

**REPORT** by

Philippe FICHAUX

Ref 040422 Recyclingn PF FinalE.doc

Written on 2004/04/19

## Recycling

### Context

#### Market organization

First it is necessary to describe the French system which can lighten the 10 years experiments we made and the on going situation about selective collection.

At the beginning of the 90's, the selective collection appeared in France with an operation of glass collection whose benefits were allocated to a cancer research center. Containers were implemented in voluntary cities. Some time after, a second operation aimed to collect textiles for the benefit of an handicapped people NGO.

The European directive of 1990 put the question of the organization all over the territory of the recycling of packaging materials. The directive says that the producers and distributors of household goods have the obligation to take in charge the collection and the recycling of their packaging. So the industrialists proposed to the government to take in charge their obligation trough a specific company operating all over the territory for the their account. So was created Eco-Emballages, a private company owned by the main French producers and distributors. Eco-Emballages signed a 5-year contract (renewable by call for tender) with the French government, delegating to Eco-Emballages the duty of financing the selective collection and the recycling. In parallel, the glass industry had created a specific private company for glass recycling, Adelphe. Adelphe passed a 5-year contract with the French government.

Later, the paper industry created REVIPAP in aim to organize the paper and cardboard recycling, the plastic industry did the same with VALORPLAST, the aluminium industry with France Aluminium Recyclage. The steel industry (in fact the company ARCELOR) entrusted that to the company SOLLAC, a subsidiary of ARCELOR.

The terms of reference of the 5-year contracts that the winner has to:

- finance the selective collection throughout the local authorities which are in charge of the SHW collection and disposal;
- guarantee the purchase price of the secondary raw materials issued of the selective collection and the sorting facilities.

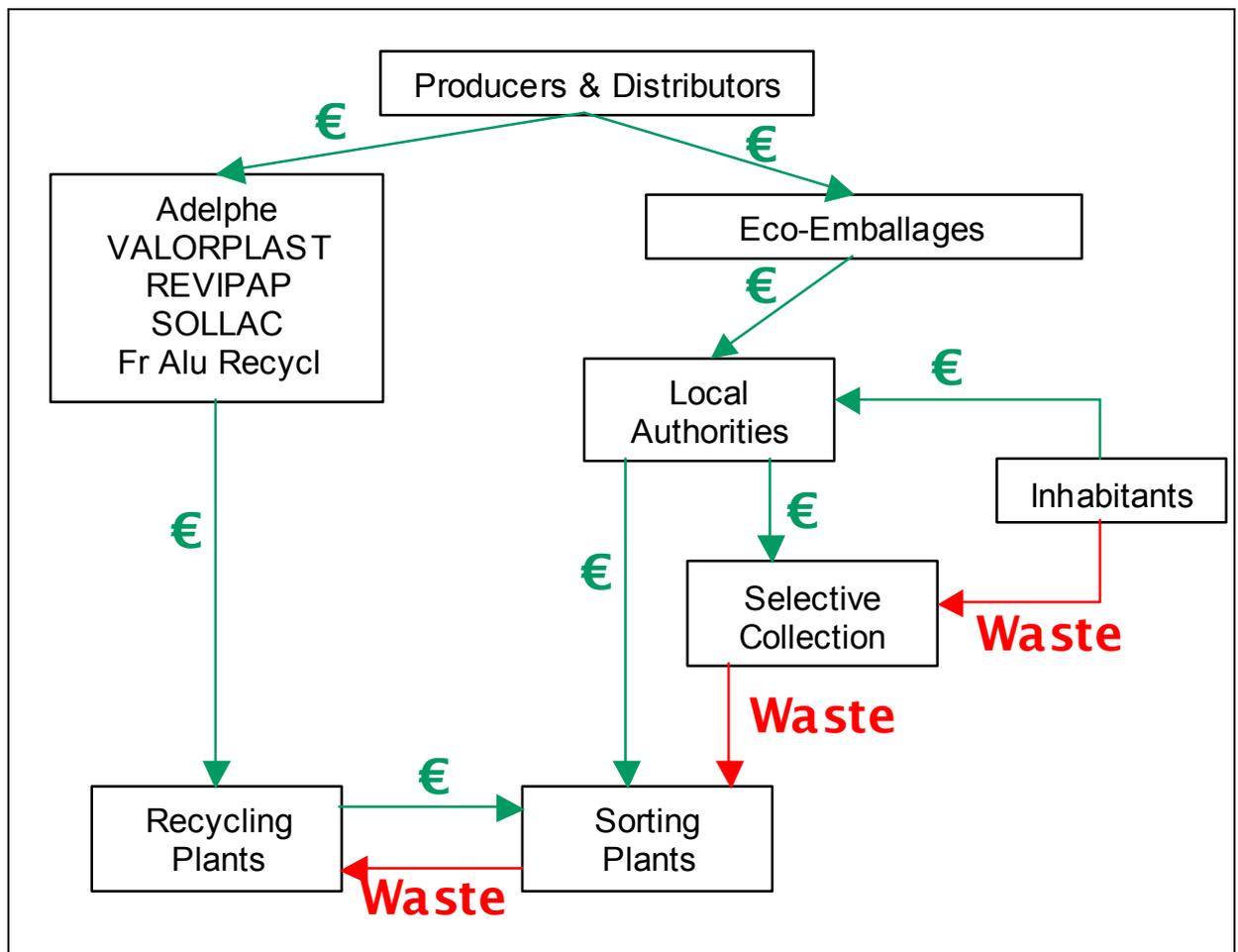
The existing system can be showed as:

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**A lot of experiments**

The question of the selective collection appeared in 1992-1993. Some experiments had been done in the field of rough waste sorting. It quickly appeared that the quality of the materials so obtained was too low for the recycling industry. It was concluded that it was necessary to ask from the inhabitants an effort for a preliminary sorting of the waste. But it's not sufficient to sort the waste. It's also necessary to organize a separate collection of the sorted waste. During 10 years a lot of experiments have been done that we'll try to synthesize.

**A whole chain**

There's a lot of ways to organize the selective collection but it's only a part of the problem which must be considered from the very beginning (when the inhabitant decides to throw away something) to the end (delivery of the secondary raw materials to the recycling facility).

The main steps of the chain are:

- the decision it's a waste,
- storage in the housing (sometimes 2 steps of storage, in the kitchen, then in a specific container),

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- transport to the collecting point (by the inhabitant toward a collection point or toward the place the truck will pass),
- conception of the sorting chain,
- required specification for recycling.

The home storage and the collection may be done material by material or mixed and shared in 1, 2 or 3 categories. The separative collection system may be done by collective collection points (containers of 1 to 4 m<sup>3</sup> with 2 to 6 categories of waste) or by a door-to-door collection of specific home containers.

### A lot of studies

A lot of studies have been done about the efficiency of the selective collection, the behaviour of the inhabitants, and so.

The general conclusions are:

- people are ready to make some effort for environment and the rate of “citizen behaviour” is always >85%;
- the global efficiency of the system (quantity of sorted waste, quality of the sorting) depends of the convenience of the system in the close space of the inhabitants, clearly all happens between the kitchen and the sidewalk.

## Reference

### **COSTS STUDY 2001 OF SELECTIVE COLLECTION AND SORTING OF RECYCLABLE SHW (December 2002, ADEME / Direction of Municipal Waste)**

#### **3 General Data about French situation €**

The production of household waste *stricto sensu* (ie out of non household waste collected by the local authorities) amount 1 kg/inh/day (353 kg/inh/year for 2001).

In 2000, with an average of 44 kg/inh/year (calculated on the whole French population), dry recyclable waste selectively collected amounted around 12% of the total of household waste, whose 34 kg/inh/year for packaging waste, 9 kg/inh/year for newspapers and magazines, and 1 kg/inh/year for textile.

#### **3.4 Panorama of selective collection**

##### 3.4.1 Development of selective collection at 31/12/00

Population under contract

At 31/12/00, 47 millions inhabitants were with a multi-materials contract with at less one of the agreed companies Adelphe and Eco-Emballages.

At the end 2000, 1115 contracts were signed between Eco-Emballages and local authorities, that amounted a population of 45.7 millions inhabitants, so 75% of French population.

Out of that, 1270 contracts were signed between Adelphe and local authorities amounting around 10 millions inhabitants (mainly mono-material contracts).

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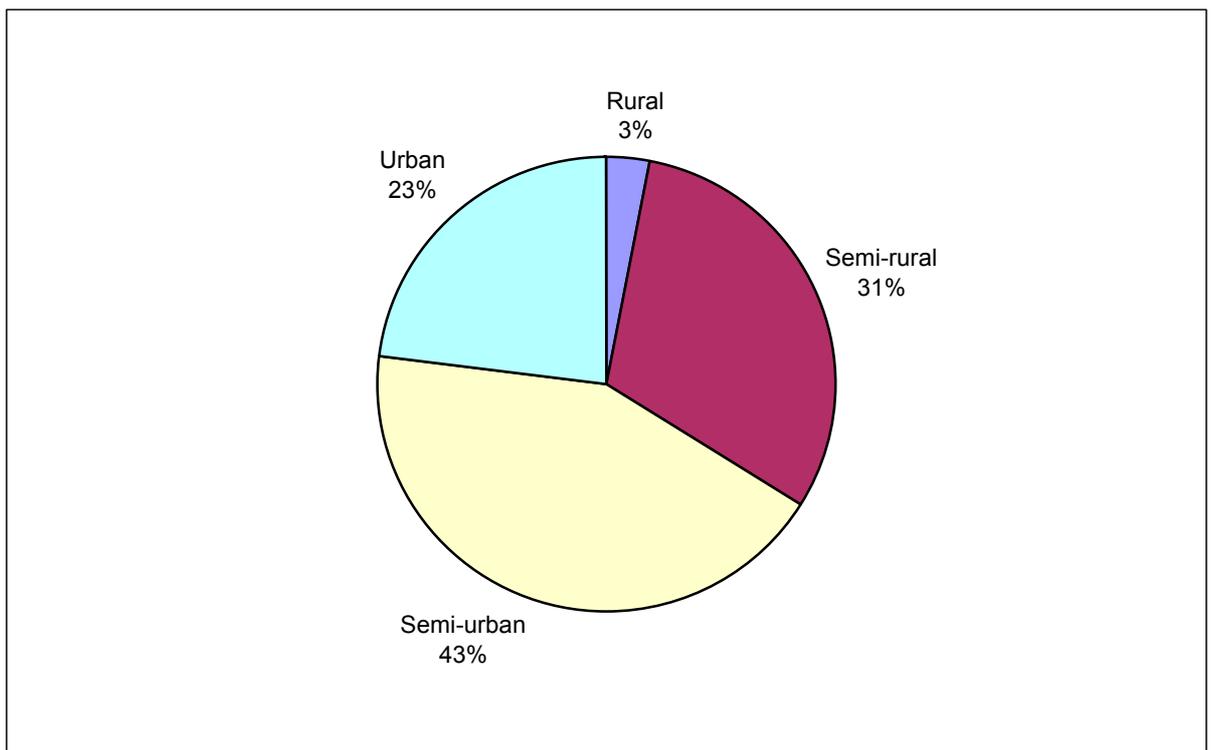
Among these 10 millions inhabitants, 5 millions were also with a contract with Eco-Emballages for other materials.

### POPULATION DESERVED BY A SELECTIVE COLLECTION OF RECYCLABLE WASTE

The population under contract is superior to the population really deserved with a selective collection of dry recyclable waste because, in most of cases, the setting is progressively done: all inhabitants are not deserved from the same date (in some cases, it takes some years may happen between the first and the last inhabitants inside the same contract of selective collection).

At 31/12/00, 37 millions, so 61% of the French population, were deserved with a selective collection of at less 3 materials. It must be noticed that this rate was around 30% in 1998 and 15% in 1996.

Light packaging are in majority collected door-to-door (in 60% cases) although glass and newspapers-magazines are collected by volunteer bringing (respectively 80% and 60% cases).



*Figure 1 Repartition of the population according to the type of housing (% population deserved by a collection of at less 3 materials)*

### REPARTITION OF HOUSING TYPES

More than 40% population with a multi-material contract lives in a semi-urban housing and less than 5% in a rural housing.

The housings are defined so:

- Rural housing: rate of collective housing <10% and at less 90% in rural municipalities

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- Semi-rural housing: rate of collective housing <10% and <90% in rural municipalities
- Semi-urban housing: rate of collective housing between 10% and 40%
- Urban housing: rate of collective housing more or equal to 40%

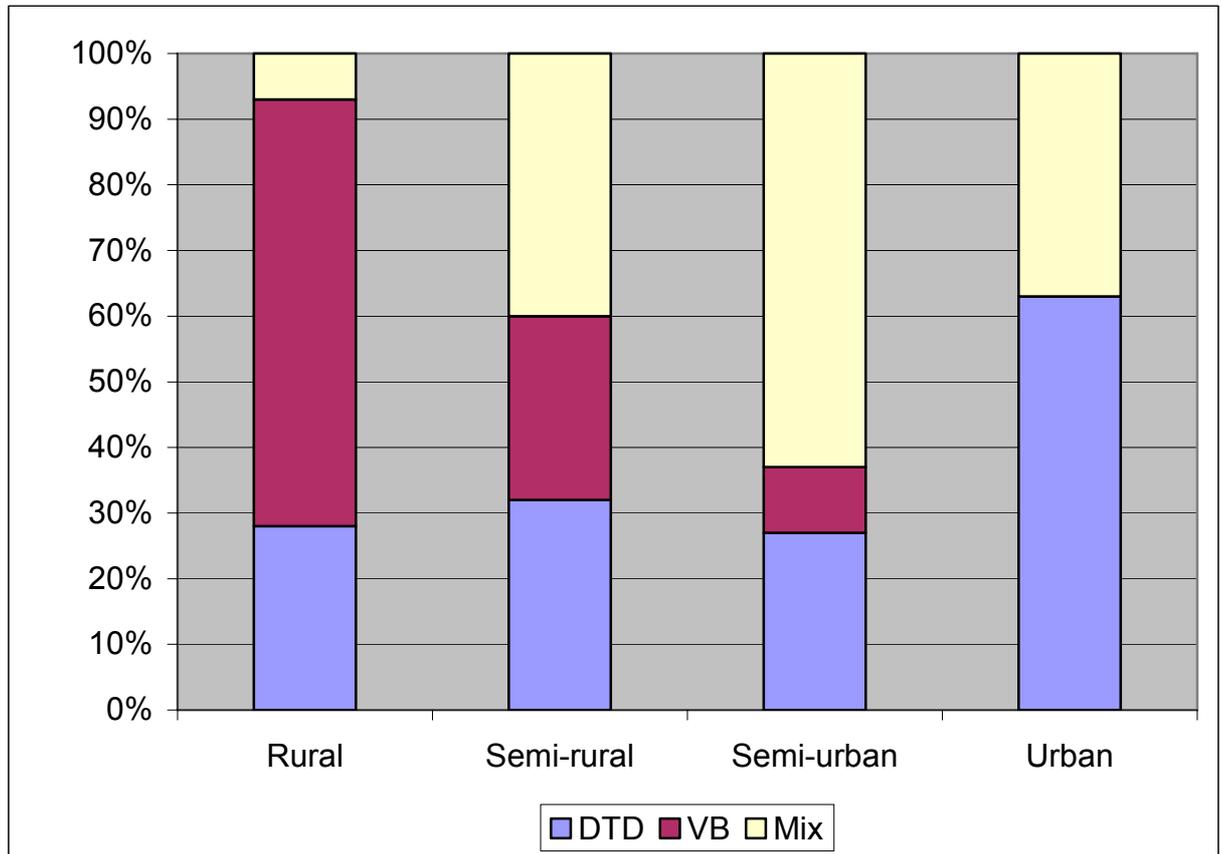


Figure 2 Organisation of the collection according to the housing (in % population deserved by a collection of at less 3 materials)

## Systems of selective collection

### Equipments

#### Voluntary Bringing Point (VBP)

This designation names a point where are disposed containers as it has been done in Slavyansk. It's also often called "Clean Point" or "Cleanliness Point". The principle is to offer to the inhabitants a close space where they can sort and dispose some categories of recyclable waste.

The way to use it is to store in a cash or in plastic bags all recyclable light objects (packaging, magazines, ...) and to bring them to the VBP. It must be said that the more often, people carry that in the car. On site, the users can easily sort the waste and put each one in the relevant container.

The conditions of performance are:

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- enough space at home to store enough waste for a weekly disposal,
- enough place to park during the disposal,
- a full range of categories of waste collected separately,
- cleanliness of the VBP,
- always enough place in containers, so frequent emptying of containers by the collection truck, and particularly, containers emptied before the week-end (the most part of the waste are brought during the week-end).

**Door-to-Door collection (DTD)**

A very old habit in France is that each one put his bin on the sidewalk at home's door the night before the passage of the collection truck. It is like that since the invention of the bin by the prefect Eugène POUBELLE at the middle of the XIX<sup>e</sup> century (who gave his name to the bin called in French "poubelle"! ). So appeared in Dunkerque the first system of DTD recyclable waste collection. It must be said also that in a lot of cases, the mechanization of the collection implied that the collectivities provided the inhabitants with a standard bin, fitted to the equipment of the collection truck. So in Dunkerque, the municipality decided to equip the inhabitants



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with 2 bins: a blue one for dry recyclable waste and a yellow one for the rest of the waste. So this system is often called “blue bin”. A specific sorting facility has been built and specific trucks have been developed, able to collect simultaneously in 2 compartments the 2 bins. An exception has always been the glass which stayed separately collected with big containers. The reason is that during all the operations of unloading (of bins and of trucks), glass breaks and it causes a lot of problems of security for the people employed on the sorting chain.

**Variants****■ 2 “blue bins”**

We have seen for some years DTD systems with 2 bins for the recycling. The purpose is to separate papers and cardboards from the other packaging waste. Often plastic bottles, cans, and so, contain liquids or organic matters spoiling the paper.

**■ Cashes**

Some municipalities provided plastic cashes instead of bins for the recyclable waste. The reason is that usually cashes are cheaper than bins. The drawback is that they are more fragile.

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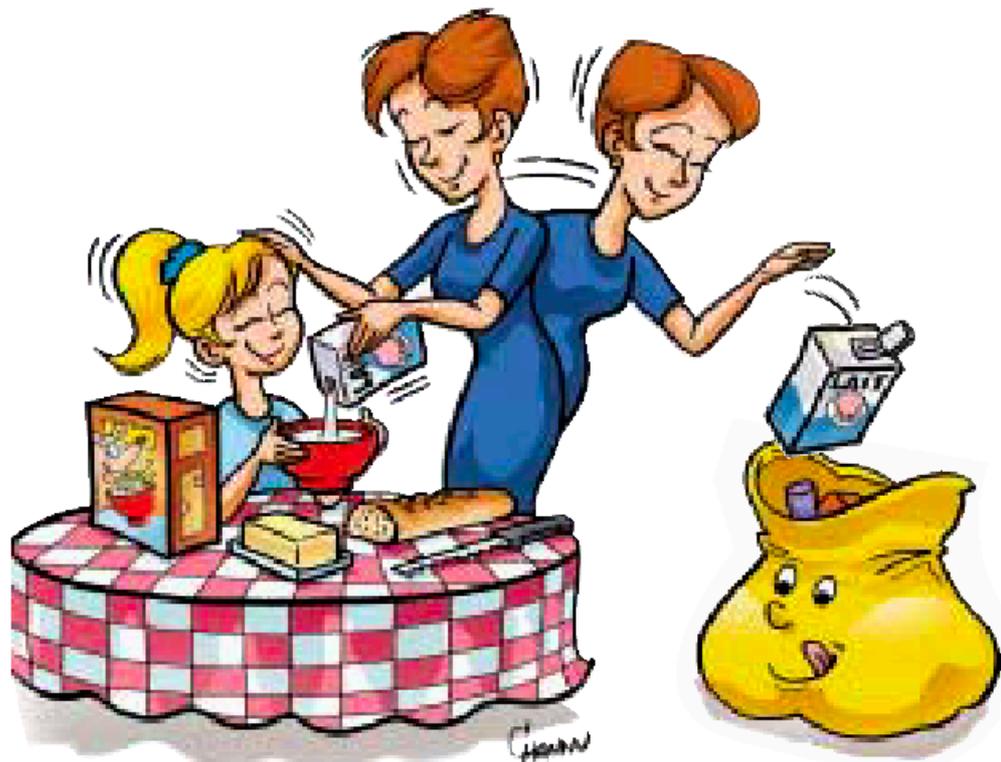
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## ■ Plastic bags

In some cities, the municipality provides plastic bags for recyclable waste. Usually these are transparent and coloured bags, with different colours for different categories of waste but enough transparent in aim the collecting workers can verify the quality of the waste.



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## ■ Specific containers for collective housing

The refuse chutes have been forbidden and the collective housing buildings are equipped with a waste room where each one brings his waste (usually in plastic bags). The standard equipment is a container equipped with rolls, from 200 litres to 1000 litres. The use is now to dispose in these rooms different containers dedicated to the common and recyclable waste.

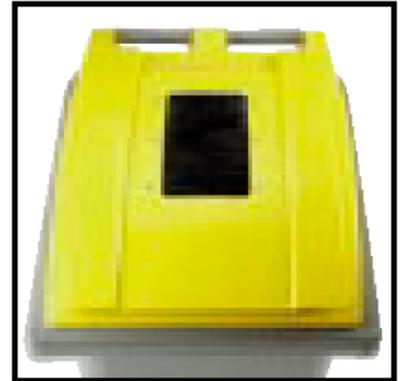


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## Comments

At evidence, the more the waste are sorted by the inhabitants (as number of categories and as quality of sorting), the more It's easy and efficient to recycle the waste. But we cannot ask the inhabitants to sort 12 or 15 different waste and to store them in different bags or buckets in the kitchen ! On the other

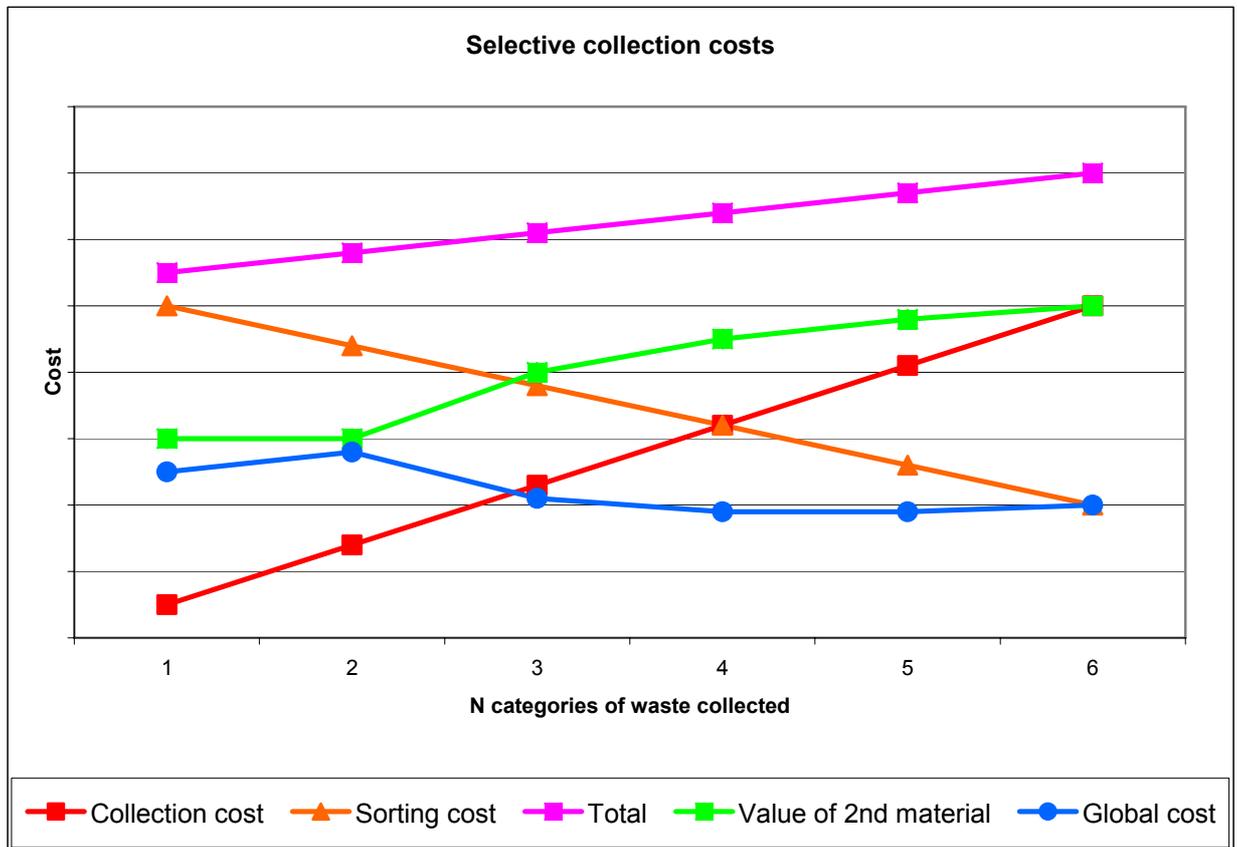
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hand, the more numerous are the categories collected, the more expensive is the collection (multiplication of the specialized trucks, collection rounds, employed people, ...). Otherwise, the waste have always to be passed on the sorting chain and the cost of this work will not change a lot if waste are more or less sorted.



A particular study must be done case by case. The parameters are:

- the number of collected waste and the collection cost; usually there's at less 3 collected material and it can be studied the additional cost for a 4<sup>th</sup> material, a 5<sup>th</sup>, and so;
- in all these cases, the sorting cost, taking into account that if some materials are mixed in the collection, it will be necessary to put more people on the sorting chain and the quality of the secondary raw material will decrease;
- the value of the secondary raw material whose price, as we said, can decrease with the quality.

So the global cost, on the previous graph, is the total of collection cost + sorting cost - value of the secondary raw material.

So it's necessary to find the good balance between all these sides and to aim to optimise the global cost of the operations. An other point of view is that the behaviour of the inhabitants will progress with time and often it's better to begin with only 2 or 3 materials and to develop progressively the system.