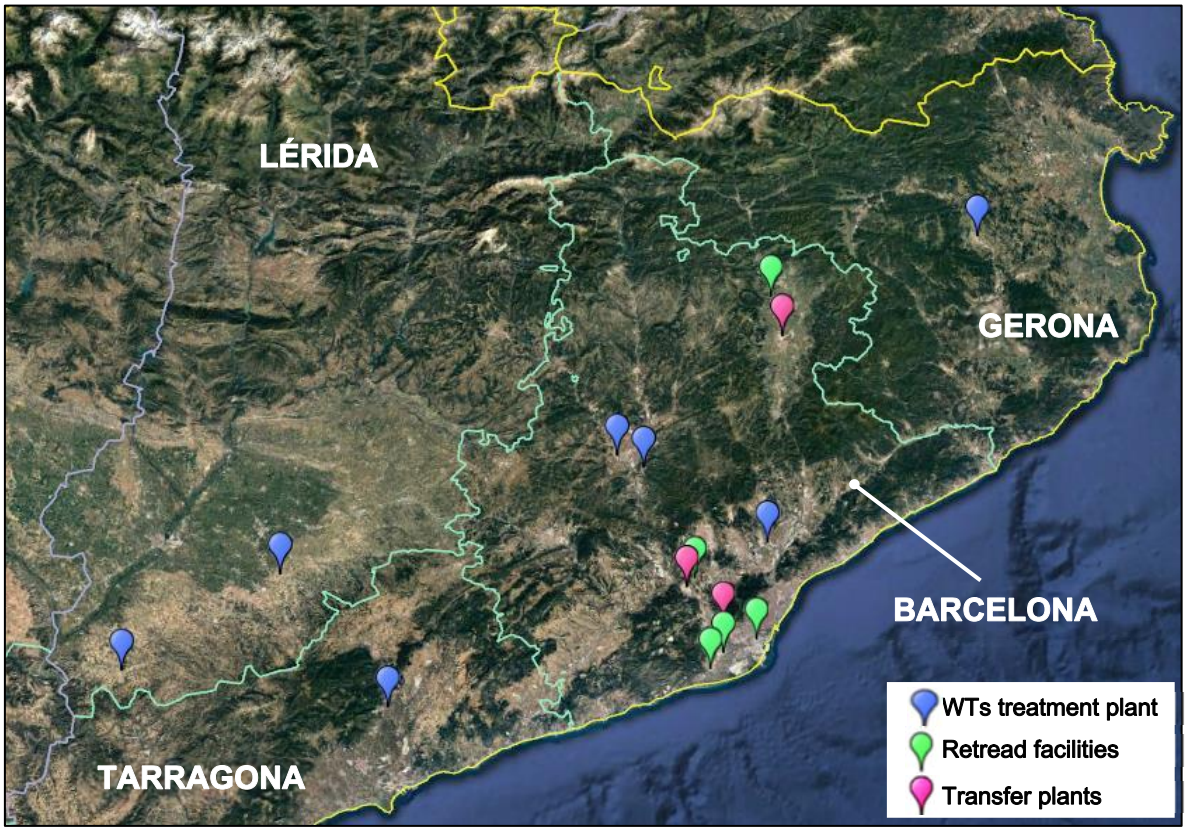


Figure 2. Distribution of facilities related to the recovery of tyres, EWC Code V52 in Catalonia. (own elaboration from information presented in Annex VIII)

The plant will operate eight hours per day, from Monday to Friday. During the weekend it will be only open to receive WTs from particular customers. The values for WTs plant entry estimations are shown in Table 6.

Table 6. Values for WTs plant entry calculation. (own elaboration from information presented in Annex IX)

Catalonia Data	**Value**	***Unit***
Collected WT (IMSs 2016)	34,125.45	*t*
WTs for Retread (TNU)	13.25	%
WT Growth Rate (TNU)	8.26	%
WT Income	15.00	%
Variation of capacity Increase	20.00	%

The capacity of the treatment plant will be of approximately 8,600 tons per year and a 4.1 *t*/h. Table 7 shows the WTs entry on the operation years considering the aforementioned specifications.

Table 7. WTs plant entry. 20% variation of capacity increase is showed in bold letter and orange. (own elaboration)

Year	Total Collected IMS's WTs (*t*/y)	WTs without for Retreat (*t*/y)	WTs plant Entry				
			15% income to the plant (*t*/y)	per month (*t*/m)	per week (*t*/w)	per day (*t*/d)	per hour (*t*/h)
2020	46,879.5	40,667.8	6,100.2	508.3	117.0	23.4	2.9
2021	50,752.7	44,027.7	6,604.2	550.3	126.7	25.3	3.2
2022	54,945.9	47,665.3	7,149.8	595.8	137.1	27.4	3.4
2022	**54,945.9**	**47,665.3**	**8,579.8**	**715.0**	**164.5**	**32.9**	**4.1**

4.2 Location

In order to define the more suitable place to locate the plant, the first step was searching the capacity per year of some WT treatment facilities in Catalonia and Spain (Annex X). Considering this data together with the total surface area occupied by each of the plants analysed (which is also presented in Annex X), it was possible to obtain an approximation of the minimum surface to construct the plant (*t*/m^2), whose value would be about 1 *t*/m^2. Thereby, considering the 8,600 *t* income in 2022 (Table 7), the plant's surface would have to be near to 8,600 m^2.

With this approximate value, the best location was searched in the region of Barcelona and considering the following points:

- *Proximity to road networks*, in order to prioritize a good access and avoid long times of truck's circulation.
- *Enough distance from a waterbody*, in order to prevent possible impacts during the construction or operation of the plant.
- *Avoid "Natura 2000" protection areas*, in order to comply with European legislation.
- *Location on an industrial land.*

Considering the aforementioned points and using the online Geographical information system of *Generalitat de Catalunya (Departament de Territori i Sostenibilitat*, 2018), a

location on the Municipality of Viladecans, 50 meters access from highway C-32, was selected. This site is categorized as industrial soil use and the ground surface is 48,800 m^2. Consequently, there will not be a problem to construct the plant considering the 8,600 m^2 needed, as was previously mentioned. The plant will be located in the UTM ETRS89 coordinates 31T 418,104.22 m East, 4,572,822.10 m North. Figure 3 shows the location (red point) of the plant in Barcelona province and Figure 4 displays soil use and the road network in the area.

Figure 3. Location of WT Treatment plant in Barcelona province. (own elaboration with Google Earth)

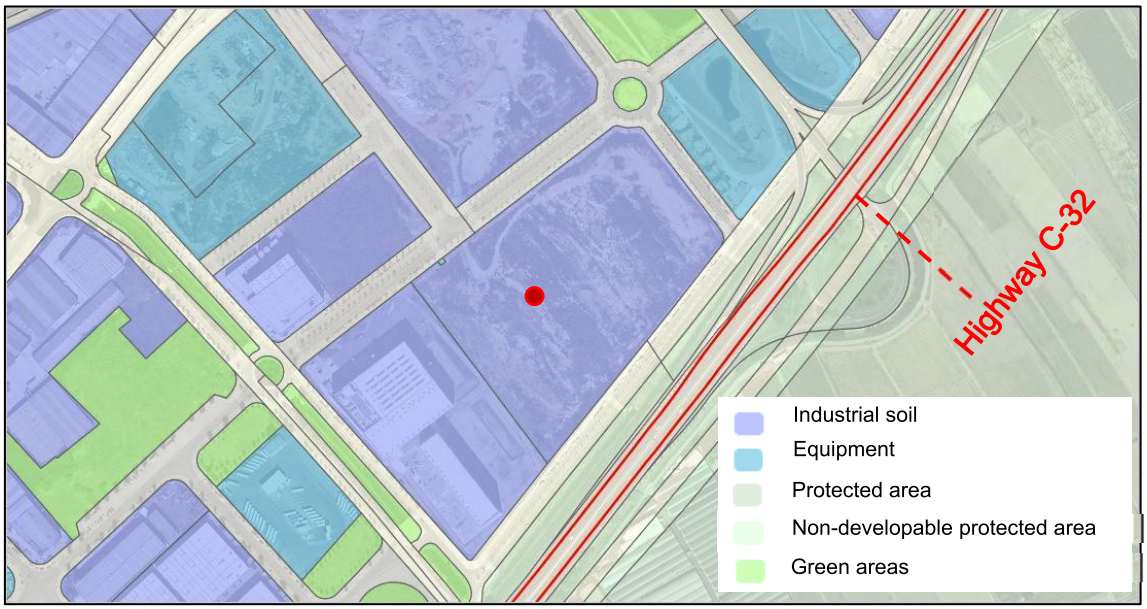


Figure 4. Location of WT Treatment plant with road networks and Soil Use parameters. (adapted from Departamento de Territorio y Sostenibilidad, 2018)

Figure 5 shows that the plant is far enough from a "Natura 2000" protected area and, in addition, is located at a considerable distance to waterbodies. The direct distance from the closest "Natura 2000" protected area is about 1.5 km.

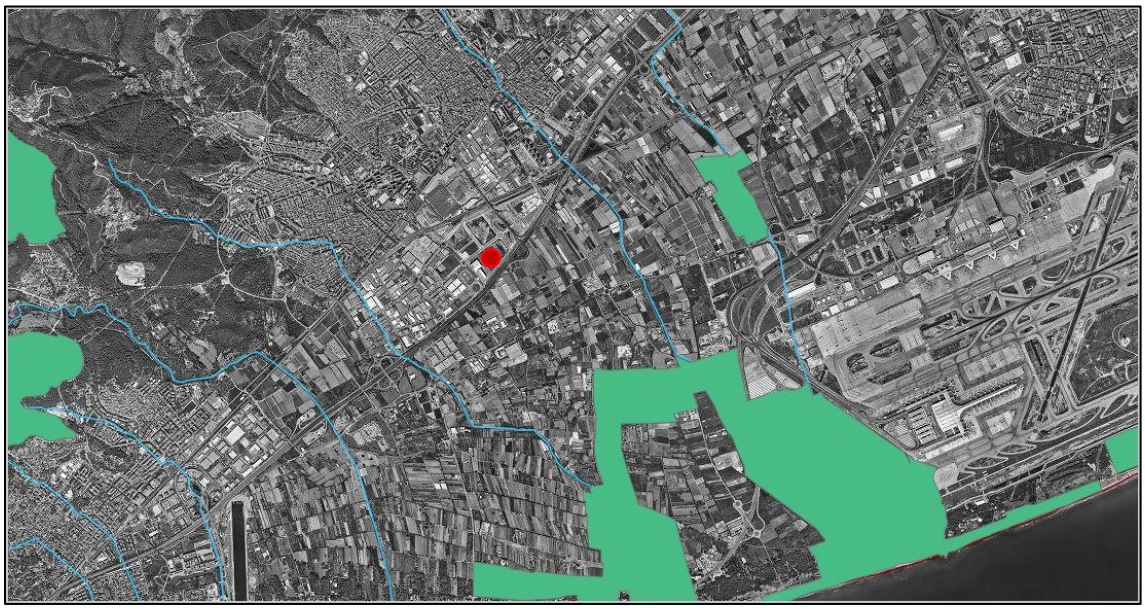


Figure 5. Location of the WT Treatment plant in comparison with "Natura 2000" protected areas (green) and waterbodies (blue lines). (own elaboration with Google Earth and considering data from Departament de Territori i Sostenibilitat, 2018)

A visit to the location of the plant took place on the 30th of April 2018, in order to confirm that constructions have not been conducted in the area. Furthermore, other observations of the zone were made to compare with the information presented in the aforementioned figures. This visit was also of big help for the elaboration of the Environmental inventory (section 5.2). Some photos of the area are provided in Annex XI.

Another important point to consider are the possible clients that could collect TDM from the plant. They could use it for their process production (Table 4) and/or for being used as TDF. Figure 6 shows the distribution of facilities that could use the products of the plant (red point) as a TDM or a TDF.

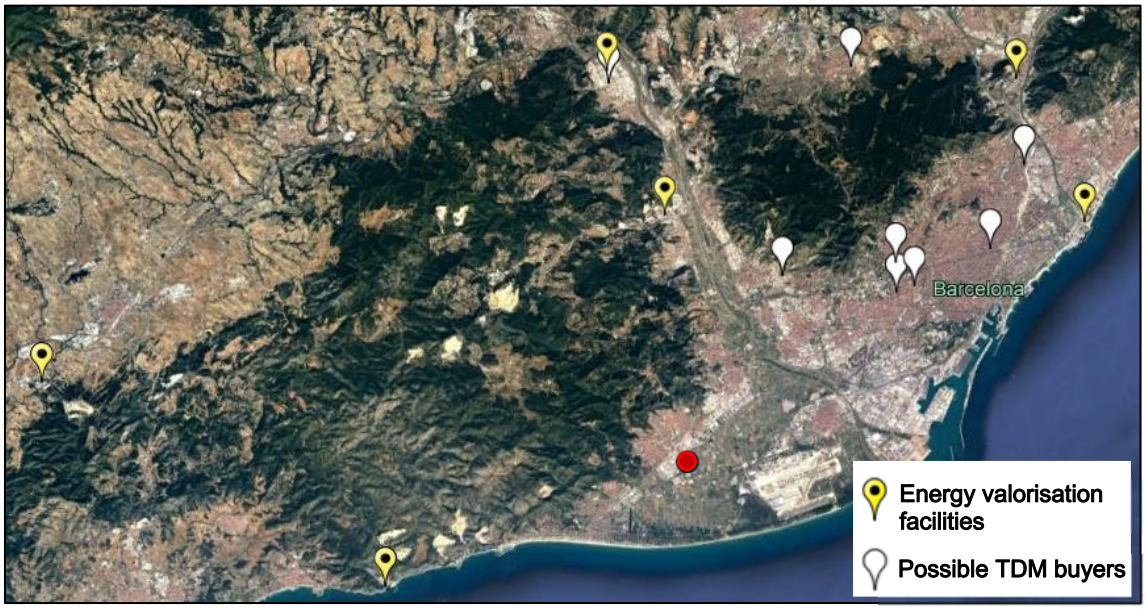


Figure 6. Distribution of facilities related to the energy valorisation, EWC Code V61, and possible TDM buyers in Catalonia. (own elaboration from information presented in Annex VIII)

4.3 WT treatment facilities

According to SIGNUS and NFU (2016), the highest values of WTs were from light vehicles. Therefore, the calculations and decisions taken in this project were focused on this kind of vehicles, whose properties are shown in Table 8.

Table 8. WT from light vehicle's properties. (own elaboration from IGEMEC, 2018)

Properties	Value	Unit
Average Weight	7.75	kg
Thickness	0.16	m
Diameter	0.58	m
Surface	0.26	m^2
Volume	0.04	m^3
Apparent density	188	kg/m^3

The complete WT treatment process of the plant will have the stages described as follows. To facilitate the comprehension, a schematic representation of the process is summarized in Figure 7.

- *Reception:*

In this area, the trucks will be received and weighted on a truck scale. Afterwards they will be guided to discharge the WT's in a storage area.

- *Mechanical treatment:*

The WTs will be moved into a primary tyre shredder by a wheel material handler. The shredder will cut the whole WTs producing rough tyre shreds (~150 mm). This will allow a reduction of storage space. After a re-circulation by conveyor belts into the same machine, tyre chips (~50 mm) will be produced.

- *Size reduction:*

The tyre chips will be transported to a secondary tyre shredder by a conveyor belt system. This shredder will produce smaller size chips mixed with steel wire. At the output of this machine the product will pass through a magnetic separator which will separate the steel wire from the tyre chips, for which will result in a wire-free rubber chips (~38-16 mm) and a high quality steel. The wire steel will be compacted in a bale compactor (bales of 1000x500x500 mm) and the wire-free rubber chips will be moved to a granulator. The granulator will grind the chips until their size allows them to pass through an internal screen, producing granulate rubber mixed with textile fiber. This mix will be transported by a pipe system to a vibrator table where the two products will be separated by their weight, obtaining granulate rubber (~16-4mm and smaller) and liberated textile.

- *Product storage and packaging:*

Regarding the rubber and textile products mentioned before, they will be packaged in a 1,000 L big bag on a plastic pallet. They will be moved by forklifts to their storage area. The steel wire bales will be stored in 20 m^3 open-top containers.

The apparent density (Table 9) of the products as well as the necessity of any compaction device were considered to estimate the space storage requirements of the plant. Photos of the products are presented in Annex XII.

Table 9. TDM apparent density of this WT treatment plant. (adapted from Tchobanoglous, 2002; U.S Department of transportation, 2016; Edeskär, 2004; Deltagom, 2018)

TDM	Apparent density (kg/m^3)
Tyre Shreds (150 mm)	390
Tyre Chips (50 mm)	440
Wire-Free Rubber Chips (38-16 mm)	553
Granulate Rubber (16-4 mm and smaller)	600
Steel Wire	164
Textile Fiber	258

4.3.1 Machinery.

The machinery for each stage was selected with a high operation capacity to ensure they could operate over 4.1 *t*/h (Table 7) in the future. Table 10 shows the capacity, quantity and dimensions of the selected machinery of the plant. The dimensions of each machine were taken into account on the layout elaboration.

Table 10. WTs plant machinery (*Own elaboration from information presented in Annex XIII).*

Machine	Quantity	Capacity	Dimensions (m)		
			Length	Width	Height
Weighing scale	1	80 *t*	18.00	3.00	0.32
Wheel material handler	1	6.5 *t*	7.50	3.66	3.12
Forklift	4	2.5 *t*	2.10	1.73	3.77
Conveyor belt	9	180 kg/cm^2	6.00	1.20	0.28
Primary tyre shredder	1	30 *t*/h	4.34	2.57	4.66
Secondary tyre shredder	1	12 *t*/h	5.26	3.04	3.88
Steel separation equipment	1	3 *t*/h	2.80	1.64	0.41
Compactor	1	250 *t*	2.00	1.40	0.90
Granulator	1	10 *t*/h	3.24	2.96	4.56
Vibrator table	1	2,500–3,000 pieces	3.05	0.91	1.00

4.3.2 Flowchart.

For the following mass balance flowchart (Figure 7) it was considered an entrance of 164.5 tons of WT, which was the highest value of WTs income that the plant will receive per week based on the results shown in Table 7. This value was considered because the WT volume will be reduced by half in the primary tyre shredder in order to optimize the place usage. This reduction is a result of the ratio between the apparent density of tyre shreds (390 kg/m^3, Table 9) and the apparent density of WT (188 kg/m^3, Table 8), which is approximately 2.

According to the capacity of the machinery presented in Table 10, the plant will be fully operative only once a week. Throughout the rest of the week, the operations will be limited to the reception of WTs, products storage and package.

The percentages used to calculate the amounts of products for each stage were based on the components percentages shown in Annex II.

The machines employed in the different operation's stages shown in the mass balance flowchart were associated with the corresponding WT treatment level, as was mentioned in section 3.3.

Also, it is important to mention the orange line represents the re-circulation of tyre shreds to obtain tyre chips by their second shredding.

This mass balance flowchart shows the full treatment of WT, considering the maximum quantity for each product per week. As the products demand will be variable according to client's requirements, the storage and packaging for each product is shown as a black rhombus with a dotted line.

4.3.3 Schematic layout.

For this project two schematic layouts were made. The first one (called "Inside plant") displays all the treatment processes of the plant and the second one (called "Outside plant") displays the areas for WT reception, storage and personal facilities.

The base data to draw the schematic layout was the machine dimensions (Table 10), the apparent density of each product (Table 9) and the area for their storage, considering if it will be packaged (Big Bags) or bulked. It is important to mention that to reach these values the Big Bags were considered to be stored at a height of two units.

Regarding the WT storage, the specifications defined on *RD 1619/2005* were considered. This legislation specifies that the WT storage should not exceed a height of 3 meters and a volume of 1,000 m^3. This is to avoid fires from the ignition of large tyre piles, which may pollute groundwater and air (Blanco et al., 2017).

The occupation area of the plant was calculated based on the scale of the schematic layouts. The total occupied area of this WT treatment plant is approximately 7,500 m^2 (Table 11) which is below of the 8,600 m^2 mentioned at the beginning of section 4.2 (location of the plant). From the above, the plant will use 15% of the location surface (48,800 m^2), which implies that the site has sufficient area for an expansion in the future, if necessary.

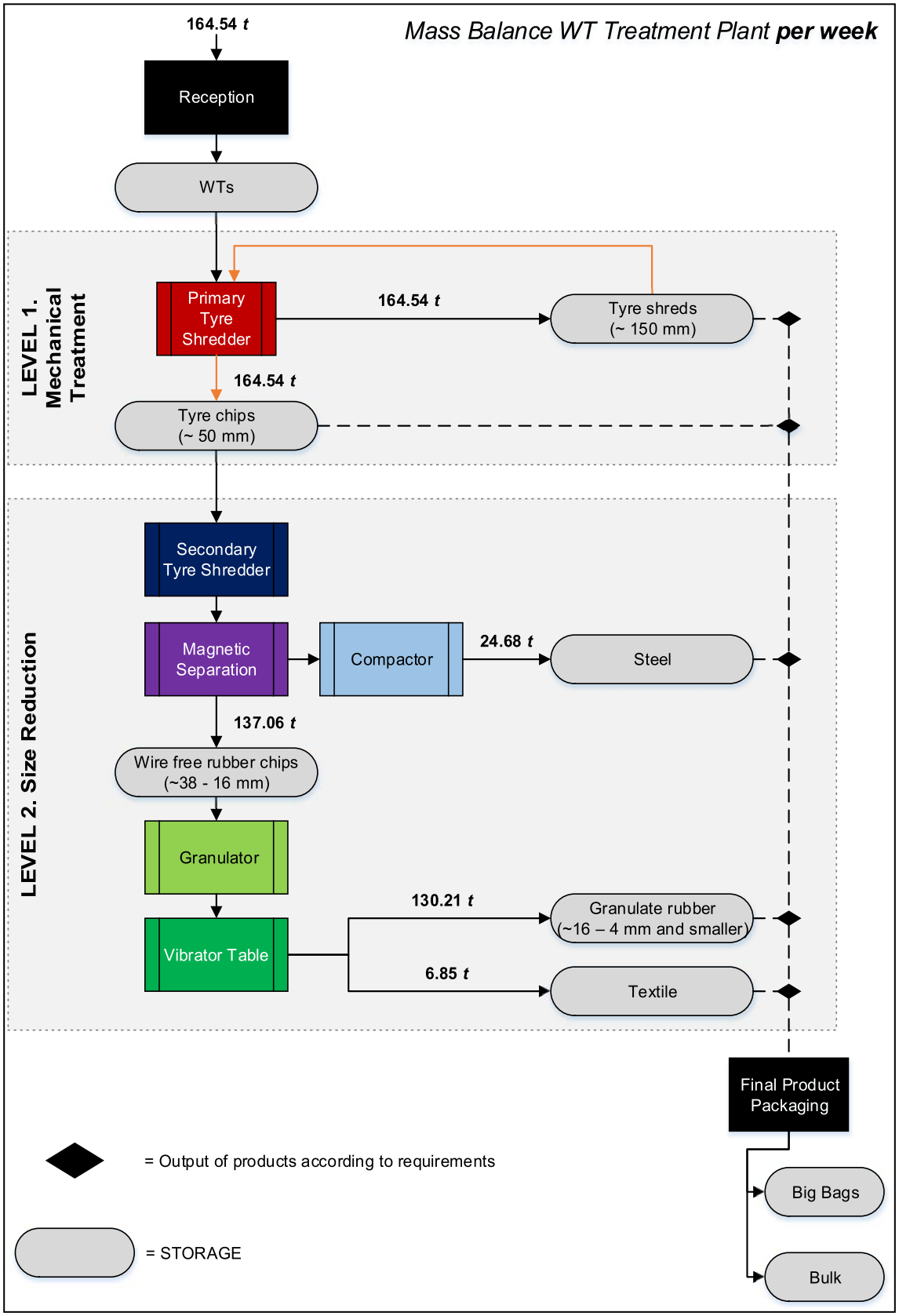


Figure 7. Mass balance WT treatment plant flowchart. (own elaboration with Microsoft Visio Professional 2013)

It is important to mention that all the products storage areas will be roofed in order to avoid rainwater accumulation, which could provide favourable conditions for propagation of disease-carrying pests (Blanco et al., 2017).

The facilities and occupied area are shown in Table 11. The total amount also includes the free surface for machinery mobilisation and charge or discharge of trucks.

Table 11. Facilities and occupied area (own elaboration from schematic layouts showed in Annex XIV)

Facility		Area (m^2)
Outside	Office and Services for workers	388
	Reception	596
	WT Storage	900
	Tyre shreds Storage	211
	Tyre chips Storage	187
	Wire-free rubber chips Storage	124
	Granulate rubber Storage	109
	Textile Storage	13
	Non-hazardous industrial waste Storage	98
Inside	Offices	120
	Primary tyre shred	136
	Secondary tyre shred	60
	Magnetic separation and steel wire compaction	69
	Tyre rubber granulation and textile separation	80
Total occupied area		**7,410**

5 THE EIA OF THE INTENDED WT TREATMENT PLANT

It is important to mention that the construction of this project's plant does not required an ordinary EIA evaluation, since this activity is not included in any of the groups of Annex I of *Ley 21/2013, de evaluación ambiental.* According to Group 8 of the aforementioned annex, ordinary EIA is only mandatory for hazardous waste treatment, incineration and landfills facilities.

Therefore, a simplified EIA will be done, since the surface occupied by the plant is less than 1 hectare and fits with the specifications defined on Annex II, Group 9 of *Ley 21/2013, de evaluación ambiental.*

The following sections (5.1-5.4) correspond to the *Prediction and Mitigation* step of the EIA, which was mentioned in section 1.3. The EIA conducted include the following contents:

- Identification of those damaging actions of the project (section 5.1).
- Environmental inventory and environmental interactions' description (section 5.2).
- Identification and evaluation of the impacts following Conesa's Methodology (matrix of importance) (section 0).
- Corrective measures proposal, if necessary (section 5.4).

5.1 Potential damaging actions of the project

The construction and operation of the plant would involve some actions with environmental impact in both the construction and exploitation phases.

Construction phase

- Thinning and clearing works.
- Earth moving.
- Transport of materials and machinery.
- Building construction: concreting, paving, formwork and structures.
- Drainage works

Exploitation phase

- Plant's operation.
- Machinery Maintenance.
- Transport (WTs reception and products expedition).

5.2 Environmental inventory

This Environmental inventory defines the environmental factors that can be affected by the project.

The plant will be located in the Municipality of Viladecans, in Baix Llobregat region. The most relevant natural components of Baix Llobregat region are *Delta del Llobregat* and *Serres del litoral central.*

Official information has been consulted to develop this inventory (GENCAT, 2018). The main purpose of the Environmental inventory is to describe and to assess the original state

of the area before the construction of the WT plant. In order to develop it, an analysis of different elements that can be affected by this project was conducted. This will allow to define the environmental state and quality value before the project. Subsequently, the potential impact of the project on these factors must be predicted. Finally, by comparing the state of the environment before and after the construction, the impact may be evaluated.

The factors under study in this present EIA are the following:

- Abiotic environment: atmosphere, climatology and soil.
- Biotic environment: vegetation and fauna.
- Perceptual environment: landscape.
- Socio-economic environment: demography and economy.

5.2.1 Abiotic environment

Atmosphere

According to the average value of the *Índex Català de la Qualitat de L'aire* (ICQA), which was approximately 60, the quality of the air in Viladecans for the last four years is considered "good" (XVPCA, 2018).

Atmospheric pollution is related to air quality and noise. The main direct impacts of the project to the atmosphere are:

- Emissions of suspended particles, which would be primarily generated during the construction phase due to earth moving.
- An increase in the noise level during both the construction and exploitation phases may be registered. However, considering that the plant is located on an industrial soil, the resulting noise impact may be masked by other surrounding activities. The typical noise level of this area is 70 dB day-evening and 60 dB at night (Ajuntament de Viladecans, 2008)

Considering that the plant is located in an industrial zone, its impact over the air quality will not be apparently important.

Climatology

Barcelona's province is characterized by a Mediterranean climate, with hot summers and mild winters. Nevertheless, the rainfall is very irregular, with some torrential rains in autumn, particularly in the coast zone. In the area of Baix-Llobregat, rainfall usually

occurs between September and November with an average of 650 mm approximately. Temperature and rainfall data corresponding to a period of 30 years can be found in Annex XV.

Soil

Soil study gives information about ground's material, relief, geotechnical characteristics, soil quality, existing risks and mineral resources.

- *Geology and geomorphology*: the geological area on which the plant will be constructed is located within *Delta del Llobregat* basin. The area's surrounding is composed of quaternary materials, as clays, silts and sands of deltaic plain (IGMN, 1991). Due to the nature of these materials the soil should be reinforced in order to place the foundations during the construction phase.
- *Land Use:* as was presented in Figure 4, the plant will be located on an industrial soil. Therefore, no expropriations or change in land use will be needed before the construction phase.
- *Hydrology:* as was mentioned in section 4.2, the plant will be located away from waterbodies. The nearest artificial canal will be at 1.2 km from the plant, whereas the Llobregat river will be at 8 km. Therefore, this will not be an issue for the construction of the plant.

5.2.2 Biotic environment

Vegetation

Human activity has made extensive transformations in the original environment of *Delta del Llobregat*, to the point that the current natural habitats only represent 14% of the area (Domínguez, 2015). Among the anthropogenic activities that have modified the vegetation, the most relevant are: agriculture (36% use of the area), building (22%) and sterile ground (12%) (Domínguez, 2015). The best conservation and abundant habitats are common reed beds (30%), reed beds (18%) and halophile vegetation (16%). Common reed beds are high herbaceous formations' which is dominated by the specie *Phragmites communis*.

However, the specific location selected for placing the project does not present the characteristics of the habitats before mentioned.

Fauna

Delta del Llobregat is one of the most varied birding zone on the Spanish territory, and is the third humid zone of Catalan coast. There has been more than 350 species detected between residents and migratory birds, which represents the 72% of the total in Spain (Domínguez, 2015).The plant will not apparently affect bird's mobilisation because it is far enough from a "Natura 2000" protected area (Figure 5).

The mammals of the zone are primarily rodents, which are adapted to live in urban areas. It is important to mention the absence of carnivorous with the exception of foxes (*Vulpes vulpes*) and weasels (*Mustela nivales*). The only abundant amphibious in the zone, are the common frog (*Rana perezi*) and meridional frog (*Hyla meridionalis*). There are 14 reptiles species within the zone related to aquatic habitats (Domínguez, 2015).

The selected area to locate the plant does not have nearby waterbodies and is characterized for high anthropogenic intervention in their surroundings. Accordingly, it is unlikely to find most of the species mentioned before, with the exception of some rodents.

5.2.3 Perceptual environment

Landscape impact is complex to define and evaluate, as it is considered a subjective factor. Scenic study and evaluation of the possible impact generated by the plant's construction has been done by analysis of the following perspectives (Gontier, M., 2005):

Aesthetic (harmonious combination of shapes and colours), cultural (affected by human modelling) and ecological/geographical (constituted by natural systems) characteristics gives different parameters to define landscapes. Aesthetic and ecological/geographical landscape are those landscapes with highest values of quality and fragility.

The area where the plant will be located is an industrial area, which had already been affected by human activity (cultural landscape). Therefore, the landscape would not be seriously damaged.

5.2.4 Socio-economic environment

Demography and economy

Viladecans has currently 65,993 inhabitants (IDESCAT, 2018). The most important increase in the population occurred recently, between 1998 and 2011, due to the industrial development in the province of Barcelona. Subsequently, the population has continued to

increase, but to a lesser extent. Currently, the 66% of the population of Viladecans are between 15 and 64 years old (IDESCAT, 2018). Figure 8 shows the increase of population in Viladecans.

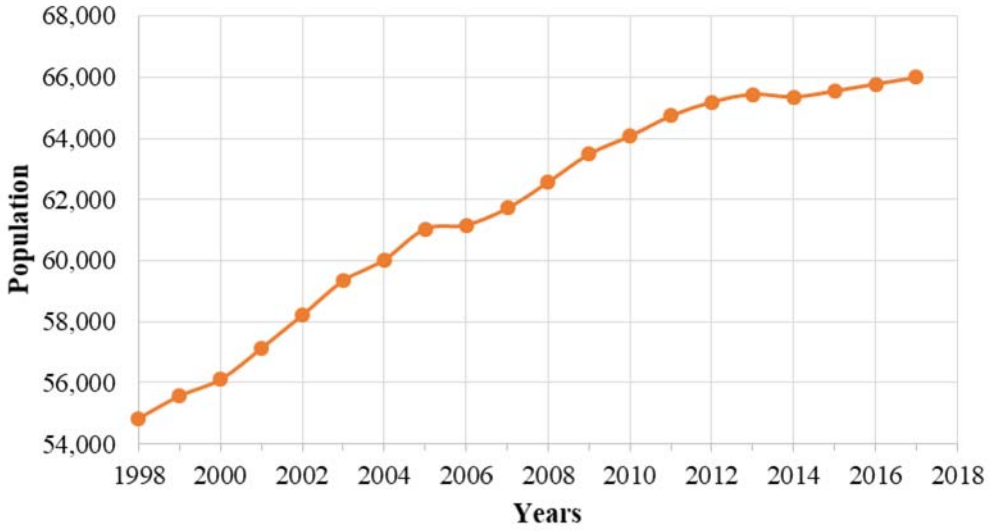


Figure 8. Demographic evolution of Viladecans between 1998 and 2017. (adapted from IDESCAT, 2018)

Regarding the economy, the residents in Viladecans are primarily employed on service sector (82.5%), followed by industry (10.7%), construction (6.5%) and agriculture (0.3%) (IDESCAT, 2018). It is important to mention that the active population have a 72% employment rate (IDESCAT, 2018).

Direct and indirect jobs will be created during the construction and operation of the plant. This will be a benefit to vacated people in Viladecans. According to the Handbook of Solid Waste Management (Tchobanoglous, 2002), this plant will need approximately 6 people during the operation phase: a Manager, a Foreman, a Wheel material handler's operator and three Forklift's operators.

5.3 Identification and impacts valorisation

In this part, a numerical evaluation of the importance of the most significant environmental effects generated by this project will be developed. Impact's identification is done by the analysis of interactions between project's actions and environmental factors previously defined in the Environmental inventory.

5.3.1 Methodology

The procedure used to evaluate the impacts were based on Conesa's methodology (Conesa, 2010). This methodology allows reducing the subjectivity related to this kind of studies by introducing a formula (Equation 1) to calculate the importance of an impact (Im). Im is the qualitative measure of the impact and is obtained considering both the intensity and characterization of the effect based on established attributes (Conesa, 2010). These attributes are detailed in Table 12.

$$\mathbf{Im} = \pm(3 \cdot \mathbf{IN} + 2 \cdot \mathbf{EX} + \mathbf{MO} + \mathbf{PE} + \mathbf{RV} + \mathbf{SI} + \mathbf{AC} + \mathbf{EF} + \mathbf{PR} + \mathbf{MC}) \quad (1)$$

Table 12. Conesa's formula attributes. (adapted from Conesa, 2010)

Effect's Attributes	Symbol	Meaning
Sign	+	The action has a beneficial effect
	-	The action has a detrimental effect
Intensity	IN	Incidence degree of the action on the factor
Extension	EX	Extension of the affected area
Moment	MO	Occurrence moment of effect over action
Persistence	PE	Permanency of the effect
Reversibility	RV	Possibility of impact recovery by natural methods
Synergy	SI	Reinforcement of two or more simple effects
Accumulation	AC	Progressive increase of the effect manifestation
Effect	EF	Cause-effect relationship (indirect or direct effect)
Periodicity	PR	Regularity of the effect manifestation
Recoverability	MC	Possibility of impact recovery by human methods

The values assigned to the characteristics of each effect are detailed in Annex XVI.

5.3.2 Importance's Matrix

Considering all the data described in the previous sections (factors, actions and methodology), the importance's matrix was elaborated (Figure 9). These importance matrix will allow to obtain a qualitative assessment at the level required by a simplified EIA.

The minim and maximum values for Conesa's formula (Equation 1) are 13 and 100, respectively. Accordingly, the minimum reached value for an effect can be ±13·8 actions (±104) and maximum value can be ±100·8 actions (±800). Considering the maximum value, the impact types are detailed in Table 13.

Table 13. Impact types according to effect's importance range (adapted from Conesa, 2010).

Importance Range	Impact Type	Description
Im ≤ 200	Compatible Impact	Recovery is immediate once the project has finished.
200 < Im ≤ 400	Moderate Impact	The recovery does not require corrective measures but it takes some time to reach the initial environmental conditions.
400 < Im ≤ 600	Severe Impact	Recovery requires corrective measures and even with these measures, it takes a long time to reach the initial environmental conditions.
Im > 600	Critical Impact	The project is not allowed.

Positive impacts have also been considered, as the plant's construction may result in a benefit for economy due to the creation of new jobs (both direct and indirectly). On the matrix (Figure 9), positive impacts has been highlighted in **blue** and negative impacts have been highlighted in the same colours used in Table 13.

Therefore, according to Figure 9, it can be seen that there is a total of 19 impacts, of which 7 are moderate, 11 are compatible and one is positive. As no sever nor critical impacts have been identified, the construction of the plant would be theoretically sustainable without taking any corrective or protective measurements. Nevertheless, some corrective measures have been proposed in order to reduce the number of moderate impacts.

The actions that has the biggest environmental impact are indicated in red colour and are the following: thinning and clearing works and earth moving during the construction phase. This is not surprising since both actions affect almost all the environmental factors.

FACTORS			ACTIONS								
			Construction phase					Exploitation phase			
			Thinning and clearing works	Earth moving	Transport of materials and machinery	Concreting, Structures construction.	Drainage works	Plant operation	Machinery Maintenance	Transport	Total
Abiotic environment	Atmosphere and Climatology	Atmosphere pollution	-29	-46	-43	-20	-16	-33	-25	-51	**-263**
		Acoustic pollution	-33	-57	-37	-33	-33	-55	-38	-52	**-286**
	Geology and Geomorphology	Relief changes	-63	-63	-22	-29	-29	-13	-13	-13	**-232**
		Geological risks	-13	-35	-13	-13	-13	-13	-13	-13	**-113**
		Soil removal	-82	-82	-41	-41	-41	-23	-23	-23	**-333**
		Soil pollution	-40	-28	-50	-49	-28	-31	-50	-50	**-276**
	Hydrology	Water changes/pollution (groundwater)	-13	-13	-18	-13	-13	-13	-16	-18	**-99**
		Water changes/pollution (surface water)	-14	-14	-25	-25	-14	-14	-24	-24	**-130**
		Disruption of groundwater flows)	-13	-13	-13	-13	-13	-13	-13	-13	**-91**
Biotic Environment	Vegetation	Vegetation degradation/removal	-75	-74	-19	-16	-16	-17	-17	-22	**-234**
		Habitat area changes/reduction	-66	-51	-24	-20	-20	-13	-13	-16	**-207**
	Fauna	Increase species mortality risk	-19	-19	-13	-14	-14	-14	-14	-14	**-107**
		Species behavior changes	-19	-22	-21	-14	-14	-20	-16	-20	**-126**
Perceptual	Landscape	Visual quality impact	-31	-31	-14	-17	-17	-40	-14	-17	**-164**
		Soil use changes	-13	-13	-13	-13	-13	-13	-13	-13	**-91**
Social-economic	Population	Health and Security	-15	-20	-22	-20	-19	-19	-14	-26	**-129**
	Traffic	Traffic annoyances	-19	-20	-35	-19	-19	-22	-14	-35	**-148**
	Environment	Waste generation	-28	-28	-22	-25	-19	-24	-30	-21	**-176**
	Economy	Job creation (direct and indirect)	35	35	55	35	35	80	29	58	**304**
			-460	**-495**	**-353**	**-330**	**-313**	**-366**	**-360**	**-383**	

Figure 9. Importance's Matrix (own elaboration)

5.4 Corrective measures proposal

Although corrective measures are not required, as no severe impacts have been found, it has been considered that it is possible to adopt some measures in order to decrease the number of moderate impacts, thus making the project more sustainable.

Some of the possible corrective measures are as follows:

- Dust generation reduction:
  - Trucks with material that move outside the work fronts and that access public roads will be covered with canvas to avoid the detachment of material.
  - The internal surfaces of the works, platforms and work fronts will be wet, in order to reduce the amount of suspended particles to the atmosphere.
- Noise reduction: acoustic barriers and specific semi-enclosures for the noisiest machinery will be implemented during the construction phase.
- Soil and vegetation protection: vegetation removed from the work site and facilities (clearing), will be placed at nearby zones with none or very little vegetable cover, avoiding its carriage and dumping in some dumps site.
- Workers training: the project's workers will be trained through brochures and talks, in order to create awareness and protection procedures for land fauna, and restrictions concerning pursuit, keeping away and hunting.

6 CONCLUSIONS

Finally, the following conclusions have been compiled from the development of this project:

- The selected alternative for a WT treatment plant in Barcelona province was the mechanical treatments and size reduction technologies at environmental temperature. Energetic valorisation of WTs was not considered due to its great investment and the pollutant emissions of the process.

- The plant`s capacity will be 8,600 WT's tons per year, but it could be increased due to the high operation capacity machinery used. Furthermore, it will be located on the Municipality of Viladecans next to highway C-32, on an industrial land. The total occupied area will be approximately 7,500 m^2. Location of the plant will not affect waterbodies and "Natura 2000" protection areas.

- According to plant's machinery, the TDMs produced by the plant will be: tyre shreds (~150 mm), tyre chips (~50 mm), wire free rubber chips (~38-16 mm), granulate rubber (~16-4 mm and smaller), steel and textile.

- According to *Ley 21/2013, de evaluación ambiental*, a WT treatment plant of these characteristics does not need an ordinary EIA. Accordingly, a simplified EIA has been done and therefore only importance of the impact has been evaluated.

- Apparently, the construction of the plant seems sustainable, which makes the project environmentally friendly, as most of the impacts that have been found are moderate. For this reason, corrective measures are not required but some are still considered in order to decrease their number.

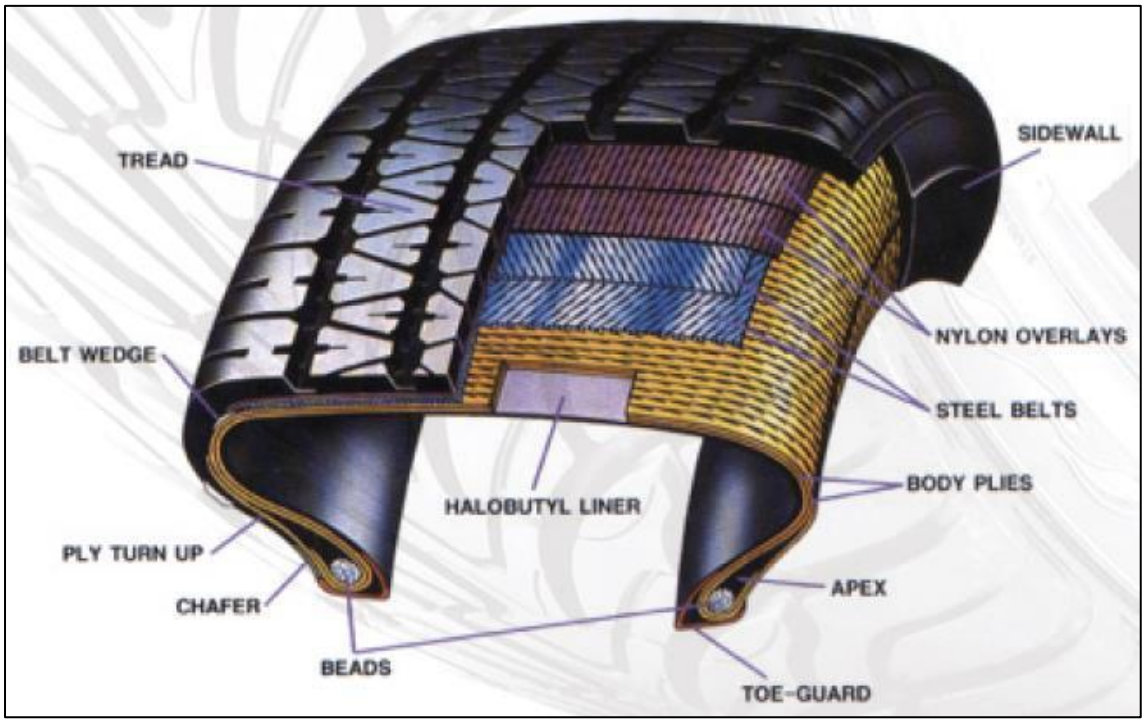
- According to the matrix importance, the construction of the plant will involve 7 moderate impacts, 11 compatible and one positive impact related to job creation. The most impacting actions are thinning and clearing works and earth moving, both during the construction phase.

- Some corrective measures were adopted in order to reduce the number of moderate impacts. The factors that can be reduce by these measures are: emissions to atmosphere, noise problems, soil removal and deterioration of vegetation.

ANNEXES

Annex I

Schematic illustration of the most common type of tyre (WBCSD, 2008)



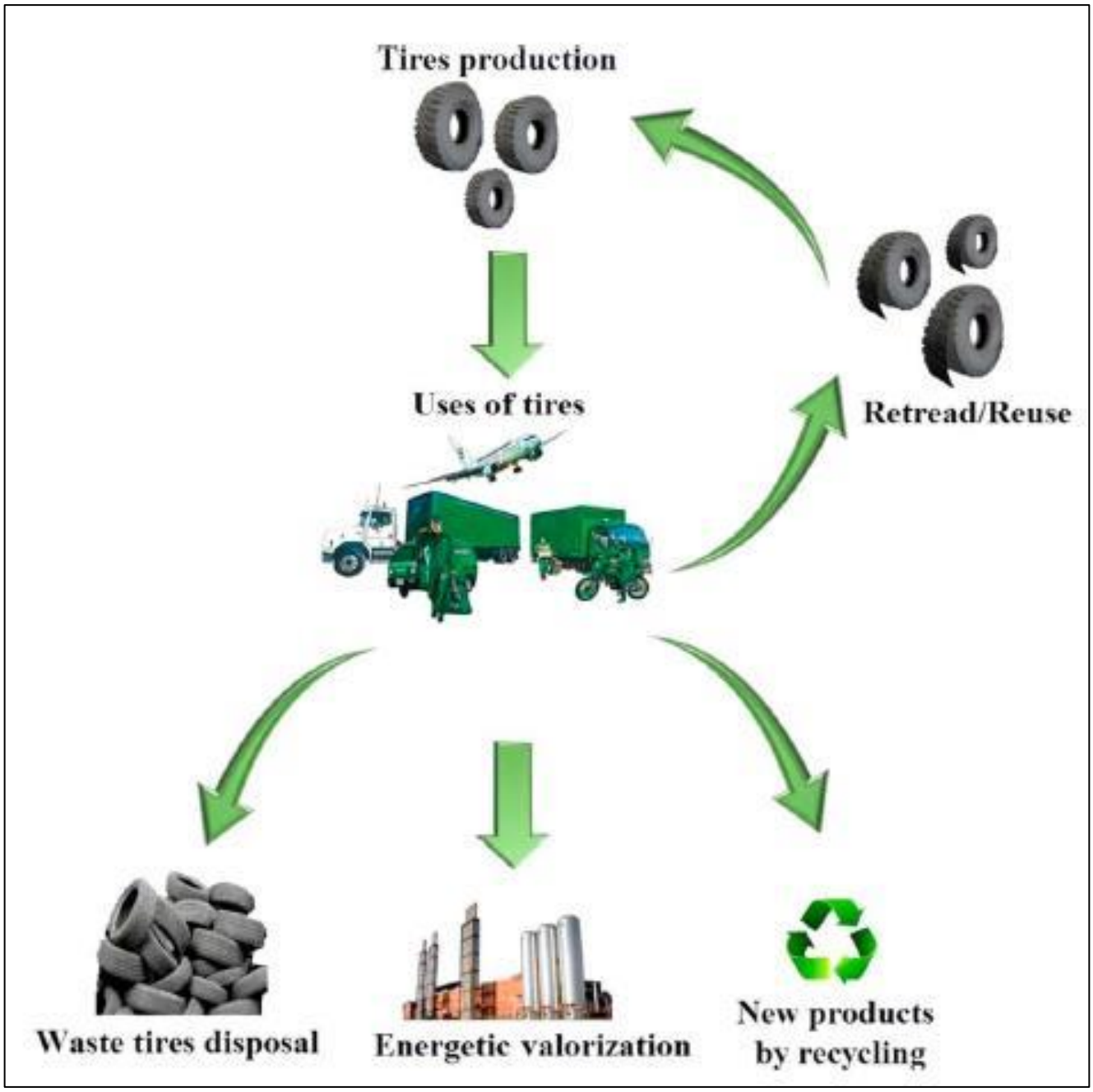
Annex II

Percentage and functions of a WTs components (ETRma, 2015)

Component	%	Function
Rubber and elastomers	48.0	Structure-Deforming
Lampblack	22.0	Upgrades Physical Properties
Steel	15.0	Structure formation
Textile	5.0	Structure formation
ZnO2	1.2	Catalyst
Sulphur	1.0	Vulcanizing Agent
Additives and others	10.0	

Annex III

Tyre's Life Cycle. (Blanco et al, 2017)



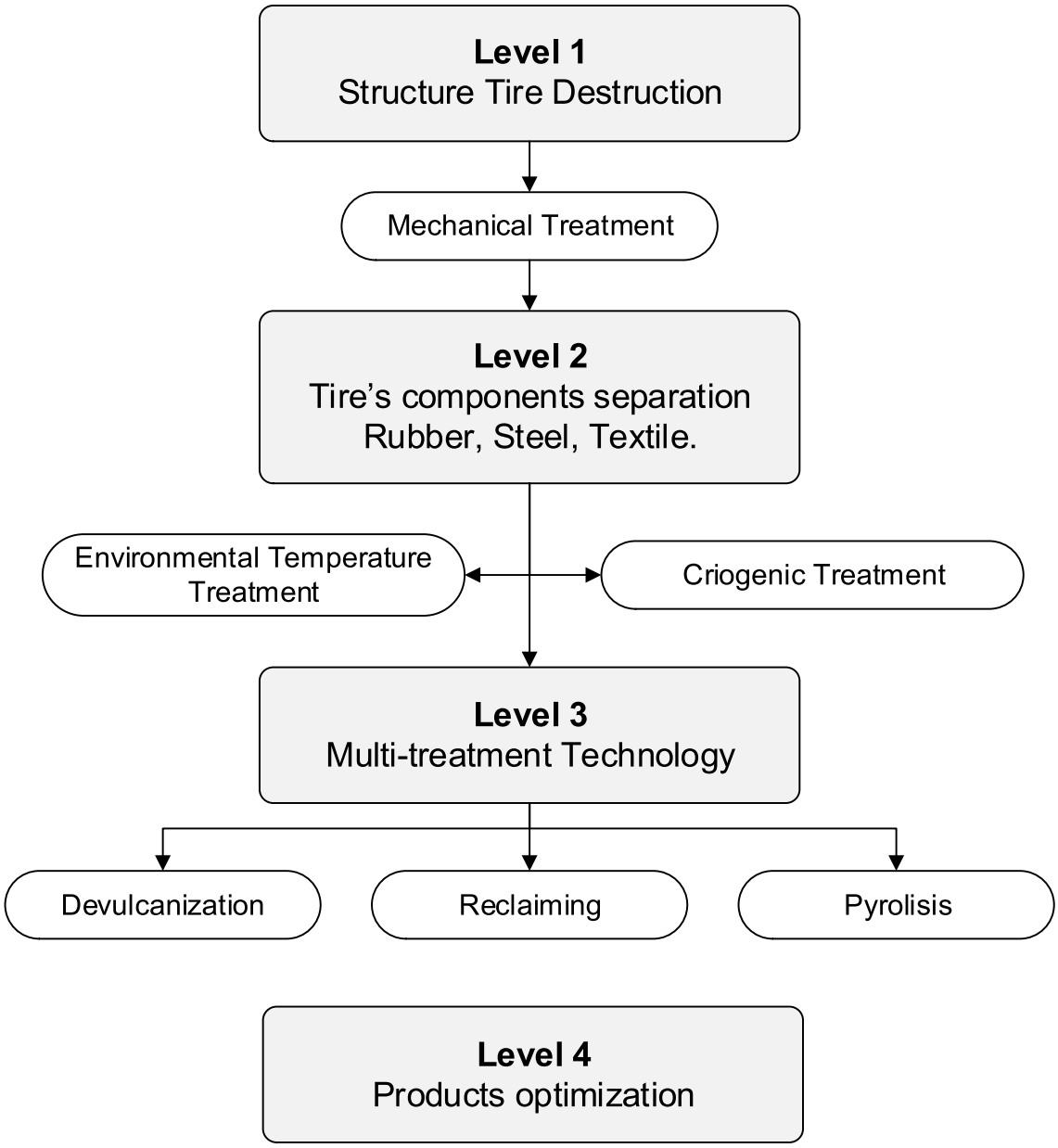
Annex IV

Current alternatives for energetic valorisation of WTs (adapted from Blanco, 2017).

Alternative	Description	Advantages	Disadvantages
Incineration	Direct combustion of WTs in incinerators as fuel. Burning WTs in boilers for high-pressure steam production, which is introduced into a steam turbine coupled to a generator for electricity generation.	>Low cost for power-production costs, high energy recovery and lower environmental impacts when compared to landfill disposal. >Successful WT combustion experiments in fluidized- bed reactor, being the most effective process for WT management. >Rotary kiln combustion allows WTs combustion with different sizes at reasonably low operating costs.	>No material recuperation, higher capital investment, necessity of exhaust gas cleaning process, higher CO_2 emission and operating costs. >Additional researches are needed to reduce the environmental impact related to emissions of polycyclic aromatic hydrocarbons (PAH). >Relatively expensive due to high operating costs and considerable feedstock preparation. >Tyre material is elastic and its pulverisation is meticulous. It is extremely costly to break it to the necessary size for pneumatic transport. >Rotary kiln combustors requires the implementation of technologies for particulate filtration and for emissions controls in the effluent gas
Pyrolisis	Burning of WTs at high temperatures in a limited quantity or absence of oxygen.	>Volatile compounds released have the potential of renewable energy recovery and their liquefaction to a liquid fuel is noteworthy, because they can be easily manipulated, transported and stored, permitting high flexibility for power applications.	>The main problem is to drive the process is an efficient heat transfer for a uniform temperature. >Products from the pyrolysis of WTs are physico-chemically more complex than products from alternative thermochemical conversion processes such as gasification or combustion. >The economic sustainability of the process strongly depends on the possible uses of its derived products.
Plasma Gasification	WTs pass through an electric field within a plasma-processing chamber without oxygen. Thus, gasification of waste tyre components occur in an extremely high temperature atmosphere (1300ºC)	>Almost no residue is left after the process (<5% inert ash). >It eliminates the use of landfills. >Higher efficiency in energy conversion materials is achieved in comparison to traditional incineration systems and power generation by combined cycle.	>Its implementation requires high initial investment. >It has high electricity consumption. >Requires periodic maintenance. >Elevated operation costs

Annex V

WTs Treatment Levels (adapted from Lopez, 2017).



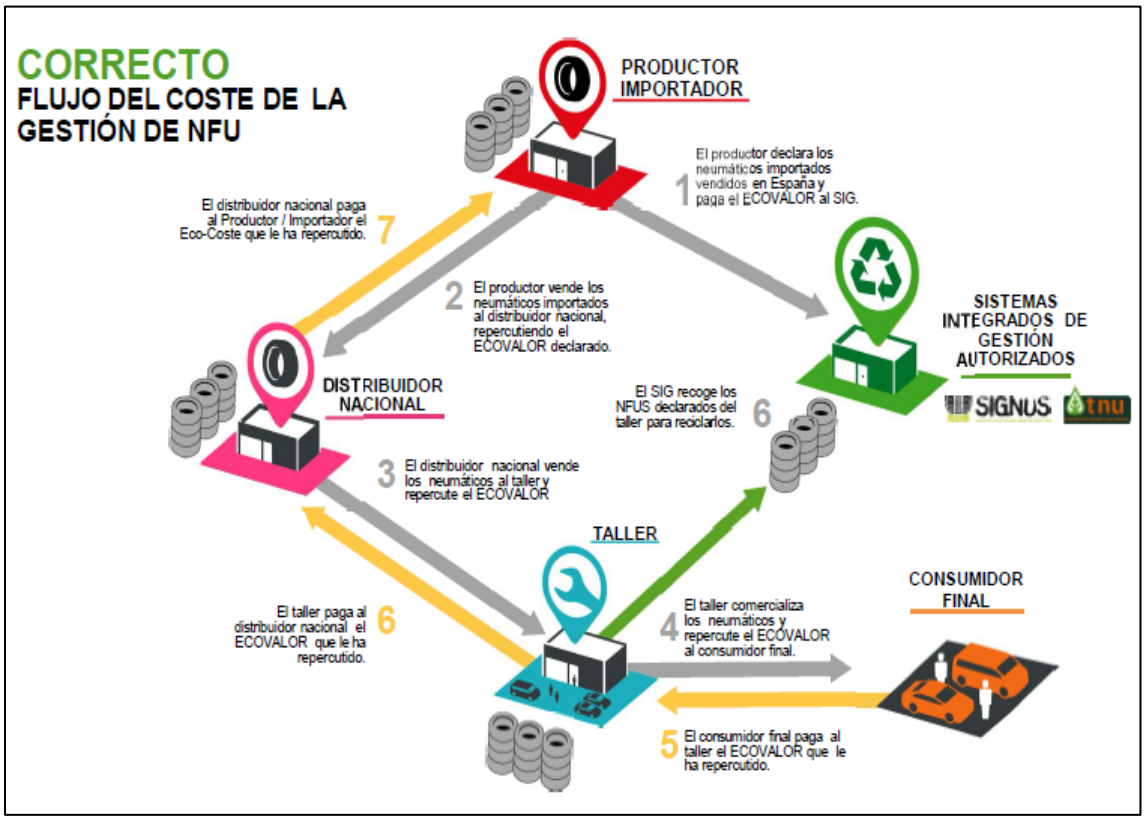
Annex VI

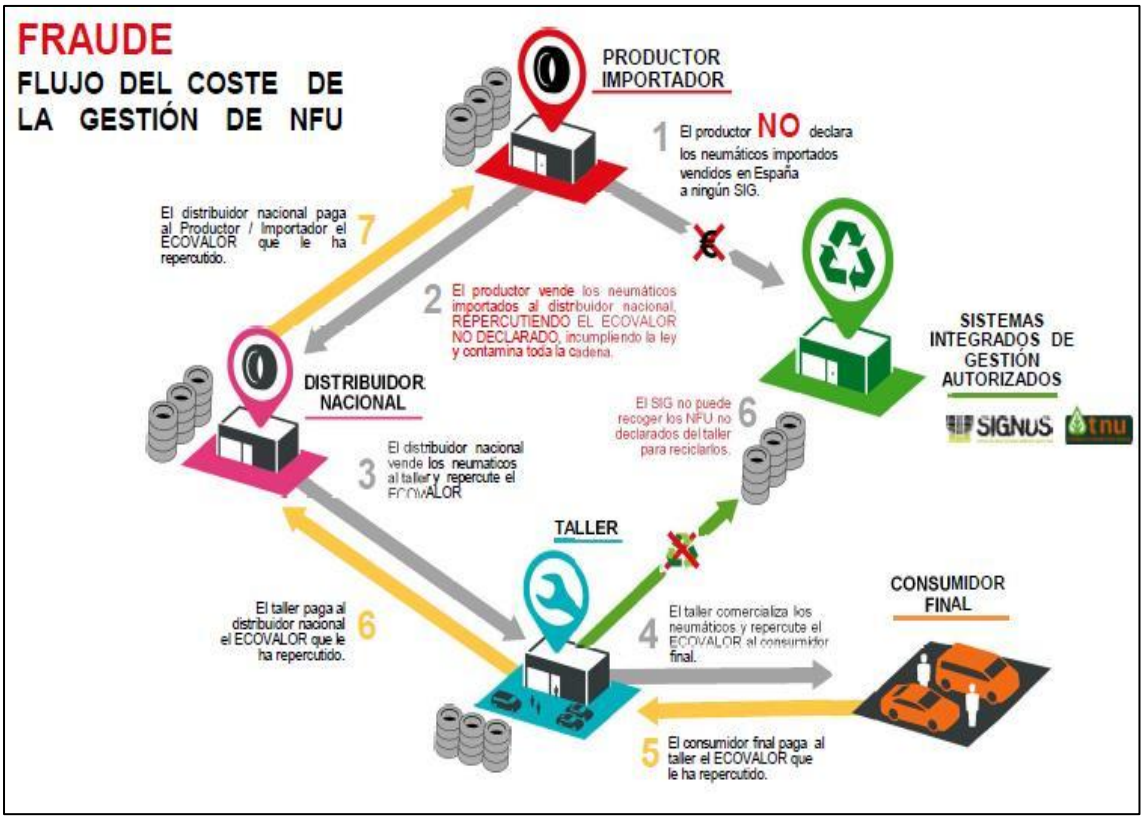
WTs products from different recovery and recycling treatments (Lopez, 2017)

Product	Size	Technology
Tyre		M
Slice	300 mm	M
Shred	50 - 300 mm	M - A
Chips	10 - 50 mm	M - A
Granulate	1 - 10 mm	A - C
Powder	< 1 mm	A - C
Fine Powder	< 500 µm	A - C
M	Mechanical	
A	Size Reduction Technologies: Environmental Temperature	
C	Size Reduction Technologies: Cryogenic Temperature	

Annex VII

Correct and incorrect management of WTs (Jornada "Gestión Fraudulenta de los Neumáticos Fuera de Uso", 2017)





Annex VIII

Data table of EWC V52, V61 and possible buyers facilities in Catalonia (adapted from Agència de Residus de Catalunya, 2017) BCN = Barcelona. LER = Lérida. TAR: Tarragona.

Retread and Recycling WTs Managers - V52.				UTM ETRS89 Coordinates	
Name	**Province**	**Municipality**	**Region**	**X**	**Y**
ALFREDO MESALLES, SA	BCN	EL PONT DE VILOMARA I ROCAFORT	Bages	406472	4617710
INTERNITCO COMERCIO, SL	BCN	MANRESA	Bages	401056	4620886
ALFREDO MESALLES, SA	BCN	GAVÀ	Barcelona	417072	4572469
ALFREDO MESALLES, SA	BCN	SANT BOI DE LLOBREGAT	Barcelona	420126	4575803
FCC ÁMBITO, SA	BCN	CASTELLBISBAL	Barcelona	415358	4592692
FCC ÁMBITO, SA	BCN	SANT FELIU DE LLOBREGAT	Barcelona	420591	4582306
FRANCISCO ALBERICH, SA	BCN	CASTELLBISBAL	Barcelona	413492	4590823
RECUPERACIONES DE METALES DIVERSOS CATALUNYA, SL	BCN	SANTA PERPETUA DE MOGODA	Barcelona	431424	4599224
COMERCIAL RIBA FARRÉ, SA	BCN	L'HOSPITALET DE LLOBREGAT	Barcelonès	427406	4578210
DESFERRES CATALUNYA, SL	BCN	LAS MASIES DE VOLTREGÀ	Osona	436509	4653009
FERIMET, SL	BCN	GURB	Osona	438194	4644215
INTERNITCO COMERCIO, SL	GER	BANYOLES	Pla de l'Estany	481639	4662712
RECICLAJES ARBECA, SL	LER	ARBECA	Garrigues	327511	4600756
GESTIÓN MEDIOAMBIENTAL DE NEUMÁTICOS, SL (GMN, SL)	LER	MAIALS	Segrià	291971	4582270
JORDI FONDO MARTÍNEZ	TAR	ALCOVER	Alt Camp	347954	4569639

Energy valorisation WTs Managers - V61.				UTM ETRS89 Coordinates	
Name	**Province**	**Municipality**	**Region**	**X**	**Y**
UNILAND CEMENTERA, SA	BCN	SANTA MARGARITA Y LOS MONJES	Alt Penedès	388073	4574343
CEMENTOS MOLINS INDUSTRIAL, SA	BCN	SANT VICENÇ DELS HORTS	Barcelona	416141	4584246
LAFARGE CEMENTOS, SA	BCN	MONTCADA I REIXAC	Barcelona	431859	4591846
PALWASTE RECYCLING, SL	BCN	CASTELLBISBAL	Barcelona	412979	4590811
CENTRO INTEGRAL DE VALORIZACIÓN DE RESIDUOS DE SANT ADRIÀ DE BESÒS	BCN	SANT ADRIÀ DE BESÒS	Barcelonès	435530	4585342
UNILAND CEMENTERA, SA	BCN	SITGES	Garraf	404543	4565880
CENTRO INTEGRAL DE VALORIZACIÓN DE RESIDUOS DEL MARESME	BCN	MATARÓ	Maresme	451846	4597151
CALAS DE LLIERCA, SA	GER	ARGELAGUER	Garrotxa	467900	4674407

Energy valorisation WTs Managers – V61				UTM ETRS89 Coordinates	
Name	**Province**	**Municipality**	**Region**	**X**	Y
CAL INDUSTRIAL, SL	GER	GIRONA	Gironès	485978	4650405
CEMEX ESPAÑA OPERACIONES, SLU	TAR	ALCANAR	Montsià	291340	4495309
INCINERADORA DE TARRAGONA (EXPLOTADOR SIRUSA)	TAR	TARRAGONA	Tarragonès	351106	4555791
SARP CONSTANTÍ, SLU	TAR	CONSTANTÍ	Tarragonès	347320	4558170

Possible TDM buyers				UTM ETRS89 Coordinates	
Name	**Province**	**Municipality**	**Region**	**X**	**Y**
SUPREME FLOORS IBÉRICA	BCN	SANT CUGAT DEL VALLÈS	Vallés Occidental	424203	4591848
SOLTEC PAVIMENTS I REVESTIMENTS, S.L.	BCN	BARCELONA	Barcelona	427084	4581410
DEGOM S.A.	BCN	BARCELONA	Barcelona	426943	4582821
DEGOM S.A.	BCN	SANT JUST DESVERN	Bajo Llobregat	421777	4581809
COLOBER PAVIMENTOS LIGEROS S.L.	BCN	BARCELONA	Barcelona	432533	4587844
PAVINDUS S.A	BCN	BARCELONA	Barcelona	427895	4581784
FORBO PAVIMENTOS S.A	BCN	BARCELONA	Barcelona	431266	4583796
CAUCHO DISTRIBUCIÓN	BCN	ANDREU DE LA BARCA	Bajo Llobregat	413109	4590256

Annex IX

Data tables elaborated from 2016 annual report IMSs in Spain (adapted from SIGNUS, 2016 and TNU, 2016)

WTs collected (tons)		
Autonomous Community	**TNU**	**SIGNUS**
Andalucía	9.920	31.339
Aragón	2.513	7.151
Cantabria	252	3.146
Castilla-La Mancha	3.684	9.637
Castilla y León	4.413	19.063
Cataluña	**8.613**	**25.512**
Ceuta	17	57
Com. De Madrid	7.776	17.620
Com. Valenciana	12.466	11.540
Extremadura	575	7.332
Galicia	4.286	15.647
Islas Baleares	692	3.976
Islas Canarias	4.798	7.640
La Rioja	273	1.534
Melilla	12	357
Navarra	674	4.058
País Vasco	1.990	11.335
Pdo. Asturias	1.175	6.540
Región Murcia	4.167	5.153
TOTAL	**68.296**	**188.637**

TNU WTs collection in Catalonia per year	
Year	**Tons**
2007	9.415
2008	8.592
2009	8.273
2010	8.415
2011	7.066
2012	6.280
2013	6.561
2014	6.955
2015	7.762
2016	8.613
Total	**77.931**

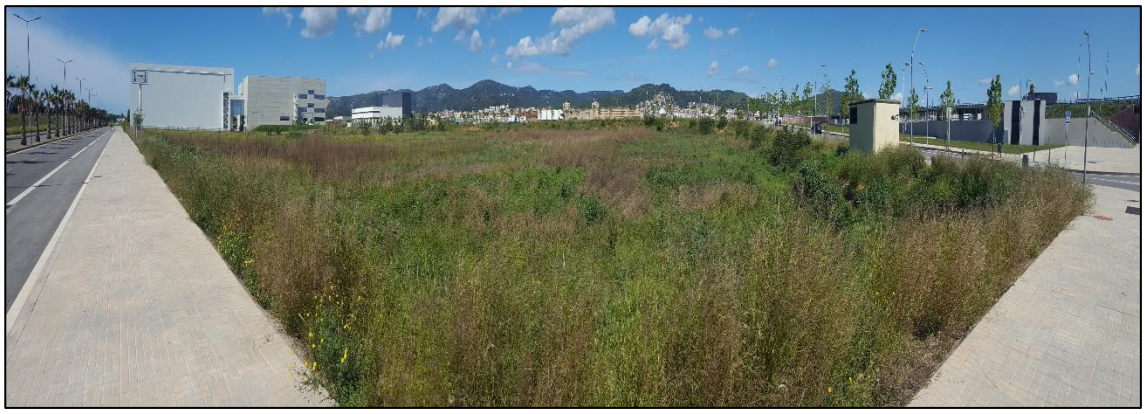
Annex X

Capacity, surfaces and location of some WTs treatment plants in Catalonia and Spain (own elaboration from data of web pages of company's administrations) AC = Autonomous Community. Blue points = allocation of treatment plants.

Name	AC	Province	Municipality	Capacity (*t*/year)	Surface (m^2)	*t*/m^2	*Source*
ALFREDO MESALLES, SA (AMSA)	Cataluña	Barcelona	EL PONT DE VILOMARA I ROCAFORT	15,000	11,000	1.36	AMSA, 2018
GESTIÓN MEDIOAMBIENTAL DE NEUMÁTICOS, SL (GMN, SL)	Cataluña	Lérida	MAIALS	45,000	31,000	1.45	GMN, 2018
INDUGARBY NFU	Navarra	Navarra	Ribera Arga-Aragón	10,000	15,000	0.67	GE, 2018
GESTIÓN DE NEUMÁTICOS ARAGÓN, S.A.	Aragón	Aragón	Zaragoza	30,000	28,425	1.06	PE, 2008
RECICLADO DE NEUMÁTICOS DE ANDALUCÍA, S.L.	Andalucía	Jaén	Campiña	18,000	18,749	0.96	EE, 2007
RECICLADO DE NEUMÁTICOS DE CASTILLA Y LEÓN, S.A.	Castilla y León	Palencia	Tierra de Campos	14,000	23,000	0.61	RENECAL, 2018
RECICLAJE DE NEUMÁTICOS Y CAUCHO, S.L.	Murcia	Murcia	Vega Media del Segura	13,000	22,141	0.59	LV, 2015
VALORIZA SERVICIOS MEDIO AMBIENTALES, S.A.	Castilla-La Mancha	Guadalajara	La Alcarria	25,000	24,333	1.03	VSMA, 2018
					Average	**~1**	

Annex XI

Photos of the Area



Annex XII

Photos of WT treatment plant products (adapted from General Recycling, 2018)

(A) Tyre Shreds (~150 mm), (B) Tyre Chips (~50 mm); (C) Wire-Free Rubber Chips (~38-16mm), (D) Steel Wire, (E) Granulate Rubber (~16-4mm and smaller) and (F) Liberated Textile fiber.

Annex XIII

CD's Machinery specification. (own elaboration from sources show below)

Machine	Source
Weighing scale	ROVER-BAS, 2018
Wheel material handler	TABARELLI, 2018
Forklift	DOOSAN, 2018
Conveyor belt	MASANÉS, 2018
Primary tyre shredder	GENERAL RECYCLING, 2018
Secondary tyre shredder	GENEAL RECYCLING, 2018
Steel separation equipment.	CONVEYORTEK, 2018
Compactor	TFKJ, 2018
Tyre rubber granulator	GENEAL RECYCLING, 2018
Vibrator table	SEC, 2018

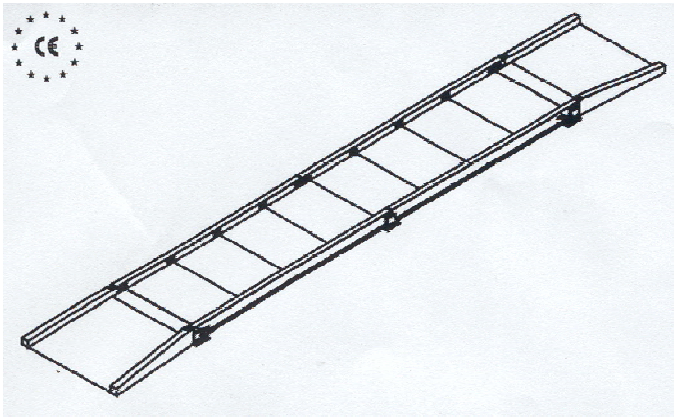
ROVER-BAS, S. L. EQUIPOS DE PESAJE Y CONTROL

FICHA TÉCNICA

TÍTULO : **RV-2000 SS C**

Código	ESP-DA/05		Hoja 1 de 1
Edición	2	Fecha	30/09/2006

BÁSCULA-PUENTE MODELO RV-2000 SS C, METÁLICA, ELECTRÓNICA, SOBRESUELO



DIMENSIONES EN m	Nº. MÓDULOS DE 2 x 3 m	Nº. MÓDULOS DE 1 x 3 m	Nº. DE CÉLULAS	CAPACIDAD EN Tn	FRACCIONES EN Kg	REF. PLANO FABRICACIÓN
12 x 3	5	2	6	60	20	5.12
14 x 3	7	-	6 / 8	60	20	5.14
15 x 3	6	3	6 / 8	60	20	5.15
16 x 3	7	2	6 / 8	60 / 80	20 / 50	5.16
18 x 3	9	-	6 / 8	60 / 80	20 / 50	5.18
20 x 3	10	-	6 / 8	60 / 80	20 / 50	5.20

CARACTERISTICAS

- Certificado de Aprobación CE de Modelo.
- Instalación : Sobresuelo.
- Sistema electrónico.
- Células de carga : 20 / 30 Tn.
- Visor electrónico.
- Puntos de apoyo : 6 / 8.
- Acceso células : Tapas laterales.
- Altura rodadura : 320 mm.
- Grueso chapa superior lisa : 12 mm.
- Acabado : Pintura epoxi de alto nivel anticorrosivo. Módulos color gris y vigas colores amarillo y negro.

INCLUYE

- Placas y soportes células de carga.
- Células de carga y accesorios de montaje.
- Armario metálico con caja suma.
- Visor electrónico (conectable a todos los indicadores descritos en la Aprobación de Modelo).
- 15 metros cable plataforma visor.
- 15 metros tubo PG-9 para cable plataforma.
- Cables de células entubados.
- Estructura completa con tornillería.
- Topes limitadores de movimiento.
- Planos obra civil.

EXCLUSIONES

- Obra civil.
- Transporte y embalaje.
- Grúa para descarga y montaje de la báscula
- Peonaje para ayuda montaje.
- Montaje de la báscula y puesta en marcha.
- Verificación CE de la báscula (Opcional).

OPCIONES

- Placas de anclaje para obra civil.
- Angular para las rampas de acceso.
- Células de carga con protección anti-tormentas.
- Ancho plataforma : 3,20 m.
- Ancho plataforma : 3,30 m.

EDICIÓN	FECHA	MODIFICACIONES

MATERIAL HANDLERS

MH3026 (2018)

< Back

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360° Exterior view. Double click on the image to zoom in on any area of the product.

PHOTO VIDEOS 360 VIEW

SPECIFICATIONS BENEFITS & FEATURES

OVERVIEW

We know that when it comes to material handling equipment, your success depends on productivity and low operating costs. The MH3026 is a purpose-built material handler, designed for industrial and recycling applications that call for safe, quality and reliable products. It is relentlessly efficient for sites and applications requiring larger lifting capacities and working envelope.

ENGINE

UNITS: **US** **METRIC**

Engine Model	Cat C7.1 ACERT
Emissions	Tier 4 Final/Stage IV
Displacement	7.01 l
Maximum Gross - ISO 14396	129.4 kW (174 hp [176 hp/PS*])
Bore	105.0 mm
Cylinders	6 in-line
Maximum Net Power - SAE J1349/ISO 9249	126 kW (169 hp [171 hp/PS*])
Maximum Torque - 1,400 rpm	830.0 N·m
Note	*Metric values.
Stroke	135.0 mm

WEIGHTS

Operating Weight	25 220-26 150 kg (55,601-57,651 lb)

With MH Boom (6800 mm/22'4") - MH 2.99 m/9'8" Undercarriage and 5900 mm (19'4") Drop Nose Stick	25770.0 kg
With MH Boom (6800 mm/22'4") - MH 2.99 m/9'8" Undercarriage and Straight Stick	26150.0 kg
Key Components - Drop Nose (4900 mm/16'1")	955.0 kg
Key Components - Drop Nose (5500 mm/18'1")	1075.0 kg
Key Components - Drop Nose (5900 mm/19'4")	1115.0 kg
Key Components - MH Blade	745.0 kg
Key Components - Straight (4800 mm/15'9")	1420.0 kg
MH Push Blade	745.0 kg
Note	Operating weight is with solid tires, 5200 kg (11,465 lb) counterweight, MH undercarriage, fuel tank, operator and work tool, 1400 kg (3,086 lb). Weight varies depending on configuration.
With MH Boom (6800 mm/22'4") - MH 2.75 m/9'0" Undercarriage and Straight Stick	25220.0 kg

SWING MECHANISM

Swing Speed	9.0 r/min
Maximum Swing Torque	59.0 kN·m

SERVICE REFILL CAPABILITIES

Cooling System	46.9 l
Diesel Exhaust Fluid Tank	34.5 l
Fuel Tank	420.0 l
Hydraulic System Capacity	352.0 l

Hydraulic Tank Capacity	200.0 l

UNDERCARRIAGE

Axle Clearance - All MH Undercarriages	325.0 mm
Oscillation Axle Angle	±5 degrees

TRANSMISSION

Maximum Travel Speed	25.0 km/h
Creeper Speed - 2nd Gear	12.0 km/h
Maximum Gradeability (25 000 kg/55,120 lb)	60%
Maximum Travel Speed - 2nd Gear	25.0 km/h

HYDRAULIC SYSTEM - MAXIMUM FLOW

Auxiliary Circuit - High Pressure	250.0 l/min
Auxiliary Circuit - Medium Pressure	49.0 l/min
Implement/Travel Circuit	359.0 l/min
Swing Mechanism	118.0 l/min

HYDRAULIC SYSTEM - MAXIMUM PRESSURE

Auxiliary Circuit - High Pressure	35000.0 kPa
Auxiliary Circuit - Medium Pressure	21000.0 kPa
Implement Circuit - Heavy Lift	37000.0 kPa
Implement Circuit - Normal	35000.0 kPa
Swing Mechanism	31000.0 kPa

Travel Circuit	35000.0 kPa

MAXIMUM DIMENSIONS - APPROXIMATE

Maximum Shipping Height*	3635.0 mm
Maximum Shipping Width	2990.0 mm
Note	*5900 mm (19'4") stick needs to be detached for transportation.

WORKING RANGES - WITHOUT WORK TOOL: MH BOOM (6800 MM/22'4"); STICK LENGTH (4800 MM/15'9")

Maximum Depth	1820.0 mm
Maximum Height	12425.0 mm
Maximum Reach	11435.0 mm

WORKING RANGES - WITHOUT WORK TOOL: MH BOOM (6800 MM/22'4"); STICK LENGTH (4900 MM/16'1")

Maximum Depth	1920.0 mm
Maximum Height	12505.0 mm
Maximum Reach	11530.0 mm

WORKING RANGES - WITHOUT WORK TOOL: MH BOOM (6800 MM/22'4"); STICK LENGTH (5900 MM/19'4")

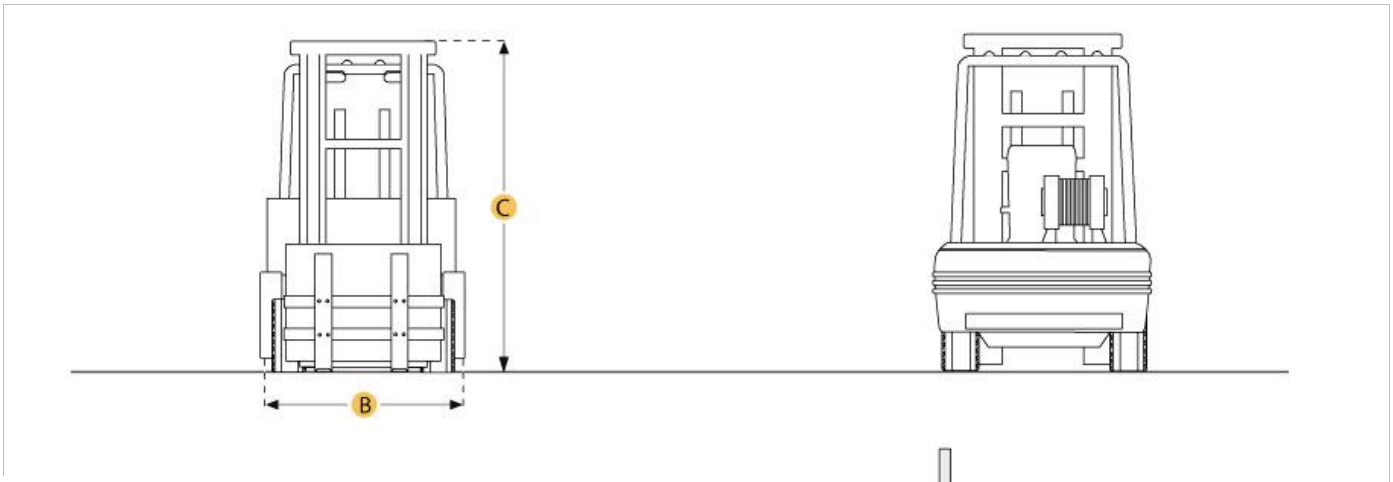
Maximum Depth	2925.0 mm
Maximum Height	13300.0 mm
Maximum Reach	12485.0 mm

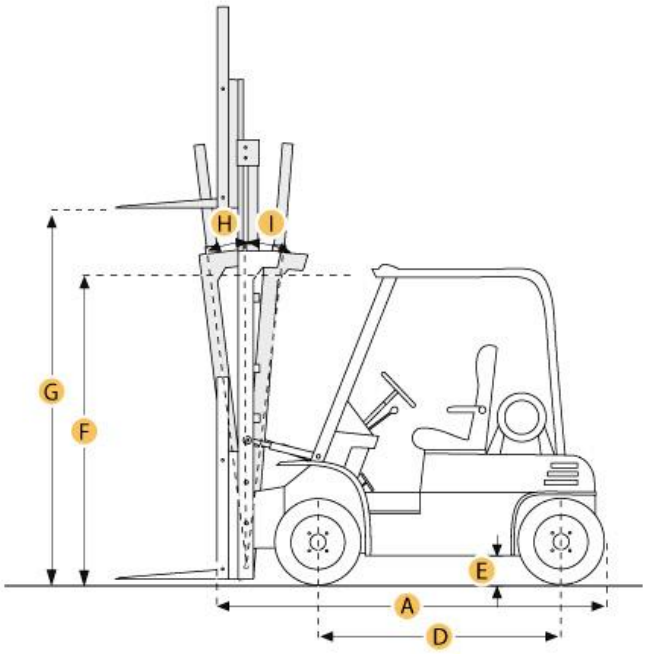
WORKING RANGES - WITHOUT WORK TOOL: MH BOOM (6800 MM/22'4"); STICK LENGTH (5500 MM/18'1")

Maximum Depth	2525.0 mm

Maximum Height	12605.0 mm
Maximum Reach	11910.0 mm

CATERPILLAR P5000 FORKLIFT





Selected Dimensions

Dimensions		
A. LENGTH TO FORK FACE	8.4 ft in	2550 mm
B. OVERALL WIDTH	3.8 ft in	1150 mm
C. OVERALL HEIGHT - MAST LOWERED	7 ft in	2140 mm
D. WHEELBASE	5.2 ft in	1600 mm
E. GROUND CLEARANCE	4.6 in	117 mm
F. HEIGHT TO TOP OF OVERHEAD GUARD	6.9 ft in	2105 mm
G. MAX FORK HEIGHT	11 ft in	3340 mm
MAST		
H. MAST TIP FORWARD	6 degrees	
I. MAST TIP REAR	10 degrees	

Specification

Engine		
MODEL	K25	
POWER	63 hp	47 kw
TORQUE	139 lb ft	188.5 Nm
POWER MEASURED @	2700 rpm	
DISPLACEMENT	152 cu in	2.5 L
TORQUE MEASURED @	1600 rpm	
FUEL TYPE	gas	
Operational		
OPERATING WEIGHT	7900 lb	3583.4 kg
TIRE TYPE	pneumatic	
NUMBER OF FRONT WHEELS	2	
NUMBER OF REAR WHEELS	2	
MAX SPEED	11.5 mph	18.5 km/h
MAST		
LOAD CAPACITY	5511.6 lb	2500 kg
LOAD CENTER	19.7 in	500 mm
MAST TIP FORWARD	6 degrees	
MAST TIP REAR	10 degrees	
MAX FORK SPREAD	39.4 in	1000 mm
LIFT SPEED	130 ft/min	39.6 m/min
LOWER SPEED	98 ft/min	29.9 m/min
Dimensions		
LENGTH TO FORK FACE	8.4 ft in	2550 mm
OVERALL WIDTH	3.8 ft in	1150 mm
OVERALL HEIGHT - MAST LOWERED	7 ft in	2140 mm
MAX FORK HEIGHT	11 ft in	3340 mm
WHEELBASE	5.2 ft in	1600 mm
TURNING RADIUS	7.3 ft in	2230 mm
HEIGHT TO TOP OF OVERHEAD GUARD	6.9 ft in	2105 mm

Featuring Hägglunds Hydraulic Motors

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Sealed, Low Grease Bearings

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The ECO Krumbuster® is the heart of the Rubber Powder Module, producing up to 99.9% wire- and fiber-free rubber powder. Output produces rubber powder smaller than 0.850 mm (850 Microns). The ECO Rubber Powder Module is available with an output capacity of up to 1.5 metric tons per hour of powder.

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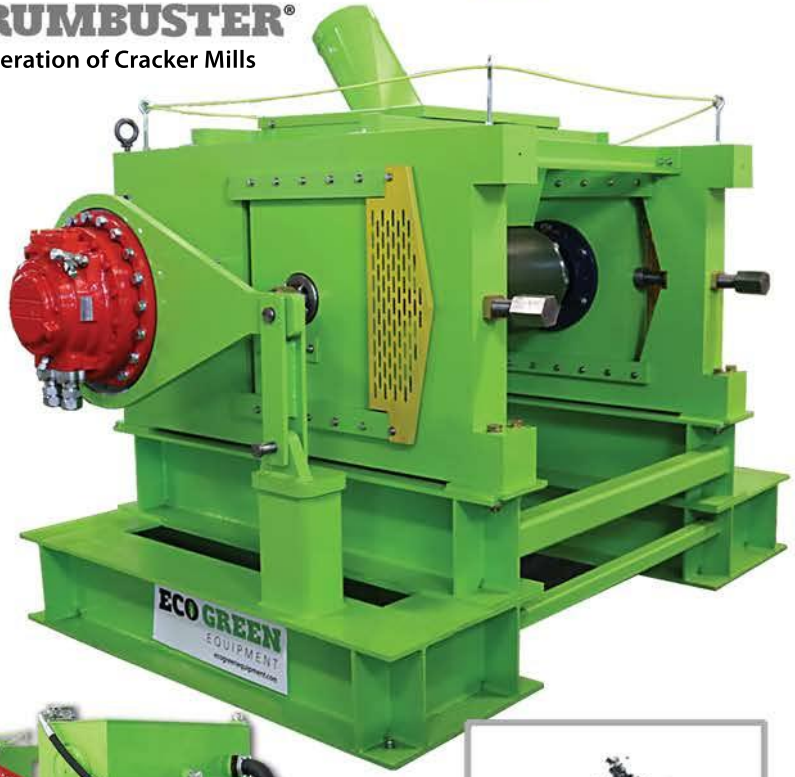


ECO Krumbuster®
with Hydraulic Power Unit

Rubber Powder System / ECO Krumbuster® Hydraulic Mill

The ECO Krumbuster® is the Next Generation of Hydraulic Cracker Mills for Fine Rubber Processing!

The ECO Krumbuster® Rubber Powder Module is the perfect solution for processors who demand fine rubber powder output in commercial quantities.

Choose either a fully-configured module line complete with accessory conveyors, augers, screeners and bagging station, or a separate ECO Krumbuster® Mill with hydraulic power unit.

- **Lower Maintenance and Energy Costs in Less Space**
- **New Technology Increases Grinding Power using Patented Advanced Hydraulics**
- **Cuts Bearing Grease by More Than Half**
- **Forged Steel Shafts, Enclosed Double-Row Spherical Bearings**
- **Commercial Output Down to 0.850 mm (850 microns)**
- **Virtually Eliminates Maintenance Downtime**
- **Surpasses Conventional Cast-Iron Cracker Mill Output up to 50%**
- **Financing Options for USA Clients**
- **Handles Various Input Sizes (Granulates, Buffings, and Chips)**
- **The ECO Krumbuster® is the Leading Technology for Fine Powder Milling.**

The ECO Rubber Powder Module Provides Quality Rubber Output for the following Secondary Applications:

- **Rubberized Asphalt Applications**
- **New Tire Manufacturing**
- **Rubber Reclaim and Devulcanization Applications**
- **Thermoplastic Elastomers**
- **Automotive Parts & Tires**
- **Spray and Sealant Applications**
- **Membranes**

ECO Krumbuster® with Hydraulic Power Unit

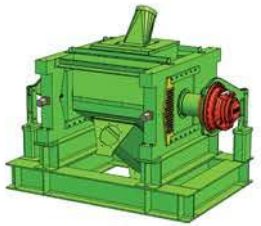
Input: Wire-free Chips / Mulch
Output: Clean Crumb Rubber and Rubber Powder

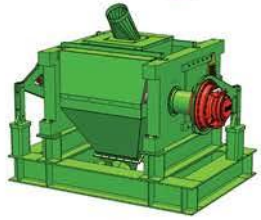
ECO Krumbuster® Rubber Powder System Installed in Europe.

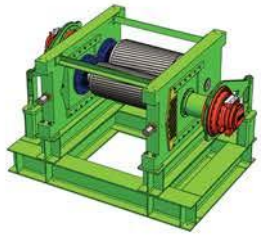
ECO Krumbuster® Assembly in the ECO Green Equipment USA Facility.

ECO KRUMBUSTER®

The Next Generation of Cracker Mills







ECO Krumbuster®Hydraulic Mill Specifications and Descriptions

Model Number ECO KB-76-55-300-H

Item	Specifications
Input Material	Wire-free and Fiber-free Chips 6 mm (0.25" -inch) and smaller
Output Material	Rubber Powder from 0.850 mm (850 microns) and smaller depending on screening. Liberated Steel Liberated Fiber
Max Capacity	Up to 1.5 metric TPH
Mill Power	225 kW (300 HP)
Mill Weight	5,500 kg (12,000 lbs.)
Friction Ratio	1:80
Mill Dims L x W x H	4,340 x 2,570 x 4,664 mm (14' 3" x 8' 5" x 15' 3" ft)
Hydraulic Power Unit (HPU) Weight	2,045 kg (4,500 lbs.)
Hydraulic Power Unit (HPU) Dimensions L x W x H	3,353 x 914 x 1,829 mm (11' x 3' x 6' ft)
Number of 406 mm (16" inch) rolls	1
Number of 559 mm (22" inch) rolls	1
Description	ECO Green's patented ECO Krumbuster® Fine Grinding Mill efficiently grinds crumb rubber into rubber powder down to 0.850 mm - 0.177 mm (850 -177 microns). Powered by a 225 kW (300 HP) hudraulic power unit, the ECO Krumbuster® features a 762x 406 -559 mm (30"x 16"-22" -inch) roll size. The ECO Krumbuster® grinds and mills until the desired size is reached. The fine milling process grinds up to 1.5 metric tons/hour of 0.850 mm (850 microns) minus.

ECO Rubber Powder System Specifications and Descriptions

Model Number ECO RP-KB-1.5-850 System

Item	Specifications
Input Material	Wire-free and Fiber-free Crumb Rubber 6 mm (0.25"-inch) and smaller with no foreign materials.
Output Material	Rubber Powder smaller than 0.850 mm (850 microns)
Max Capacity	Up to 1.5 metric TPH
System Power	Standard is 295 kW (394 HP)
System Dimensions L x W x H	13904 x 5507 x 6130 mm (45' 8" x 18' x 1" x 20' 2" ft) (9.25' x 5.75' x 5.25' ft)
Estimated Shipping Loads	2 to 4
Description	ECO Green's RP-KB-1.5-850 Rubber Powder System efficiently grinds crumb rubber into rubber powder smaller than 0.850 mm (850 microns). The system features the ECO Krumbuster® Hydraulic Mill as the main equipment with complementary feed bin, conveyors, and separation equipment, which return clean, high-quality rubber powder.

CUTTING EDGE INNOVATION IN TIRE RECYCLING

ECO GREEN EQUIPMENT

USA

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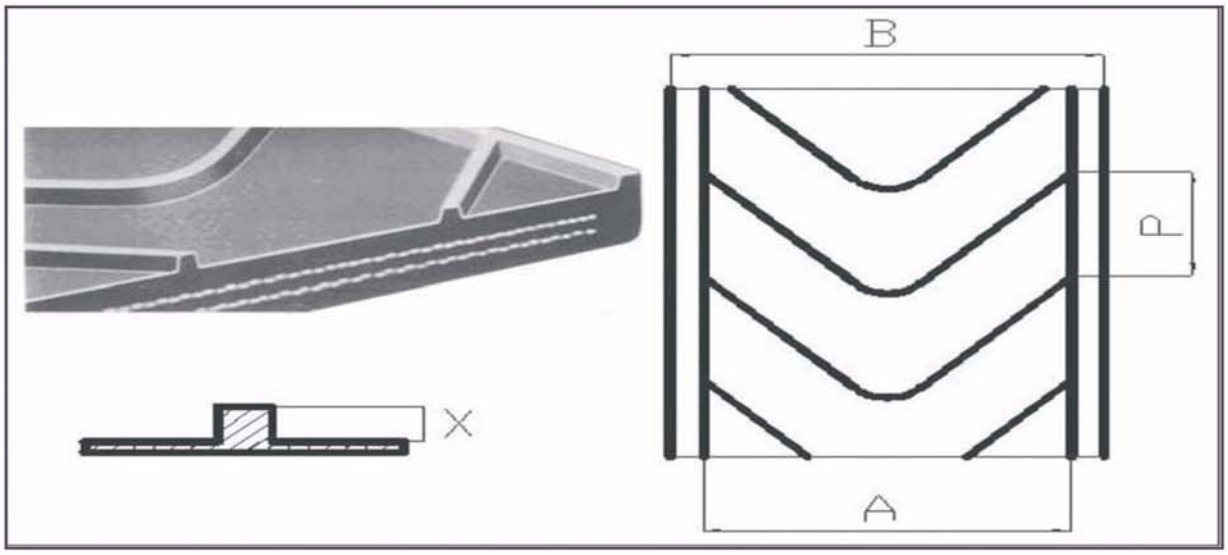
Bandas Nervadas

Antigrasa



DIMENSIONES	
ANCHO	1200 +/- 12 mm
ESPESOR REC. SUPERIOR	3 - 0.2 mm
ESPESOR REC. INFERIOR	1.5 - 0.2 mm

PROPIEDADES GOMA RECUBRIMIENTO	
CARGA DE ROTURA	min. 18 N/mm²
ALARGAMIENTO A LA ROTURA	min. 550%
PÉRDIDA POR ABRASIÓN	máx. 165mm³
DUREZA	65+/- 5 Shore A
INMERSIÓN EN LÍQUIDO IRM Nº3, 28 28 DÍAS (UNE 53540). Variación en peso.	20

PROPIEDADES CARCASA	
CARGA DE ROTURA (urdimbre)	min. 400 N/mm
ALARGAMIENTO A LA ROTURA (urd)	min. 10%
ALARGAMIENTO AL 10% C.R	máx. 1.5%
ADHERENCIA GOMA-LONA	min. 5 N/mm
ADHERENCIA LONA-LONA	min. 7 N/mm

Tipo de Banda	A	B	P	X
EP400/3 3+1.5 MOR	1000	1200	250	13

Input:
Whole Tires up to 1220 mm (48"-inches), Chopped Mining Tires (Debeaded), Off The Road (OTR) Tires, (Debeaded) Rough Tire Shreds

Output:
Rough Tire Shreds Down to 2"-inches

Giant Cutting Chamber
Produces More Tire Shreds with Less Cost. Fast Blade Replacement Reduces Downtime.

Authorized ECO Green Equipment Distributor:

Call Now. Request a Free Quote:
+1 (801) 505-6841 USA

ECO GREEN EQUIPMENT
USA
ecogreenequipment.com

TDS (Tire-Derived Shreds) System / ECO Green Giant Two-Shaft Shredder

The ECO Green Tire Recycling Systems

8 State-of-the-Art Integrated Systems

ECO GREEN EQUIPMENT
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ECO GREEN GIANT

The Ultimate in Tire Shredding

TDS (Tire-Derived Shreds) System / ECO Green Giant Two-Shaft Shredder

The ECO Green Giant is the Industry Standard Two-Shaft Shredder for Rubber Processing!

The ECO Green Giant and expanded TDS (Tire-Derived Shreds) Systems are the perfect solution for processors which demand fine clean-cut TDS shred output for commercial energy and secondary product uses.

Choose either a fully-configured system complete with accessory conveyors and screeners, or a separate ECO Green Giant shredder with control panel.

- **NEW! Lower Maintenance and Energy Costs**
- **NEW! Improved Technology and Shredding Power using Patented Rotor and Blade Design**
- **Easy Adjustment and Replacement of Cutting Blades**
- **Quick Access Side Cutting Chamber Maintenance Doors**
- **Forged Steel Shafts, Enclosed Double-Row Spherical Bearings**
- **Input Capacity of up to 30 tons/hour!**
- **Output Rough Shreds down to 2"-inches in Size**
- **Perfect Shredder and Module System for Clean-Cut TDS Chips**
- **Handles Various Tire Input Sizes (Passenger, Truck, Super Singles, Semi OTR, and Cut OTR Pieces).**
- **Financing Options for USA clients**
- **Global Delivery Options**

ECO Green's Green Giant Shredder features a state-of-the-art, low RPM, high-torque shredding technology. Each shaft holds a row of hardened tool steel rotors containing sharp blades ready for shredding.
ECO shredders can process car tires, truck tires, super singles, semi-OTR, and cut OTR pieces. Come see this shredder in action—**the ECO Green Giant is always hungry for tires!**

The ECO TDS (Tire-Derived Shreds) System Provides Quality Rubber Output for the Following Secondary Applications:

- **Fuel for Cement Kilns**
- **Fuel for Pulp and Paper Mills**
- **Fuel for Industrial and Utility Boilers**
- **Civil Engineering**
- **Clean-Cut TDS Chips for Further Processing**

Featuring Two High-Efficiency Electric Motors

Patent-Pending Blade Insert Design

The ECO Brain Control Panel

CUTTING EDGE INNOVATION IN TIRE RECYCLING

ECO GREEN EQUIPMENT

MADE IN USA

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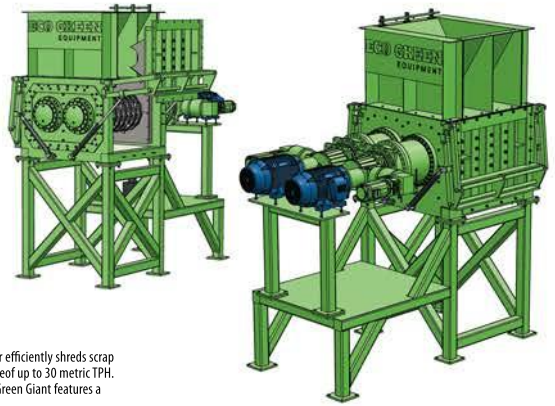
ECO Green Giant Specifications and Descriptions

Model Number ECO-TS-120-75-100-M



Item	Specifications
Input Material	Whole Tires up to 1220 mm (48"-inches) Chopped mining Tires (Debeaded) Off The Road (OTR) Tires (Debeaded) Rough Tire Shreds
Output Material	Rough Shreds (can produce chips down to 50 cm 2"-inches) with the addition of screening and recirculating equipment
Max Capacity	Up to 30 metric TPH
Shredder Power	150 kW (200 HP)
Shredder Weight	24,000 kg (52,800 lbs.)
Shredder Dims LxWxH	4,340 x 2,570 x 4,664 mm (14' 3" x 8' 5" x 15' 3" ft)
Number of Shafts	2
Number of Fly Knife Inserts	384 (24 per blade)
Description	ECO Green's Green Giant series Two-Shaft Primary Shredder efficiently shreds scrap tires into uniform rough shreds from 2"- 6"-inches at a rateof up to 30 metric TPH. Powered by two 75 kW (100 HP) electric motors, the ECO Green Giant features a 1209 x 1524 mm (48" x 60"-inch) cutting chamber.

ECO TDS TS-30-RS System Specifications and Descriptions

Model Number ECO TS-30-RS System

Item	Specifications
Input Material	Whole Tires up to 1220 mm (48"-inches) Chopped mining Tires (Debeaded) Off The Road (OTR) Tires (Debeaded) Rough Tire Shreds
Output Material	Rough Tire Shreds
Max Capacity	Up to 30 metric TPH
System Power	Standard is 165 kW (220 HP)
System Dimensions LxWxH	16,772 x 5,000 x 5,089 mm (55' x 16' 7" x 16' 8" ft)
Estimated Shipping Loads	2 to 4
Description	ECO Green's TDS TS-30-RS Rough Shred System efficiently shreds whole tires into rough shreds from 2"- 6"-inches. Powered by a 150 kW (200 HP) electric motor, the ECO Green Giant Two-Shaft Primary Shredder is the main equipment with complementary conveyors in this system and shreds whole tires into rough shreds.

ECO TDS TS-30-RS System

Featuring the ECO Green Giant Two-Shaft Shredder

The ECO Green Giant Two-Shaft Shedder is the perfect primary shredder for downsizing large tires such as OTR, Super Singles, and agricultural tires. This electric-powered shredder system is the ideal solution for Tire-Derived Shreds for secondary rubber applications. **See an ECO Green Equipment Representative for more information.**

ECO TDS TS-15-150 System Specifications and Descriptions

Model Number ECO TS-15-150 System

Item	Specifications
Input Material	Whole Tires up to 1220 mm (48"-inches) Chopped mining Tires (Debeaded) Off The Road (OTR) Tires (Debeaded) Rough Tire Shreds
Output Material	Rough Tire Shreds
Max Capacity	Up to 15 metric TPH
System Power	Standard is 190 kW (254 HP)
System Dimensions LxWxH	21,901 x 10,637 x 5,464 mm (72' x 35' x 18' ft)
Estimated Shipping Loads	3 to 5
Description	ECO Green's TDS TS-15-150 Recirculation System efficiently shreds and screens whole tires into rough shreds from 2"- 6"-inches. Powered by a 150 kW (200 HP) ECO Green Giant, the system returns clean, uniform rough shreds with auxilary conveyors and connected screening equipment.

ECO TDS TS-15-150 System

Featuring the ECO Green Giant Two-Shaft Shredder

The ECO Green Giant Two-Shaft Shredder is a component of the TDS TS-15-150 System and produces clean rubber cuts with consistent sizing for TDS chip specifications. This recirculation system can screen and process up to 15 metric TPH of 2"- 6"-inch rough shreds. **See an ECO Green Equipment Representative for more information.**

The ECO Green Tire Recycling Systems

8 State-of-the-Art Integrated Systems

The ECO Grater features a revolutionary patent-pending design to reduce heat and operating costs in rubber processing!

Contact an ECO Green Equipment Representative for more information on this exciting shredding and steel separation technology!

Input: Tire Shreds smaller than 200 mm (8"-inch) minus.

Output: 38 - 16 mm (1.50" - 0.625"-inch) and wire-free rubber mulch/chips.

Output: Liberated Steel

Authorized ECO Green Equipment Distributor:

Call Now. Request a Free Quote:

USA +1-801-505-6841

ECO GREEN EQUIPMENT

USA

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Wire-Free Chip System / ECO Grater Secondary Shredder

The ECO Green Tire Recycling Systems

8 State-of-the-Art Integrated Systems

ECO GREEN EQUIPMENT

USA

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ECO GRATER

Secondary Tire Shredder

Wire-Free Chip System / ECO Grater Secondary Shredder

The ECO Grater is The Ultimate Machine for Wire and Rubber Separation for Scrap Tire Processing!

The ECO Grater and expanded Wire-free Chip System is the perfect solution for processors which demand clean wire-free rubber chips output for commercial applications.

Choose either a fully-configured system complete with accessory conveyors, auger, magnet, and screeners or a separate stand-alone ECO Grater Secondary Shredder with control panel.

- **NEW! Lower Maintenance and Energy Costs**
- **NEW! Improved Technology and Shredding Power using Patent-Pending Rotor and Blade Design**
- **Easy Adjustment and Replacement of Cutting Blades**
- **Quick Access Cutting Chamber Maintenance Doors**
- **Forged Steel Rotor, Enclosed Double-Row Spherical Bearings**
- **Input Capacity of up to 12 metric tons/hour!**
- **Product Output Size from 38 to 16 mm (1.50" - 0.625" -inch)**
- **Perfect Shredder and Module System for Clean Rubber Mulch!**
- **Financing Options for USA Clients**
- **Global Delivery options**

The ECO Wire-Free Chip System Provides Quality Clean Rubber Chip Output for the following Secondary Applications:

- **Landscape Mulch and Ground Cover**
- **Playground and Safety Shock Absorbtion Applications**
- **Training Courses/Safety Surfacing**
- **Animal and Pet Park Area Surfacing**
- **Landscape and Property Boarders**
- **Equestrian Products**
- **Various Indoor/Outdoor Construction Applications**

CUTTING EDGE INNOVATION IN TIRE RECYCLING

ECO GREEN EQUIPMENT

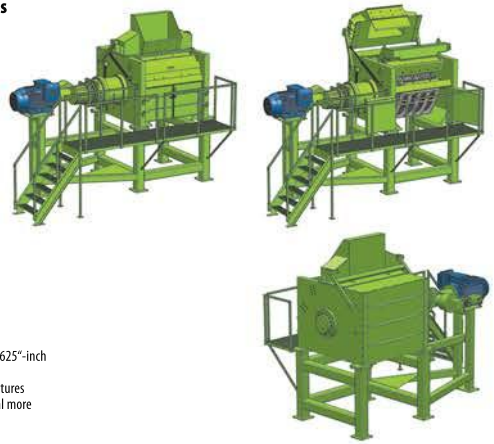
USA

ecogreenequipment.com

ECO Grater Secondary Shredder Specifications and Descriptions

Model Number ECO GR-101-109-250-M

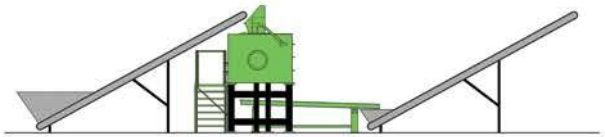
Item	Specifications
Input Material	Tire Shreds smaller than 200 mm (8" inches)
Output Material	Up to 99% Wire-Free Rubber Chips Liberated Steel
Max Capacity	Up to 12 metric TPH
Shredder Power	187 kW (250 HP)
Shredder Weight	19,000 kg (41,800 lbs.)
Shredder Dims LxWxH	5,260 x 3,040 x 3,884 mm (17' x 10' x 13' ft)
Number of Rotors	1
Number of Fly Knives	80
Number of Bed Knifes	34
Description	ECO Green's Grater series efficiently shreds tire shreds down to 0.625"-inch wire-free rubber chips at a rate of up to 12 metric TPH. Powered by a 187 kW (250 HP) electric motor, the ECO Grater features increased torque and power, yet slower RPM, which cuts material more efficiently while reducing heat during operation.



ECO Wire-Free Chip / Rubber Mulch System Specifications and Descriptions

Model Number ECO WC GR-12-38 System

Item	Specifications
Input Material	Tire Shreds smaller than 200 mm (8"-inches)
Output Material	Up to 99% Wire-free Rubber Chips Liberated Steel
Max Capacity	Up to 12 metric TPH
System Power	Standard is 208 kW (278 HP)
System Dimensions LxWxH	22156 x 6335 x 4219 mm (72' 9" x 20' 10" x 13' 10" ft)
Estimated Shipping Loads	2 to 4
Description	ECO Green's WC GR-12-38 Wire-Free Chip / Rubber Mulch System efficiently shreds tire shreds from 6" -inch minus into wire-free rubber chips. Powered by a 187 kW (250 HP) electric motor, the ECO Grater is the main equipment with complementary material conveyors, and steel separation equipment. The system produces clean, uniform rubber chips ouput from 38 -16 mm (1.50" - 0.625" -inches) in size.



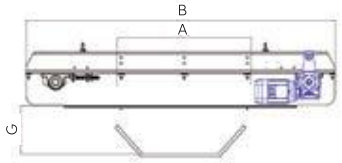
Featuring a High-Efficiency 250 HP Electric Motor

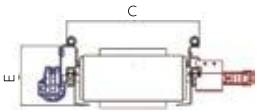
Ouput Rubber Chips for Landscaping Applications

The ECO Brain Control Panel

MODEL	TYPE	A	B	C	D		E	F	G	Approx Weight (kg)	
		Magnet Length (mm)	Total Length (mm)	Width Without Motor (mm)	Width With Motor (mm)		Depth (mm)	Belt Width (mm)	Max Operating Gap* (mm)	Single Pole	Twin Pole
					Electric Drive (D1)	Hydraulic Drive (D2)					
CORE 400S	B+	400	1150	462	800	885	218	350	150	250	X
CORE 600S	B+	600	1300	462	800	885	218	350	150	300	X
CORE 800S	B+	800	1450	462	800	885	218	350	150	350	X
CORE 600	D	600	1800	1000	1225	1410	407	750	300	700	850
	E		1800	1000	1225	1410	448	750	350	775	925
CORE 800	D	800	2000	1000	1225	1410	407	750	300	850	1000
	E		2000	1000	1225	1410	448	750	350	950	1125
CORE 1000	D	1000	2350	1000	1225	1410	407	750	300	1000	1175
	D+		2350	1000	1225	1410	407	750	325	1075	1275
	E		2450	1000	1225	1410	448	750	350	1125	1375
CORE 1200	D	1200	2350	1000	1225	1410	407	750	300	1075	1300
	D+		2350	1000	1225	1410	407	750	325	1175	1450
	E		2450	1000	1225	1410	448	750	350	1275	1575
CORE 1400	D	1400	2350	1000	1225	1410	407	750	300	1225	1500
	D+		2350	1000	1225	1410	407	750	325	1300	1625
	E		2450	1000	1225	1410	448	750	350	1425	1775
CORE 1500	D	1500	2800	1000	1225	1410	407	750	300	1400	1700
	D+		2800	1000	1225	1410	407	750	325	1475	1800
	E		2800	1000	1225	1410	448	750	350	1675	1925

CORE PERMANENT MAGNETS
SELF CLEANING OVERBAND TYPE





Suspended over the conveyor, the overband magnet is self-cleaning, collecting the ferrous metal on a continuous basis thus eliminating downtime and keeping production moving. These are available with either an electric or hydraulic drive.

OPTIONAL EXTRAS

- Suspension Chains
- Essential Spares Kit

Jiangyin Tianfu Technology Co., Ltd.

Jiangsu, China

Gold Member Since 2011 Audited Supplier Manufacturer/Factory

OEM/ODM Service Russian/Japanese Speaker Factory Tour






Push out Automatic Stainless Steel Scrap Compactor

Reference FOB Price:	**US $100,000-150,000 / Set**
Min. Order:	1 Set

Port:	Shanghai, China
Production Capacity:	50 Sets Per Month
Payment Terms:	L/C, T/T, D/P, Western Union, Paypal, Money Gram
Name:	Automatic Stainless Steel Scrap Compactor
Feed Box Size:	3000*2000*1200mm
Bale Size:	600*600mm
Power:	90kw
Quality Certification:	ISO; Ce; SGS
Warranty:	12 Months

Basic Info

Model NO.: Y81T-4000 Automatic Stainless Steel Compactor

Application: Press All Kinds of Metal Scrap to Be Bales

Operation Mode: Manual or PLC Operation

Cooling System: Water or Air Cooler

Color: Customer Decide

Trademark: TIANFU Automatic Stainless Steel Compactor

Transport Package: Nude Package

Specification: ISO 9001: 2008; CE; SGS

Origin: Jiangsu Prov. China

HS Code: 8462919000

Product Description

Product Description

1. Product Application
Item:Y81T-4000 Waste Recycle Automatic Stainless Steel Compactor

Automatic Stainless Steel Compactor is capable of extruding various metal leftover,steel paring,waste copper, aluminum, stainless steel and scrapped car into regular charging as square, column,cylinder etc. different shapes.

By this way, the costs of transportation and refining can be reduced. It also makes the transportation easier and faster.

Automatic Stainless Steel Compactor is mainly used in steel plants,recycling corporation,waste recovery and metal refining industry. Size of compression chamber and bale can be customized.
All machine modes adopt hydraulic driving. manual operation and PLC automatic control can be chosen.

2. Technical Parameters

Model	Main cylinder force (ton)	Feed box size (mm)	Bale size (mm)	Bale weight (kg)	Motor (kw)
Y81-1250	125	1200*700*600	300*300	50-70	15
Y81-1600A	160	1600*1000*700	350*350	100-180	22
Y81-1600B	160	1600*1200*800	400*400	100-200	30
Y81-2000A	200	1600*1200*800	400*400	120-220	37
Y81-2000B	200	1800*1400*800	450*450	180-350	44
Y81-2500A	250	1800*1200*800	400*400	200-400	44
Y81-2500B	250	2000*1400*900	500*500	200-450	44
Y81-2500C	250	2000*1750*1200	500*500	200-450	60
Y81-3150	315	2600*2000*1200	600*600	400-700	90
Y81-4000	400	3000*2000*1200	600*600	500-800	90

3. Main Features
1) Hydraulic drive,PLC or hand valve control
2) No need for foot screws
3) Integral design, no need to install
4) Pressing force ranges from 125T to 1000T.
5) We are factory with strict quality control.

4.Detailed Machine Parts:
1) Name: Guard Board
we use imported HARDOX NM500 wear plate on the gate and feed box.
make the machine stronger and more wear-resisting.
extend the machine service life
2) Name: High Pressure Hose Joint

abandon screw-type coupling, and adopt FAS sealing flange which has better sealability.
better anti-vibration
better resistance to leaking
3) Name: Blade
we use blades on the door sides and feed box sides.
The blades can cut the extra scrap when machine working, better to protect the machine.
4) Name: Water Cooler
every machine will equip a water cooler.
It can reduce the oil temperature, avoid too high oil temperature.

5.Youtube Link:
(welcome to visit our youtube channel)
https://www.youtube.com/channel/UCM-1umRJO2TvE1qep4UWyQg

6.FAQ
1) Are you a factory or trade company?
We are manufacturer with own factory for 15 years, export proportion 70~80%.
2) How can i trust your company?
a. With professional design and sales team, we can serve you the perfect solution with lowest cost.
b. Assessed by third party, national patents for all equipment, also CE, ISO.
c. Agents in RU, UKR,MYS,PH; Users around the world.
d. Welcome to inspect anytime. We are near to Shanghai airport.
e. About the machine, we do much better on:
Wear plates, seals, structure design, pressure head.
3) How about the test running & installation?
Before delivery, we finish the test over 3times.
If you take integral design, no need to installation at all. If parted design, we can send our technicians to your place if necessary.
4) Any warranty?
Under the proper usage, one year for whole machine except the wear parts.
5) Is your price competitive?
Only good quality machine we supply. Surely we will give you best factory price based on superior product and service.

Contact Detail:
Contact Person: Lara Li
Cell: 0086-15852668763
Tel: 0086-510-86010821

Welcome to contact us at any time
We will reply you within 24 hours

The ECO Green Tire Recycling Systems

8 State-of-the-art Integrated Systems

The ECO Crumbler produces up to 99.9% wire-free and fiber-free granuales with output sizes ranging from 16 - 4 mm (0.625" - 0.16" -inch). ECO Crumb Rubber Systems are available with output capacities from 1 to 4 tons per hour.

Featuring Hydraulic Access Doors

Custom Hydraulic Service Motor

Small Footprint Less Space Required

The ECO Brain Control Panel

Input: 38 mm (1.50"-inch) and smaller

Output: 16 - 4 mm (0.625" - 0.16"-inch) and smaller crumb rubber

Output: Liberated Fiber

Authorized ECO Green Equipment Distributor:

Call Now. Request a Free Quote:
USA +1-801-505-6841

ECO GREEN EQUIPMENT
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Crumb Rubber Systems / ECO Crumbler Granulator

The ECO Green Tire Recycling Systems

8 State-of-the-Art Integrated Systems

ECO GREEN EQUIPMENT
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ECO CRUMBLER

The Premier Granulator

Crumb Rubber Systems / ECO Crumbler Granulator

The ECO Crumbler Is The Center Of Production For Crumb Rubber Processing!

The ECO Crumbler with the expanded ECO Crumb Rubber Systems, is the perfect solution for scrap tire processors who demand clean crumb rubber output in commercial quantities.

Choose either a fully-configured system complete with accessory conveyors, augers, screeners and bagging station(s), or a separate ECO Crumbler granulator with control panel.

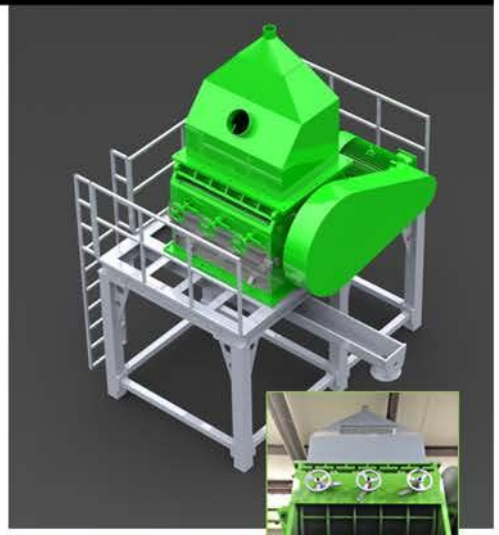
- **NEW! Two Newly Configured ECO Crumb Rubber Systems!**
- **NEW! Technology Lowers Maintenance and Saves Energy!**
- **Perfect Systems for Commercial Quantities of Crumb Rubber**
- **Input Capacity of up to 4 Metric Tons/Hour!**
- **Product Output Size from 16 to 4 mm (0.625" to 0.16"-inches)**
- **Financing Options for USA clients**
- **Global Delivery Options**

The ECO Crumbler is designed to cut rubber mulch from the ECO Grater into small granules. The granules are cut until sized properly for passage through the internal screen.

Each ECO Crumb Rubber System is uniquly designed with precise alignment and setup in order to provide a uniform cut and high-quality granule. During the granulation process, up to 99.9% of the fiber is removed, minimizing contamination.

ECO Crumb Rubber Systems Provide Quality Crumb Rubber Output for the following Secondary Applications:

- **Athletic Surfaces and Fields**
- **Equestrian Mats**
- **Molded and Extruded Products**
- **Porous Drainage Pipes**
- **Playground and Safety Surfaces**
- **Landscape, Trails and Walkways**
- **Various Indoor/Outdoor Construction Applications**
- **Rubber Reclaim and Devulcanization Applications**
- **Rubber Modified Asphalt and Sealants**



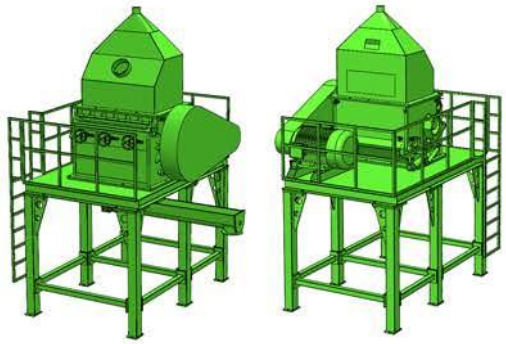
CUTTING EDGE INNOVATION IN TIRE RECYCLING

ECO GREEN EQUIPMENT

USA **ecogreenequipment.com**

ECO Crumbler Granulator Specifications and Descriptions

Model Number ECO-CB-120-80-125-M



Item	Specifications
Input Material	Wire-free Chips 38 mm (1.5" inches) and smaller
Output Material	Up to 99% Wire-free and Fiber-free Crumb Rubber Liberated Steel Liberated Fiber
Max Capacity	Up to 2 metric TPH
Granulator Power	90 kW (125 HP)
Granulator Weight	5,600 kg (12,346 lbs.)
Granulator Dims L x W x H	3,237 x 2,957 x 4,556 mm (10' 7" x 9' 8" x 14' 11" ft)
Number of Rotors	1
Number of Fly Knives	14
Number of Bed Knives	4
Description	ECO Green's Crumbler Granulator series efficiently processes wire-free and fiber-free rubber chips/mulch into uniform crumb rubber from 16 - 4 mm (0.625" - 0.16" inches) at a rate of up to 2 metric TPH. Powered by a 90 kW (125 HP) electric motor, the ECO Crumbler features an efficient yet powerful and proven processing design.

ECO Crumb Rubber System (ECO Crumbler) Specifications and Descriptions

Model Number ECO CR-CB-2-16 System

Item	Specifications
Input Material	Wire-free Rubber Chips 38 mm (1.5" inch) and smaller
Output Material	Up to 99% Wire-free and Fiber-free Crumb Rubber Liberated Fiber
Max Capacity	Up to 2 metric TPH
System Power	Standard is 174 kW (232 HP)
System Dimensions L x W x H	26,080 x 6,479 x 5,933 mm (85' 7" x 21' 4" x 19' 6" ft)
Estimated Shipping Loads	3 to 5
Description	ECO Green's CR-CB-2-6 Crumb Rubber System efficiently shreds and screens wire-free chips/mulch into crumb rubber from 16 - 4 mm (0.625" - 0.16" inch). Powered by a 90 kW (125 HP) ECO Crumbler, the system returns clean, uniform crumb rubber with auxilary conveyors and screening equipment.

ECO Crumb Rubber System (ECO Crumbler) Specifications and Descriptions

Model Number ECO CR-CB-4-16 System

Item	Specifications
Input Material	Wire-free Rubber Chips 38 mm (1.50"-inch) and smaller with no foreign material
Output Material	Up to 99% Wire-free and Fiber-free crumb rubber Liberated Fiber
Max Capacity	Up to 4 metric TPH
System Power	Standard is 275 kW (369 HP)
System Dimensions LxWxH	26,080 x 6,479 x 5,933 mm (85' 7" x 21' 4" x 19' 6" ft)
Estimated Shipping Loads	3 to 5
Description	ECO Green's CR-CB-4-16 Crumb Rubber System efficiently shreds and screens wire-free chips/mulch into crumb rubber from 16 - 4 mm (0.625" - 0.16"-inch). Powered by a 90 kW (125 HP) ECO Crumbler Granulator, the system returns clean, uniform crumb rubber with auxilary conveyors and screening equipment.

1-2 Kw Vibrating Table

Rs 55,000/Set

Shankar Engineering Corporation
Poddar Court, Kolkata, West Bengal

View Mobile Number

Response Rate: 96%
Nature of Business: Manufacturer
Delivery Location: All Over India

Product details:

Max Weight	200-400 kg, 400-800 kg
Power	1-2 kw
Table Dimension (mm X mm)	3000 x 900
Vibrating Range (Amplitude)	1-2 mm, 2-3 mm
Voltage (V)	440 volt
Automation Grade	Manual
Portable	Yes
Material	Iron
Automation	Manual
Block Type	Paver
Capacity (Blocks per hour)	1500-2000
Capacity (Bricks per Hour)	500-1000, 1000-1500, 1500-2000
Condition	New
Raw Material	Cement, Stone Dust, Stone Chips
Minimum Order Quantity	1 Set

Product description:

Consistent innovation, coupled with an alert understanding of customer's needs & demands, makes us the most famous manufacturer, exporter and supplier of **Vibrator Table**. This table is commonly used at the time of manufacturing paving blocks, kerb stones and tiles. It is manufactured in strict compliance with the most stringent industry quality standards and has durable finish standards and sturdy construction. Keeping in mind the different

Recently Viewed: Vibrating Tables

- Automatic Vibrator rubber Mould Moving and Vibrating
- Production Capacity: 2500 to 3000 pcs
- Machine Size: 3 ft. x 10 ft
- Motor Capacity: 2 HP (Heavy Duty)

Fact sheet

Year of Establishment
1983
Legal Status of Firm
Proprietorship Firm
Nature of Business
Manufacturer
Number of Employees
11 to 25 People
Annual Turnover
Rs. 2 - 5 Crore
IndiaMART Member Since
Nov 2013

Statutory details

Permanent Account Number (PAN)
ADNPG*****

Contact us

Shankar Engineering Corporation

18, Rabindra Sarani, Poddar Court, Gate No. 2
Poddar Court
Kolkata - 700001 West Bengal, India

Pratik Garg

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About us

Shankar Engineering Corporation has emerged as the top notch company for Food Processing Machinery and Equipments supply in the industry. Since our inception in **1983**, we have continued to rise as the leading brand name, setting standards as a role model for other rising companies. Based in **Burdwan & Kolkata, West Bengal**, we have gained reputation as the chief **Manufacturer, Exporter, Supplier and Trader** of a vast range of Roller Flour Mills, Atta Chaki Plants, Puffed Rice Roasters, Poha Plants, Besan Plants, Sattu Plants, Oil Mills, Spices Plants, Rice Mills, Bakery Equipments, Paking Machines, Machine Tools, Metal Mechanical Machines, Food Processing Machines, Rice Parboiling & Rice Drier Plants, Oil Expeller Machines, Pulveriser Machines, Rice Mill Machines, Mill Machines, Wood Working Machines, Workshop Machines, Electric Motors and many more products that all have sub-ranges. Being a quality conscious-firm, we supply best in line products available in the market. We believe in serving our clients with our best efforts and diligence, who have in turn, laid their invaluable trust and faith upon our brand since our establishment.

For more details, contact **Shankar Engineering Corporation**

Email ID

Full Name

Product Name

1-2 Kw Vibrating Table

Contact Supplier

Explore more products from this supplier

View more brick making machines >

Paver Tiles Making Machine

Get Latest Price

Rs 55,000/Set

Pulping Machine

Get Latest Price

Rs 30,000/Piece

Puffed Rice Machine

Get Latest Price

Rs 75,000/Set

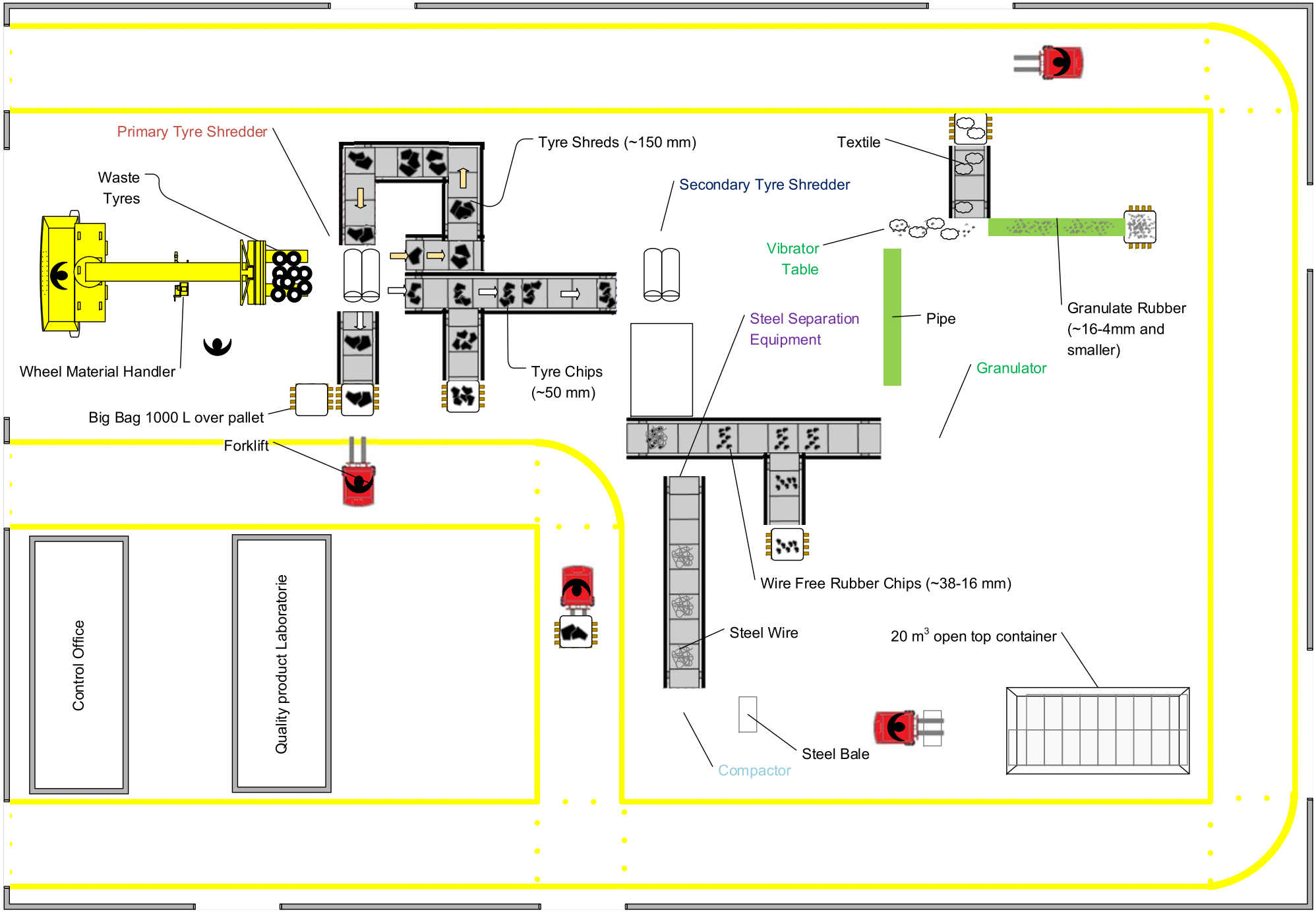
Rice Puffing Machine

Get Latest Price

Rs 1.15 Lakh/Set

Annex XIV

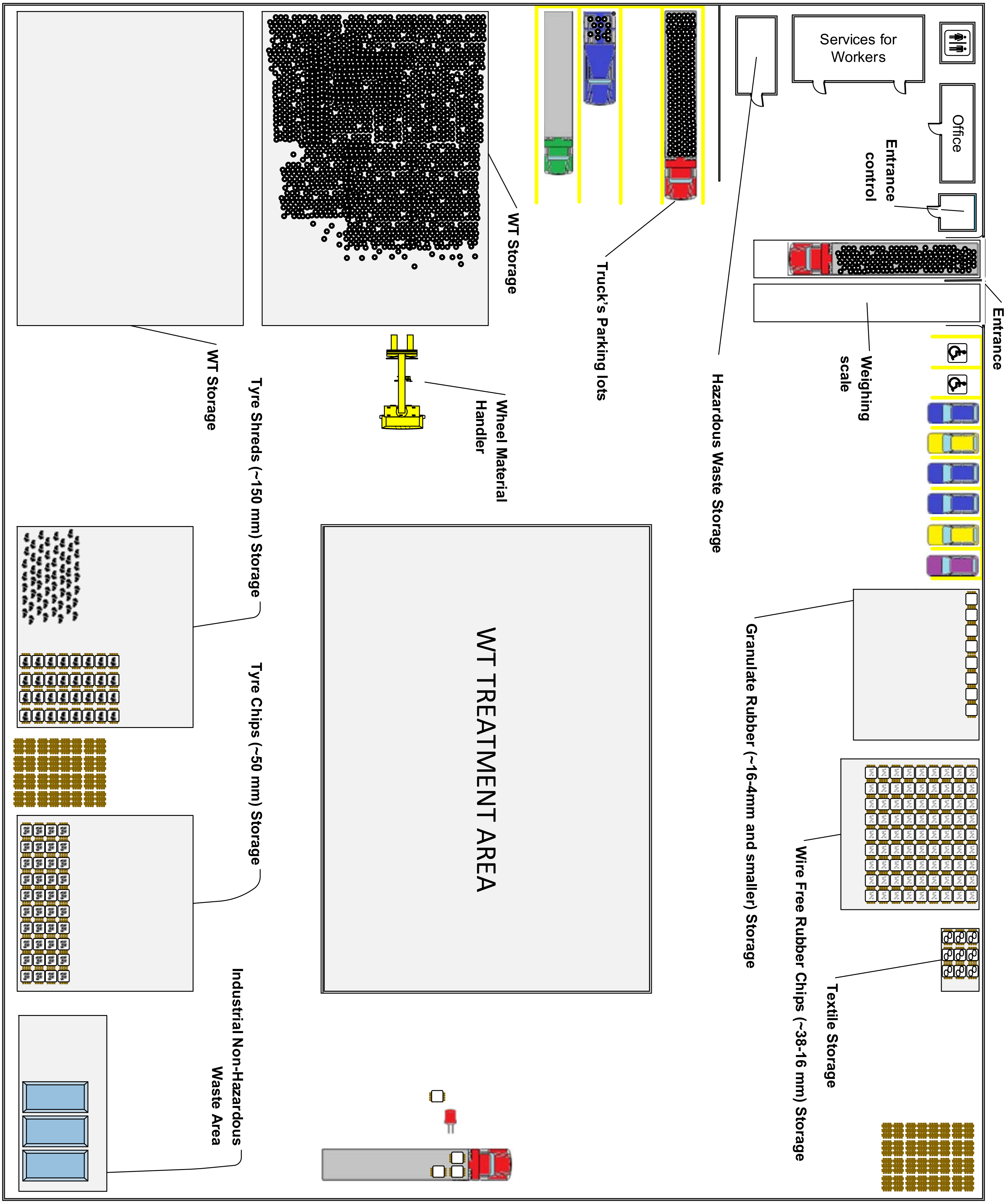
WT Treatment plant schematic layouts: Inside plant and Outside plant (own elaboration with Microsoft Visio Professional 2013).



SCHEMATIC LAYOUT – *INSIDE* PLANT

SCALE: 1 : 100

MASTER'S FINAL PROJECT: A PROPOSAL FOR A WASTE TYRE TREATMENT PLANT AND ITS ENVIRONMENTAL IMPACT ASSESMENT



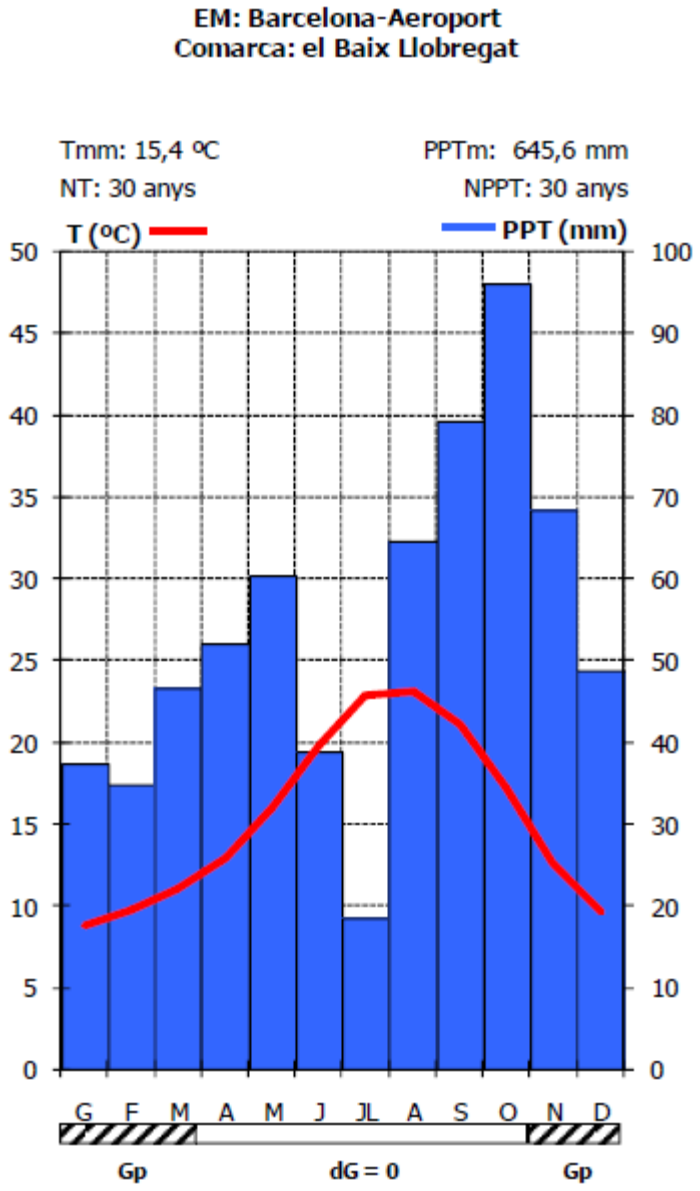
SCHEMATIC LAYOUT – *OUTSIDE* PLANT

SCALE: 1 : 275

MASTER'S FINAL PROJECT: A PROPOSAL FOR A WASTE TYRE TREATMENT PLANT AND ITS ENVIRONMENTAL IMPACT ASSESMENT

Annex XV

Temperature and rainfall annual data of Baix Llobregat region. Average data between 1961 and 1990 (Servei Meteorologic de Catalunya, 2018)



Annex XVI

Values assigned to the characteristics of the effect according to Conesa's methodology. (adapted from Conesa, 2010)

Attribute	Gradation	Value
Sign	Beneficial impact	+
	Harmful impact	-
Intensity	Low	1
	Medium	2
	High	4
	Very High	8
	Total	12
Extension (EX)	Punctual	1
	Partial	2
	Broad or Extensive	4
	Total	8
	Critical	(+4)
Moment (MO)	Long term	1
	Medium term	2
	Short term	3
	Immediately	4
	Critical	(+4)
Persistence (PE)	Fleeting or ephemeral	1
	Momentary	1
	Temporary or Transitory	2
	Persistent	3
	Permanent and Constant	4
Reversibility	Short term	1
	Medium term	2
	Long term	3
	Irreversible	4

Attribute	Gradation	Value
Sinergy (SI)	Without Synergism (Simple)	1
	Moderate Synergism	2
	Very synergistic	4
Accumulation (AC)	Simple	1
	Accumulative	4
Effect (EF)	Indirect or Secondary	1
	Direct or Primary	4
Periodicity (PR)	Irregular	1
	Intermittent Regularity	2
	Continuous	4
Recoverability (MC)	Immediately	1
	Short term	2
	Medium term	3
	Long term	4
	Mitigable, replaceable and compensable	4
	Irrecoverable	8

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