



Recycling of Nespresso capsules in Catalonia: Final report



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1. Legal framework

1.1. European framework on waste management

The new Waste Framework Directive (2008/98/EC or DMR) was published in June 2008, signifying the biggest change in waste management in Europe in recent years: it incorporated for the first time the concept of waste prevention in a legal text and offered the possibility to study the need to establish prevention targets by 2014. The Directive also determined a minimum recovery of 50% of all paper, glass, plastic and metals from municipal waste and 70% for construction waste, and both goals were to be met by 2020.

Besides this document, the only piece of European legislation that deals with packaging and similar products is the Packaging Directive.

1.1.1. Packaging Directive 94/62/CE

This Directive aims to harmonise national measures in order to prevent or reduce the impact of packaging and packaging waste on the environment and to ensure the functioning of the internal market. It contains provisions on the prevention of packaging waste, the re-use of packaging and the recovery and recycling of packaging waste.

According to the Directive, Member States were to introduce systems for the return and/or collection of used packaging to attain the following targets:

- by no later than 31 December 2008, at least 60 % by weight of packaging waste to be recovered or incinerated at waste incineration plants with energy recovery;
- by no later than 31 December 2008, between 55 and 80 % by weight of packaging waste to be recycled;
- no later than 31 December 2008 the following targets for materials contained in packaging waste must be attained:
 - 60 % for glass, paper and board;
 - 50 % for metals;
 - 22.5 % for plastics and;
 - 15 % for wood.

Amendment proposal

The Article 3 (1) of the Directive 94/62/EC on packaging and packaging waste provides a generic definition of packaging and criteria for interpretation of what is packaging and what is not. For reasons of legal certainty and harmonisation of the interpretation of the definition of 'packaging', the Commission considers it necessary to review and amend the list of illustrative examples. With this proposal, "**Beverage system capsules** (e.g. coffee, cacao, milk) which are left empty after use" are **explicitly considered as non-packaging** and submitted as an amendment draft item.

The updated status of the amendment proposal can be tracked here:

http://ec.europa.eu/prelex/detail_dossier_real.cfm?CL=en&DossierId=201468

This legal definition is deemed as a barrier to including Nespresso capsules in the existing extended producer responsibility schemes.

1.2. Spanish framework on waste management

1.2.1. Spanish Waste Act

By means of Act 22/2011, of July 28, on Waste and Polluted Soils¹ (LRSC in its Spanish acronym) the Directive 2008/98/CE is transposed into the Spanish legal framework and the legal framework on waste, established in Spain more than 10 years ago, is updated.

Its purpose is to regulate the management of waste, promoting the appropriate measures to prevent its generation, and to mitigate adverse impacts on human health and the environment, as well as to standardise the legal framework applicable to contaminated soils.

It contains the polluter pays principle, under which the costs generated by the management of a certain type of waste shall be charged to the first producer of said waste, be them the previous or current holder. But, on the other hand, it introduces the legal definition of the extended liability of waste producers in order to support prevention and improve the reuse of waste. This could be applied to Nespresso capsules.

Recycling targets

By 2015 a separate collection system shall be implemented for, at least, paper/cardboard, metal, plastic and glass. Existing systems shall be adapted to the collection of the above-mentioned materials.

When it comes to recycling targets, the Waste Act sets that by 2020 the amount of household and commercial waste prepared for reuse or sent to recycling shall be of at least 50% by weight altogether for paper, metals, glass, plastic, biowaste or other recyclable fractions.

The fact that the Spanish law speaks about materials, not products, could give leverage for the introduction of products like Nespresso capsules into existing collection systems.

1.2.2. Waste Packaging Act and Royal Decree

Legislation on packaging and packaging waste was established in Spain with Act 11/1997, of April 24, on Packaging and Packaging Waste², subsequently developed by Royal Decree 782/1998, of April 30, by virtue of which the Regulation for the Development and Enforcement of Act 11/1997, of April 24, on Packaging and Packaging Waste³ is adopted.

Both legal texts are governed by a philosophy in line with Directive 94/62/CE and aim at reducing generation of packaging waste through a combination of source reduction, recycling and recovery of packaging waste.

Royal Decree 782/1998 develops in detail the so-called 'dual system' for packaging and packaging waste management. This system offers two alternative management systems:

- **Deposit System (SDDR)**

This system implies an obligation on fillers and traders to charge a fee to their clients down to the end consumer and to accept the return of commercialised used packages with the subsequent obligation to refund the amount previously charged.

- **Integrated Management System (IMS)**

The adhesion of economic operators to an IMS enables them to place products in the market, being exempted from doing so through a SDDR system.

Ecoembalajes España (known as Ecoembes) is the representative of the green dot scheme in Spain and is nowadays the only organisation licensed to represent “green dot” in Spain.

The IMS is usually implemented through cooperation agreements with local entities and autonomous communities according to which the latter will provide collection services for

1 http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-2011-13046

2 http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-1997-8875

3 http://www.boe.es/aeboe/consultas/bases_datos/doc.php?id=BOE-A-1998-10214

packaging materials in exchange for an economic compensation for their service of selective collection. The SIG will be financed by contributions established for each packaged product placed in the market.

In line with the Packaging Directive revision of 2004, Spain introduced the following targets:

- by no later than 31 December 2008, at least 60 % by weight of packaging waste to be recovered or incinerated at waste incineration plants with energy recovery;
- by no later than 31 December 2008, between 55 and 80 % by weight of packaging waste to be recycled;
- no later than 31 December 2008 the following targets for materials contained in packaging waste must be attained:
 - 60 % for glass, paper and board;
 - 50 % for metals;
 - 22.5 % for plastics and;
 - 15 % for wood.

As specified in Article 2 of this act, supporting elements that are part of the product and are intended to be consumed or disposed of together shall not be considered packaging.

A more specific explanation is given in the Annex 1 of the Royal Decree 782/1998, that states that some wrappers should not be treated as containers: teabags, wax layers used as cheese wrapping, sausage or cold meat skins... Nespresso capsules should be included in this category.

2. Waste management in Spain

2.1. Administrations involved

When it comes to waste management, Spain is also a highly decentralised country with different powers distributed among central, regional and local authorities.

- National level: the Ministry of the Environment (Magrama) develops the national plans and tends to the authorisation and inspection of waste to/from EU countries.
- Regional level: Autonomous Communities can pass laws and develop waste management plans. They also have the power to conduct the authorisation, inspection and sanction of waste production and management activities.
- Local level: municipal authorities manage urban waste (including domestic, industrial and commercial waste).

2.1.1. Central government

The central Government, represented by the Ministry of Agriculture, Food and the Environment (*Ministerio de Agricultura, Alimentación y Medio Ambiente* [Magrama]) is the national policy maker and the one responsible for reporting to the EU.

The central Government, by integrating the different regional waste plans, develops several waste management plans that will set specific targets for the reduction, reuse, recycling, recovery and disposal of waste, as well as the measures to achieve these objectives.

The central Government is also the administration responsible for the transposition of European Legislation into basic legislation.

2.1.2. Autonomous Communities

Most Autonomous Communities have defined laws and waste management plans. Waste prevention has not been commonly addressed within these plans. Autonomous communities can extend basic legislation provided by the central government, whether it is a transposition of the European

Legislation or not.

2.1.3. Local administration

Local administration adapts national waste management policies to their local characteristics and are in charge of implementing and carrying out the collection of waste.

This management has to be in line with the existing legal framework set by the central government, the autonomous communities and the sectoral legislation on extended producer responsibility. Local authorities may develop their own plans for urban waste management and prevention and pass ordinances on how waste has to be managed by its owners.

2.2. Other stakeholders

2.2.1. Ecoembes

Ecoembalajes España, SA (Ecoembes) is a non-profit public limited company, whose main goal is the design and organisation of an Integrated Management System (IMS), aimed at the collection and recovery of used packaging and packaging waste for their subsequent treatment, recycling and recovery.

It was set up in 1996 and remains today the sole company in Spain to organise a packaging recycling system. More than 12,100 companies have joined this EPR scheme and its shareholders include 57 companies and business associations from all sectors involved in the management of packaging, from manufacturers and fillers to distributors, retailers and recyclers. More than 300,000 yellow bins are found in the streets of Spanish towns and cities.

As manager of the Integrated Management System for the selective recovery of packaging waste and paper/cardboard, Ecoembes signs agreements with the Autonomous Communities and local Administrations (municipalities, consortia, associations...) in order to pay the extra cost they face as a result of collecting packages separately, rather than using traditional mixed waste collection, as set in the Packaging Act. Currently Ecoembes holds agreements with virtually every local authority in Spain, thus providing collection services to about 46 million inhabitants. The number of framework agreements is 13 and the number of collaboration agreements is 107⁴.

Ecoembes does not own any sorting plants, but the sorted material. Hence it conducts public tenders for each material type sorted in the plants.

a) Green dot prices

Fillers/producers/importers willing to become members of Ecoembes have to sign a “membership contract” and submit an annual “packaging declaration” with regards to the packaging placed on the Spanish market, from which the contribution to the IMS will be settled.

The contribution will depend on the kind of packaging material and weight, therefore two containers with the same weight do not necessarily contribute with the same amount. Any container within the system must bear the Green Dot as a sign that it belongs to this system.

Ecoembes uses these contributions to finance the extra-cost that the selective collection, transport, classification and subsequent recycling and recovery of packaging waste means to the local authorities. Ecoembes states that the rates are calculated to cover the cost of collecting packaging waste separately and are updated in order to serve an increasing population with a selective collection system.

⁴ Ecoembes, 2012. An updated list of the agreements can be consulted on the Ecoembes website: <http://www.ecoembes.com/es/gestion-del-envase/Recogida-del-Envase/Paginas/mapa-de-acuerdos.aspx>

Rates for different types of packaging material can be checked at:

<http://www.ecoembes.com/en/gestion-de-empresas-adheridas/Pages/tarifas-del-punto-verde.aspx>

With the money collected Ecoembes helps autonomous communities and municipalities by financing the extra cost that arises from the separate collection of packaging. Industry and municipalities share responsibility, the industry covers the costs for sorting and recycling. Moreover, municipalities are in charge of the separate collection and their costs are (completely or partially) reimbursed.

2.2.2. Recyclers

In order to obtain material coming from the sorting plants, recyclers must meet certain technical, economic and environmental requirements to ensure the environmentally-sound treatment of packaging waste. Hence all recyclers choosing materials must be properly licensed and audited by an independent auditing company. Conditions for recyclers are described here: <http://www.ecoembes.com/en/gestion-del-envase/reciclaje-del-envase/caracterizacionycontrol/Pages/caraterizacion-y-control.aspx>

2.2.3. Asociación para el Reciclado de Productos de Aluminio (ARPAL)

ARPAL is a Spanish non-profit association created in 1994 whose mission is to promote initiatives and activities to foster the habit of collecting and recycling aluminium products, with a view to contributing to the conservation of the environment and natural resources through the effective implementation of a recycling culture.

The activities of the association aim towards the promotion of aluminium on the basis of a separate collection of packaging and other aluminium products in order to reduce their volume and to help to save energy, extending and developing the concept of “Aluminium for Future Generations”.

ARPAL could be an ally when it comes to persuade Ecoembes to introduce Nespresso capsules into the green dot system.

2.2.4. Asplarsem

The Municipal Packaging Recovery and Sorting Plant Association (ASPLARSEM) was set up in 2003 and comprises 22 plants throughout Spain. The main objective of the association is a technical one, focusing on sharing experiences and knowledge to improve the operation of the plant, its economic balance and the rate of recycling and recovery. Nevertheless, they tend to have political opinions when it comes to assessing waste policies.

A list of the Asplarsem sorting plants can be found in Annex IV.

2.3. Selective collection in Spain

2.3.1. Description of the basic model of selective collection

Different models of waste management coexist in Spain. A management model is defined through the types of waste collected, a combination of collection systems and the subsequent processing of the different fractions collected.

a) Separation

According to the model of separation (i.e. by number and type of fractions separated at source by the user), we can find six different models of waste separation in Spain:

- 5 fractions (especially in Catalonia): paper/cardboard, glass, packaging, biowaste and mixed waste.
- 4 fractions: paper/cardboard, glass, packaging and mixed waste.
- 4 fractions + green waste: paper/cardboard, glass, packaging and mixed waste. It includes also green waste collection (e.g. pruning).
- 3 fractions: it is a residual model that does not include the separation of packaging waste.
- wet / dry separation: paper/cardboard, glass, biowaste and mixed waste. Packages are collected together with mixed waste.
- Multimaterial: paper/cardboard are collected together with lightweight packaging. Other waste bins include glass, biowaste and mixed waste.

These collections are complemented by other major collections of specific waste streams: bulky waste, batteries, textiles, oils or other, such as those that can be collected in compacting containers in certain tourist locations.

In addition, some municipalities offer HRWC services, which sometimes include coffee capsules collection.

Household Waste Recycling Centres (HWRC)

Householders can use HWRC⁵ to recycle and dispose of their household waste that falls out of the scope of collection services. These facilities are to be used primarily by individuals and small businesses.

Fractions normally accepted include:

- **Recyclable waste:** non-packaging plastic, scrap, ferrous and non ferrous metals, plugs, glass, pruning and gardening waste, wood, cooking oil, tyres... Usually packages are also accepted (glass, paper/cardboard and lightweight packaging). In recent years some of these facilities (especially in Catalonia) also accept single-dose coffee capsules (plastic and aluminium, etc.)
- **Waste that is reusable or subject to preparation for reuse:** champagne bottles, clothes, shoes, furniture, large appliances, electrical and electronic equipment, ink cartridges, toners, etc.
- **Hazardous waste:** motor oils, aerosols and sprays, solvents, paints and varnishes, car batteries, X-rays, batteries, fluorescent bulbs, refrigerators containing CFCs, etc.

2.3.2. Package sorting plant

Package sorting facilities separate mixed lightweight material by a number of mechanical separation processes or automated and manual processes in order to recover valuable fractions. The materials that are not separated are sent to incineration or a landfill, depending on the plant. The depiction of a generic mass flow in a sorting plant can be found in Annex V.

2.4. Waste recycling figures

Spanish waste management statistics are far from being reliable, as figures reported by Spain are based on a range of data sources, often including sales data, and frequently based on data provided by the companies who are required to comply with certain obligations under the producer's responsibility.

According to 2009 figures, metal recycling rates account for around 21% of total metal waste. This figure is far from the 50% target for 2020 that is set in the WFD.

⁵ HWRC have different names in Spain, "punto limpio" being the most extended. Nevertheless, they are also known as "deixalleria" (Catalonia and Balearic Islands), "ecoparc" (Valencia), "garbigune" (Basque Country and Navarre).

The only source for aluminium recycling coming from municipal waste in Spain are the figures provided by Arpal⁶ in its yearly report. These figures show that there are four sources for aluminium waste recycling.

The main one is aluminium from *traditional recyclers*. Although it is the main source, Arpal does not give any description of who these recyclers are or where they get their material from. The total amount (114 tonnes in 2011) includes Nespresso capsules.

The second source is *complementary collection*. It is also unclear what this flow is exactly, but the report states that it includes aluminium coming from incineration plants (incineration slag). The slag from these plants is usually separated by eddy currents and aluminium is sent to recyclers.

The third source is aluminium from sorting facilities (i.e. aluminium dropped in the yellow container and separated in the sorting plants).

The fourth source are MBT plants where mixed municipal waste is sorted in order to separate valuable materials, amongst which, aluminium.

Origin	ton	
Selection plants	3,899	25.83%
MBT plants	3,423	22.68%
Complementary collection	3,829	25.37%
Traditional recoverers	3,941	26.11%
Total recycling	15,092	100.00%

Table 1: Sources for aluminium recovery

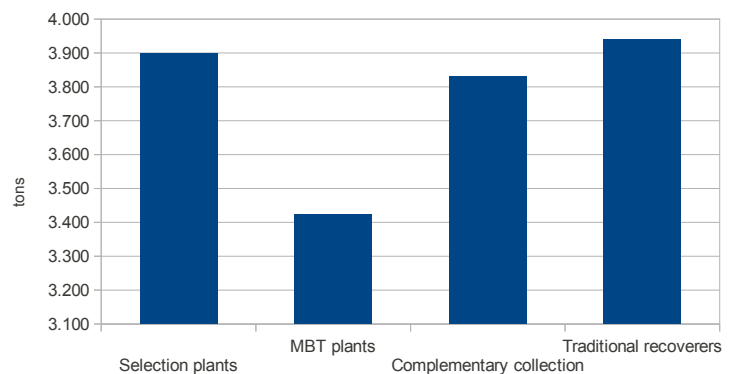


Figure 1: Sources for aluminium recovery

3. Characterisation of waste streams

3.1. Assessment of existing characterisations

The only characterisation of waste that we have been able to gain access to –and provides enough detailed information– has been provided confidentially by a sorting plant in the metropolitan area. In order to protect our sources, we will not disclose the name of the source, because the characterisation was conducted by Ecoembes and the information is not in the public domain.

⁶ For a description of Arpal, please see page 7.

3.1.1. Aluminium sent to disposal

The characterisation data provided by the plant show the following results:

	Amount analysed (kg)	Aluminium (kg)		Non-aluminium (kg)
		Packaging	Non packaging	Coffee capsules
Data set 1	151.6	0.40	0.20	0.33
Data set 2	146.75	0.76		0.37
Data set 3	151	0.84	0.09	7.00
Total	449.35	2.00	0.29	7.70
%		0.445%	0.065%	1.714%

Table 2: Aluminium sent to disposal (refuse) in 2011

	input	output	refuse
2011 material flow	16.946.878	10.468.240	6.478.638

Table 3: Material flow in the Gavà-Viladecans plant (2011)

Accepting this as the average flow of materials currently sent to disposal, we would expect a yearly material loss as follows:

- 28.83 tons of aluminium packaging
- 4.1 tons of aluminium non-packaging
- 111 tons of coffee capsules (non aluminium)

Assuming a market price for recovered aluminium of 600 €/ton (the average price Ecoembes was getting from the sale of aluminium packaging at the time of the study⁷), the nearly 33 tons of aluminium that are sent to disposal every year would have a value of **19,800 euro**. Almost all of this aluminium is packaging that is lost by technological inefficiencies. Only 12% is non packaging of unknown origin.

After discussing this figures with officers of the Catalan Waste Agency and plant managers, their conclusion was that investing in an eddy current system to capture aluminium from the refuse stream is not worth it. Such an investment would have a cost of 100,000 € to buy the machinery, plus 100,000 € for the installation. Maintenance should also be added to the bill.

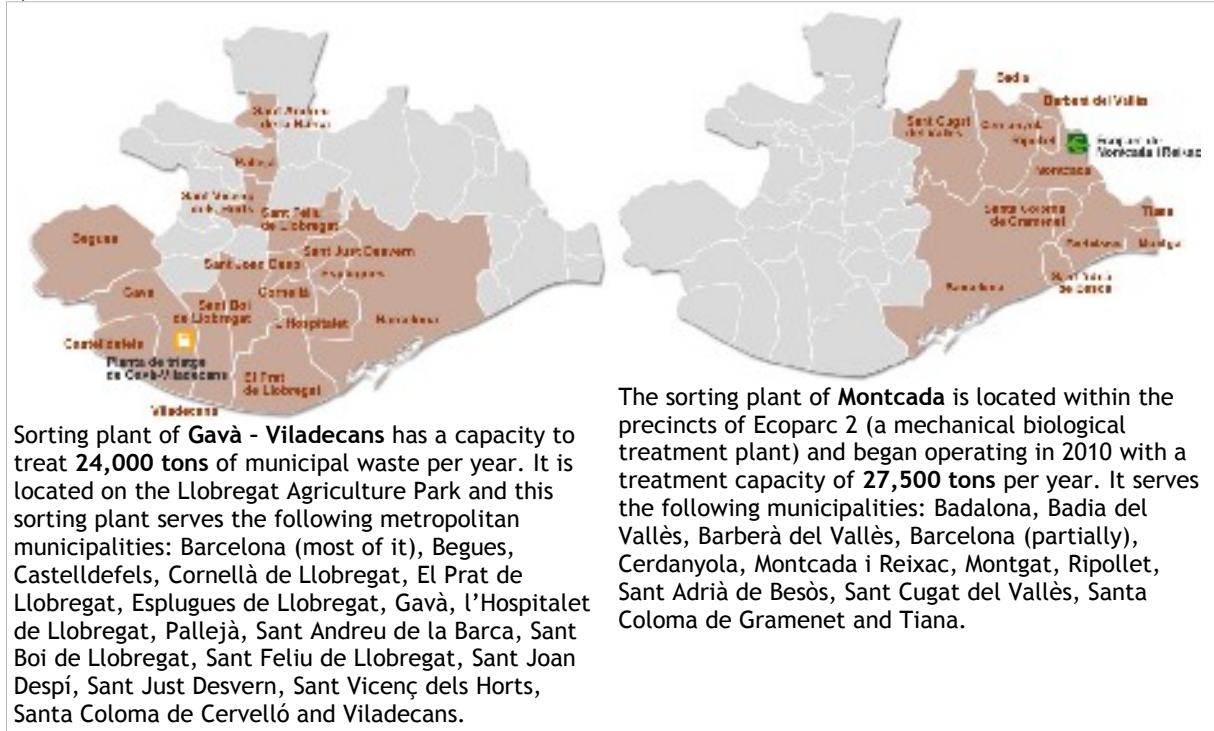
⁷ Current price can be updated at <http://www.ecoembes.com/es/gestion-del-envase/reciclaje-del-envase/resultados-de-adjudicaciones/Paginas/resultado-de-adjudicaciones-de-ofertas.aspx>

3.2. Ad-hoc characterisation of refusal stream of a sorting plant

On the first week of October, a series of 5 characterisations in two different sorting plants were conducted.

The aim of these characterisations was to determine whether it is economically viable to install an eddy current system to recycle capsules that go to the yellow container.

The characterisations were carried out by SM Sistemas Medioambientales⁸ at the two package sorting plants in the Metropolitan Area of Barcelona: Gavà (Gavà-Viladecans) and Montcada (Ecoparc 2).



Sorting plant of **Gavà - Viladecans** has a capacity to treat **24,000 tons** of municipal waste per year. It is located on the Llobregat Agriculture Park and this sorting plant serves the following metropolitan municipalities: Barcelona (most of it), Begues, Castelldefels, Cornellà de Llobregat, El Prat de Llobregat, Esplugues de Llobregat, Gavà, l’Hospitalet de Llobregat, Pallejà, Sant Andreu de la Barca, Sant Boi de Llobregat, Sant Feliu de Llobregat, Sant Joan Despí, Sant Just Desvern, Sant Vicenç dels Horts, Santa Coloma de Cervelló and Viladecans.

The sorting plant of **Montcada** is located within the precincts of Ecoparc 2 (a mechanical biological treatment plant) and began operating in 2010 with a treatment capacity of **27,500 tons** per year. It serves the following municipalities: Badalona, Badia del Vallès, Barberà del Vallès, Barcelona (partially), Cerdanyola, Montcada i Reixac, Montgat, Ripollet, Sant Adrià de Besòs, Sant Cugat del Vallès, Santa Coloma de Gramenet and Tiana.

For each plant, waste from two of the outgoing flows of the ballistic separator were analysed:

- Refuse from the rolling packaging sorting line,
- Refuse from the flat packaging sorting line.

According to the sorting plant supervisors, the main capsule flow is found among the fine materials that fall from the ballistic separator, which has not been analysed yet.

The characterisation plan was as follows:

	Rolling materials			Flat materials			Thin materials		
	02/10	03/10	04/10	02/10	03/10	04/10	24/10	25/10	26/10
Gavà-Viladecans	X	X		X	X	X		X	X
Montcada	X	X	X	X	X		X		X

⁸ Jordi Abad, Technical director (tel.: +34 93 285 70 82).

3.2.1. Methodology

The results for each characterisation –as well as the images– can be found in the Annex II.

In order to estimate the Nespresso capsules that are lost in the selection process the calculation is made as follows:

The annual flow of the plant refusal (Table 4) was found .

	Mixed input	Selected output	refusal		
			thin	rolling	flat
Montcada	15.545.883	9.472.300	1.243.671	1.554.588	1.554.588
Gavà-Viladecans	16.946.878	10.468.240	0	1.896.217	3.521.546

Table 4: Material flows in analyzed sorting plants. Source: Ecoembes 2011 report.

Then the different flows were multiplied by the the net percentage of Nespresso capsules (Table 5) found during the characterisations.

Nespresso capsules (net annual weight)	Gavà	Montcada
from flat refusal	0,0051%	0,0192%
from rolling refusal	0,1954%	0,0032%
from thin refusal		0,2346%
total	0,0717%	0,0750%

Table 5: percentage of Nespresso capsules in refusal flows

This yields the annual gross weight of capsules of the Table 6.

Net aluminium from Nespresso capsules (kg)	Gavà	Montcada
from flat refusal	178	50
from rolling refusal	3.705	298
from thin refusal		2.918
total	3.883	3.266

Table 6: Nespresso capsules processed and sent to refusal

3.2.2. Main findings

- *Nespresso capsules are found in yellow containers:*

Although there has never been a campaign asking population to throw their used capsules into the yellow container, this seems to be a common practice. In the Montcada plant, 0,075% of the refuse are Nespresso capsules and in Gavà this accounts for 0,0717%. Some capsules should be also captured in the recycled materials flow, but assessing this is beyond the scope of this report.

The collection rate of total capsules sold in the metropolitan area of Barcelona that this amount indicates is unknown because figures of consumption are not available. Thus it impossible to assess the impact of an official campaign to convince consumers to drop their used capsules in the yellow container.

- *Montcada's refuse shows less aluminium-rich material than Gavà-Viladecans:*

Material from the refuse flow of the Montcada sorting plant shows less metal-containing products than the one in Gavà-Viladecans. A feasible explanation is that Montcada is a far more modern plant than Gavà-Viladecans. The latter will undergo a complete refurbishing in 2013. According to the plant manager, "separate collection figures will be higher than the current ones in Montcada".

Aluminium content	Gavà	Montcada
Of flat refuse	1.18%	0.29%
Of rolling refuse	0.00%	1.90%
Of thin refuse	3.40%	2.74%
Of total refuse	1.96%	1.56%

Table 7: Aluminium products found in refuse flows of sorting plants

- *Nespresso capsules are only a small part of aluminium products lost among the general refuse fraction:*

Nespresso capsules account for less than 5% of the total aluminium lost in the sorting plants. Most of the lost aluminium is foil and cans. Other non-packaging aluminium materials are also important.

	rolling	flat	thin	total
Beverage caps	0.25%	0.00%	0.06%	0.14%
Crown corks	0.00%	0.00%	0.00%	0.00%
Candle caps	0.34%	0.00%	2.87%	1.59%
Glass jar lids	0.00%	0.00%	0.00%	0.00%
Aluminium foil	22.42%	7.24%	55.25%	37.90%
Champagne caps	0.12%	0.00%	0.92%	0.51%
Can lids	0.61%	0.00%	2.23%	1.38%
Blisters	1.32%	2.53%	8.08%	4.79%
Aluminium trays	0.55%	4.18%	3.06%	2.05%
Nespresso capsules	1.01%	1.14%	8.55%	4.80%
Beverage cans	29.76%	54.77%	0.22%	16.58%
Food cans	9.02%	0.00%	0.21%	4.01%
Other ferrous	0.00%	0.00%	0.00%	0.00%
Other aluminic	34.59%	30.14%	18.55%	26.25%
Other	0.00%	0.00%	0.00%	0.00%
total	100.00%	100.00%	100.00%	100.00%

Table 8: Breakdown of aluminium-containing products in refuse from the Montcada plant

	rolling	thin	total
Beverage caps	0.33%	2.27%	1.50%
Crown corks	0.00%	0.64%	0.39%
Candle caps	0,37%	1.48%	1.04%
Glass jar lids	0.00%	0.00%	0.00%
Aluminium foil	24.55%	31.63%	28.84%
Champagne caps	0.19%	0.76%	0.53%
Can lids	0.28%	3.90%	2.47%
Blisters	2.93%	4.80%	4.06%
Aluminium trays	5.31%	2.09%	3.36%
Nespresso capsules	0.43%	5.75%	3.66%
Beverage cans	15.90%	12.91%	14.08%
Food cans	0.96%	3.37%	2.42%
Other ferrous	0.00%	6.74%	4.09%
Other aluminic	48.77%	23.68%	33.54%
Other	0.00%	0.00%	0.00%
total	100.00%	100.00%	100.00%

Table 5: Breakdown of aluminium-containing products in refuse from the the Gavà - Viladecans plant

Based on the average flow of materials currently sent to disposal, every year we would expect some 127 tons of aluminium to be sent to disposal in the Gavà-Viladecans plant and some 58 in the Montcada plant. The breakdown of this aluminium flow is as follows:

total aluminium (kg)	Gavà	Montcada
from flat refusal	41,729	4.440
from rolling refusal	0	29.463

from thin refusal	64,466	34.115
total	106,195	68.019

Table 9: Estimation of aluminium sent to disposal

Assuming a lower market price for recovered aluminium of 500 €/ton and a higher market price of 700 €/ton, the tons of aluminium that are sent to disposal every year would have a value of **53,097-74,336 €** for the Gavà-Viladecans plant and **34,009 - 47,613 €** for the Montcada plant.

estimated annual value (€)	500 €/ton		700 €/ton	
	Gavà	Montcada	Gavà	Montcada
Flat	20.864	2.220	29.210	3.108
Rolling	0	14.732	0	20.624
Thin	32.233	17.058	45.126	23.881
total	53.097	34.009	74.336	47.613

Table 10: value estimation of lost aluminium

3.2.3. Economic viability of an additional eddy current in one of the flows

According to the information provided by managers of the sorting plants, an eddy current costs 100,000 euro, plus 100,000 € for installation. We should add a maintenance cost of 10%. Assuming a capture ratio of 100%, it gives us a viability threshold of 30,000 €/year.

concept	investment cost	Amortization (5 years)	maintenance	annual cost
Eddy current	100,000	10,000	10,000	20,000
Installation	100,000	10,000		20,000
total	200,000	20,000	10,000	40,000

Given the value of the lost aluminium (see Table 5), it seems that only in the case of Gavà and for thin refuse it would be possible to install an eddy current separator. The value of the separated material should be also higher than 300 €/ton.

3.2.4. Meeting with ARC, EMA and Gavà plant's management

On 11th October 2012 a meeting was held with sorting plants and packaging recycling officials from the Catalan Waste Agency (ARC) Jordi Picas and Marc Balagué, the Metropolitan Area of Barcelona sorting plants official Sofia Bajo and the head of the Gavà sorting plant Marc Nogueira.

They agreed on the results presented to them, but disagreed about the idea that a pilot project could be implemented in the Gavà plant. Given that the plant will be redesigned next year, selection rates will increase and will prevent investment geared toward increasing the recovery rate of capsules. Otherwise, the plant managers would have already invested in it.

3.2.5. Conclusions

- *Gavà-Viladecans would be the best choice to push for a pilot project:*

Given the results of the characterisations, it seems reasonable to think that there is room for a pilot project to try and capture Nespresso capsules from the current residual flow in the Gavà-Viladecans plant. **Nevertheless the plant will undergo a complete refurbishing in 2013, so wasted aluminium is expected to decrease below the viability threshold.**

- *Nespresso consumption information is needed to further assess the viability of a pilot project*

The current amount of capsules that are collected in sorting plants should be put into context by comparing it with consumption figures for the Barcelona area. This would serve as a guideline of the estimated population that currently disposes of capsules through yellow containers and the expected increase brought by a public awareness campaign. **Nevertheless, the increase derived from such a campaign may not be too significant.**

- *Value of recovered material is crucial:*

If a 600 €/ton price is maintained, and given the results of the characterisations, it does not seem reasonable to think that there is room for a pilot project to try and capture Nespresso capsules from the current residual flow in the Gavà-Viladecans plant once the redesign is performed.

- *Material used in can production influences viability*

Nowadays, only around 15% of the beverage cans consumed in Spain are made of aluminium. Spain has a strong history of steel packaging manufacture and is thus slightly unusual in its current split of steel to aluminium in the beverage container industry. This makes it more difficult than in other countries to capture aluminium capsules taking advantage of the synergies that are produced by capturing aluminium cans as well. A switch in material use in cans could help to lower the viability threshold.

- *Agreement with Ecoembes is possible:*

Ecoembes would not lose much by agreeing with Nespresso to allow their capsules to be collected through yellow containers. The expected effect would be an increase in Ecoembes income, but an insignificant increase in refuse from sorting plants as the percentage of capsules over the total lost aluminium is low. Again, overall aluminium recycling figures for Ecoembes would not increase much, as most of the aluminium recycled comes from flows other than sorting plants. Ecoembes would be willing to enter into such an agreement on the mere grounds of an income increase.

- *A campaign to promote collection through yellow containers could just be greenwashing:*

If an agreement was met, without further improvements in technologies, Nespresso would benefit from a cheaper collection system for capsules, whereas the impact on recycling figures should be further evaluated. Current technologies can already capture Nespresso capsules, but its yield is unknown due to the lack of characterisation of sorted aluminium. A campaign explaining that capsules would be recycled may not be absolutely accurate. Current collection systems (Nespresso shops and “deixalleries”) provide 100% recycling of the capsules, whereas yellow containers offer a (yet) unknown recycling rate.

- *Alternative collecting systems should be further assessed:*

Deposit or incentive systems (such as charging an amount per capsule that would be reimbursed when capsules are taken back to predefined collection points) should be further assessed before being disregarded, as they provide 100% recycling of collected capsules and could increase collection rates significantly.

- *A redesign of the capsule should be studied:*

The current legal barrier preventing capsules from being accepted is that the capsule as such is intended to be discarded together with the coffee. A design that made it easy to separate the coffee (product) from the container (packaging) would overcome such legal barrier.

- *Alternatively, lobbying for material separation rather than product separation could help to set a cheap recycling system for Nespresso capsules:*

Since the new Waste Act was passed in Spain, recycling targets have been set. These targets are not set by products (packaging), but for materials (plastic, metals, glass, paper/cardboard and biowaste). A redefinition of the products accepted in the existing containers could help Nespresso to provide their clients with a cheaper collection system, according to the most recent legal provisions.