EIMPack – Economic Impact of the Packaging and Packaging Waste Directive

The Economics of Packaging Waste Recycling:

The Case of France

January 2012
Legal notice

This report consists of a study based on the information provided by the French local authorities. It was prepared as part of the work programme of EIMPack - Economic Impact of the Packaging and Packaging Waste Directive, financed by the European Investment Bank. The European Investment Bank or any person or company acting on behalf of the Bank is not responsible for the contents and use that may be made of the information contained in this report.

Research team

Rui Cunha Marques (Principal Investigator)  Sandra Faria Ferreira (Research grant)
Nuno Ferreira da Cruz (Researcher)        Marta Cabral Pereira (Research grant)
Pedro Simões (Researcher grant)
Executive Summary

The European Directive 94/62/EC on Packaging and Packaging Waste (PPW) was responsible for a profound revolution in the waste sector of all Member States. This law imposes ambitious targets in terms of recovery and recycling of packaging waste which tend to increase the operational costs and require higher investments in equipment, infrastructure, expertise and monitoring mechanisms. To face this reality, the Member States adopted diverse strategies and enacted specific legislation (although some countries have already passed laws with a similar purpose) to fulfil the goals of the Directive.

To evaluate the impact of these goals, we analyse the viability of the actual management model of the recycling services in France. However, the analysis of the operations and of the costs that resulted from this policy represents an ongoing effort. This report presents an overview of the French recycling framework and discusses the financial transfers undertaken by the company that manages the Green Dot system (by Eco-Emballages Group). This model was implemented to recover 60% of the efficient costs (in 2010) of packaging waste collection and sorting (value determined based on the performance of local authorities), being the remaining costs financed through the sale of sorted materials, government grants and local taxes.

The study was developed collecting data from a set of 45 local authorities (which are the utilities in charge of waste management, covering about 20% of the French population), aiming to compare the costs and benefits of selective collection and sorting of packaging waste (e.g. the financial support from the Green Dot company and the sale of recyclables) for the year 2010. Through this information, we discuss the fairness and sustainability of the system.

The results show that financial transfers have been enough to ensure the economic sustainability of packaging waste recycling (including the service costs and a fair and reasonable return on the capital invested by the utilities). However, a purely financial analysis leads to different conclusions.
Following the new reform of the sector (which intends to support 80% of the “net benchmark costs” for an optimal sorting and collection service), a new picture for the packaging waste recycling will certainly be developed for the next years.
# Table of Contents

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. INTRODUCTION .................................................................................................................. 1</td>
</tr>
<tr>
<td>2. THE LIFE-CYCLE OF PACKAGING WASTE ............................................................................. 3</td>
</tr>
<tr>
<td>3. INSTITUTIONAL AND LEGAL FRAMEWORK ........................................................................... 5</td>
</tr>
<tr>
<td>4. FINANCIAL TRANSFERS ...................................................................................................... 11</td>
</tr>
<tr>
<td>4.1 Introduction ..................................................................................................................... 11</td>
</tr>
<tr>
<td>4.2 Green dot scheme ............................................................................................................ 12</td>
</tr>
<tr>
<td>4.3 Financial support for local authorities ............................................................................ 13</td>
</tr>
<tr>
<td>4.4 Complementary supports ................................................................................................ 14</td>
</tr>
<tr>
<td>4.5 Sale of sorted materials .................................................................................................. 16</td>
</tr>
<tr>
<td>4.6 Local taxes ...................................................................................................................... 17</td>
</tr>
<tr>
<td>5. ECONOMIC ANALYSIS METHODOLOGY ......................................................................... 18</td>
</tr>
<tr>
<td>6. ECONOMIC ANALYSIS OF RECYCLING ......................................................................... 23</td>
</tr>
<tr>
<td>7. CONCLUDING REMARKS .................................................................................................... 32</td>
</tr>
<tr>
<td>REFERENCES .......................................................................................................................... 34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ANNEXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annex I - Local authorities for waste collection and treatment by region</td>
</tr>
<tr>
<td>Annex II - Eco-Emballages complementary financial support for local authorities</td>
</tr>
</tbody>
</table>
List of Figures

Figure 1 – The (simplified) life-cycle of French packaging waste ........................................ 3
Figure 2 – Transfer of responsibilities on household waste collection and treatment........ 6
Figure 3 – Local authorities of waste management in the French region of Ile de France . 9
Figure 4 – Funding model for the recycling of household packaging waste in 2010 ........11
Figure 5 – General funding scheme of household waste collection and treatment ...........17
Figure 6 – The benefits and cost of recycling in France .....................................................19
Figure 7 – Service cost recovery considering quantities collected and taken back.........24
Figure 8 – Cost of a) selective collection and b) sorting for recycling system...............25
Figure 9 – Cost recovery of local authorities excluding subsidies and other benefits ......25
Figure 10 – Cost recovery of local authorities excluding other benefits ......................26
Figure 11 – Cost coverage for local authorities under 250 inhabitants per km² ..........27
Figure 12 – Cost coverage for local authorities over 250 inhabitants per km² ..........27
Figure 13 – Operational costs of local authorities based on quantities taken back .......28
Figure 14 – Economic benefits based on quantities taken back ......................................29
Figure 15 – Financial benefits based on quantities taken back ......................................29
Figure 16 – Economic benefits of local authorities based on quantities collected.........30
Figure 17 – Financial benefits of local authorities based on quantities collected ..........30
Figure 18 – Cost recovery in a financial perspective ......................................................31
Figure 19 – Cost recovery in an economic perspective ...................................................31
List of Tables

Table 1 – Local authorities with waste collection and treatment competences in 2009...... 9
Table 2 – Recycling and recovery of packaging waste in France, in 2009 (Eurostat, 2011) .............................. 10
Table 3 – Green dot fee for 2010 (PRO EUROPE, 2011) ................................................. 12
Table 4 – Financial support by local authority performance .................................................. 14
Table 5 – Values of the variables to calculate the financial support per material .......... 14
Table 6 – Metals from incineration and composting .......................................................... 15
Table 7 – Take-back prices in 2010 (Adelphe and Eco-Emballages, 2011) ...................... 16
Table 8 – Type and number of local authorities used for the cost-benefit analysis ......... 20
Table 9 – Variables and values used in the methodology ................................................. 21
Table 10 – Variables used to measure the return on capital employed ............................ 22
Acronyms

ADEME - Agency for Environment and Energy Management (Agence de l'Environnement et de la Maîtrise de l'Energie in French)

AMORCE - Association of local authorities and professionals (Association au carrefour des collectivités territoriales et des professionnels in French)

CBA – Cost-Benefit Analysis

CA – Agglomeration Community (Communauté d’Agglomération in French)

CC – Municipal Community (Communauté de commune in French)

CGCT - General Code of Local and Regional Authorities (Code Général des Collectivités Territoriales in French)

CU – Urban Community (Communauté Urbain in French)

DGCL – General Directorate for Local Authorities (Direction Générale des Collectivités Locales in French)

EPCI - Public Establishments for Intercommunal Cooperation (Établissements Public de Coopération Intercommunale in French)

ETP – Full-time equivalent (Équivalent temps plein in French)

EU – European Union

FSLA – Financial Support for the Local Authorities

MBT – Mechanical and Biological Treatment

PPW – Packaging and Packaging Waste

REOM – Fee for household waste disposal (Redevance d’Enlèvement des Ordures Ménagères in French)

SAN – New Agglomeration Association (Syndicat d’Agglomération Nouvelle in French)
SCC – Support for knowledge of costs (Soutien à la connaissance des coûts in French)

SCLO – Support for knowledge of optimization levers (Soutien à la connaissance des leviers d'optimisation in French)

SIVOM – Multiple-Purpose Intercommunal Association (Syndicat Intercommunal à Vocation Multiple in French)

SIVU – Single-Purpose Intercommunal Association (Syndicat Intercommunal à Vocation Unique in French)

SM – Mixed Association (Syndicat Mixte in French)

TEOM – Tax on household waste disposal (Taux d'Enlèvement des Ordures Ménagères in French)

THV – Vertical Housing Rate (Taux d'Habitat Vertical in French)

TPG – Global Performance Rate (Taux de Performance Globale in French)

WACC – Weighted Average Cost of Capital
1. Introduction

Recycling has a leading role in the waste sector of all Member States of the European Union (EU). In fact, despite the “waste hierarchy” – reduce, reuse, and recover (recycling and energy recovery) before disposal – which is embedded on the EU law regarding the waste management (Bulkeley et al., 2007), the Directive 94/62/EC on Packaging and Packaging Waste (PPW) gives especial emphasis to this option by setting challenging targets for the recycling rates of the Member States.

Thus, some Member States opted to “embrace” this policy and clearly fulfil the provisions of the Directive (e.g. Germany), while others set more modest objectives. The recycling rates of France are aligned with the targets of the Directive. Nevertheless, the “Grenelle Act” on environmental issues will push further the French system, by setting the recycling rate target on 75%.

From an economic (or even welfare) point of view, there should be an optimal value for the recycling rates (Massaruto, 2011). Undoubtedly, this definition is extremely complex to set since it depends on several aspects, like the topography of the regions, population density, consumption patterns, current technology, the actual type of material and related matters such as the “optimal energy recovery rate”, long-term economic sustainability and competitiveness, among many others. However, this relevant issue is beyond the scope of this report.

The present report intends to illustrate the “French case” concerning the recycling of packaging waste (so one can learn about the weaknesses and strengths of this specific system) and determine the cost and benefit structures of the local authorities regarding selective collection and sorting activities.
After this introduction, the document is organized as follows. Section 2 provides a short overview of the whole life-cycle of packaging waste. In addition, based on the literature, the logistic chain of packaging waste and the specific impacts of the “recycling system” are discussed. Section 3 characterizes the actual packaging waste management system in France while section 4 describes the financial transfers involved in the recycling system (where the financial support for local authorities undertaken by Eco-Emballages Group – the French Green Dot company – is a key issue). The data and methodology of the economic analysis of packaging waste recycling are presented in section 5, while the analysis and discussion of the results are provided in section 6. Finally, section 7 presents the most relevant concluding remarks.
2. The life-cycle of packaging waste

The life-cycle of packaging waste begins when the packaging becomes useless for the final consumer and is discarded. However, when separation at the source is correctly done, the packaging is sent to sorting centres and, then for recycling. Nevertheless, a significant part of packaging waste continues to be treated as undifferentiated flow and may have other final disposals (not necessarily leading to higher economic and environmental impacts). A simplified scheme of the life-cycle of packaging waste (in France and elsewhere) is shown in Figure 1.

Figure 1 – The (simplified) life-cycle of French packaging waste

The undifferentiated waste, received by mechanical and biological treatment (MBT) facilities, is usually sorted. Thus, the packaging included in this flow can be taken to the recycling system. Regarding the incineration process, the plastic packaging (for e.g.) may
contribute to energy production due to its high calorific value and metal packaging can be also sent back to the recycling system. Among the main waste disposal solutions, landfill is the one without (or low) added value (in financial terms), besides, it takes up a lot of space and might entail negative environmental impacts.

In France, waste collection is usually carried out by kerbside and/or bring systems. The drop-off centres contribute with a small percentage (especially, cardboard waste) of packaging waste for recycling. Concerning packaging waste, it can be collected through the following methods:

- **Bi flow** – composed of two flows: the glass flow is collected separately, from the multimaterial flow, including all types of packaging as well as newspapers and magazines;

- **Tri flow** – consists of three flows: the glass flow is collected separately, as well as the collection of multimaterial flows, excluding newspapers and magazines, which are also collected separately (the third flow);

- **Corps creux/corps plats**\(^1\) – represents a tri flow, where the glass is collected separately, the cardboard is collected together with newspapers and magazines, and the third flow is composed of metal and plastic packaging.

Recently, Eco-Emballages (2010a) concluded that the financial costs of collection may vary significantly depending on the flow and the method. However, the environmental impacts were not evaluated, though they are essentially related to the transport (as reported by Reich, 2005), depending on the average fuel consumption of the vehicles and frequency of collection. As mentioned in the literature review report (see EIMPack, 2011a), a cost-benefit analysis (CBA) will be developed in order to determine the balance between economic and environmental impacts of the life-cycle of packaging waste in France.

---

\(^1\) French terms:
"Corps creux" (hollow bodies) – refer to the metal and plastic packaging;
"Corps plats" (flattened bodies) – characterise the paper/cardboard packaging and newspapers/magazines.
3. Institutional and legal framework

The European Directive on PPW, which came into force in 1994, had the objective of providing a high level of environmental protection (reducing the consumption of raw materials and harmful emissions, especially due to landfilling) while ensuring the functioning of the internal market (setting minimum and maximum targets for recovery and recycling rates and securing the free movement of packaged goods within the EU). Currently (end of 2011), in general, all Member States must recover a minimum of 60% and recycle a minimum of 55% by weight of packaging waste (with a maximum of 80% for recycling). Regarding each specific material flow, the targeted rates for recycling are 60% by weight for glass, paper and cardboard, 50% by weight for metals, 22.5% by weight for plastics and 15% by weight for wood.

French stakeholders have been working on the Grenelle Environnement, a joint effort between the government and other groups to take measures for environment protection and to pursue a sustainable development in terms of waste management. The Grenelle Act establishes an overall recycling target of 75% to be attained by 2012, where the industry (e.g. packers and importers) will have to cover 80% of net benchmark costs for an optimal service of collection and sorting of packaging waste (MEEDDM, 2009).

According to the national law, the responsibility for the management of packaging waste can be transferred by the industry to an entity duly licensed for this activity. The Eco-Emballages, the French Green Dot company, is a private non-profit organization with the aim of promoting separate collection, sorting, recovery and recycling of packaging waste in France. In other words, Eco-Emballages Group\(^2\) (hereafter Eco-Emballages) has the

---

\(^2\) After 2005, Adelphe joined Eco-Emballages Group (see EIMPack, 2011b)
“duty to improve recycling performance whilst controlling the cost of the scheme” (Eco-Emballages, 2010b).

The responsibility of the Eco-Emballages regarding the collection and sorting of household packaging waste is set through contracts with the local authorities (municipalities, intermunicipal communities and associations) that manage the systems. In 2010, this company established contracts with 1,167 local authorities (encompassing 36,312 municipalities and 63.3 million inhabitants, corresponding to about 97% of the total population). The Green Dot company also manages the materials and supervises the recycling undertook by the recycling centres. To accomplish this, Eco-Emballages relies on the financial contributions of economic operators (i.e. the producers that place packaged goods on the market).

Traditionally, the municipalities were responsible for the household waste collection and treatment, but according to the Law No. 99-586 of July 12 of 1999, those activities must be considered independently (AMORCE, 2010). Thus, the municipalities can transfer waste collection and treatment or only the treatment to Public Establishments for Intercommunal Cooperation (EPCI) or to a mixed Association, ruled by the General Code of Local and Regional Authorities (CGCT). However, an EPCI with waste collection and treatment skills can transfer its responsibility to a mixed Association, as it is shown in Figure 2. This law did not allow the transference of competences between mixed associations and was later amended by Law No. 2006-1772 of December 30 of 2006.

Source: AMORCE (2010)

Figure 2 – Transfer of responsibilities on household waste collection and treatment
The EPCI's were created to encourage local development and optimize land resources. They are grouped in two forms of intercommunality, depending on the funding structure of the public services (see EIMPack, 2011b).

Intermunicipal associations are EPCI without their own tax scheme, managing and providing the services in their respective community. This management model should protect the interest of all member municipalities and not just a particular municipality. There are two types of intermunicipal associations (DGCL, 2007a):

- **SIVU** – a single-purpose intercommunal association. Their competences are limited to a single good or service of common interest. However, it can manage multiple goods or services that are complementary;
- **SIVOM** – a multiple-purpose intercommunal association (not only limited a single good or service).

Although they work differently, both are under the same rules of CGCT. In general, the powers transferred to these associations are the (DGCL, 2007a):

- abstraction and distribution of water;
- generation and distribution of electricity;
- public school system;
- wastewater collection and treatment;
- household waste.

The mixed (public and private) Associations/Syndicates (in closed and open regime – see EIMPack, 2011b) are not EPCI (without their own tax scheme) but are still managed under the same rules. They can provide different services (DGCL, 2007b), such as:

- water;
- waste and wastewater services;
- local development;
- energy;
- economic affairs;
- education and culture;
- tourism, sport and leisure.
Concerning the EPCI with their own tax scheme, there are four different types of associations:

- **Municipal communities (CC in the French acronym)** – which are articulated into contiguous area and without boundaries. They are not limited in terms of population and can have multiple responsibilities (DGCL, 2007d).

- **Agglomeration communities (CA in the French acronym)** – which are articulated into contiguous territory. They are devoted to urban areas and should cover a set of more than 50,000 inhabitants with one or various municipalities with more than 15,000 inhabitants. They are created for an indefinite period of time (DGCL, 2007e).

- **Urban communities (CU in the French acronym)** – which are structured without boundaries, covering a set of more than 500,000 inhabitants. They are also created for an indefinite period (DGCL, 2007f).

- **New agglomeration associations (SAN in the French acronym)** – previously "new agglomeration communities" (CAN acronym in French). They were created due to the need to organize and control development in high population density areas (and in the region of Paris in particular). As their responsibilities have regional and national interest, they get a financial support from the Government. The implementation of new agglomerations counts on different institutional (public) actors with industrial and commercial characteristics (EPA acronym in French), the SAN and the Government, through a temporarily management agreement (DGCL, 2007g).

Table 1 and Figure 3 shows the type and number of municipalities and EPCI’s with waste collection and treatment competences in 2009 (the other regions are presented in Annex I). In the remainder of this report, we will use the term “local authority” to the waste management systems, regardless of their institutional arrangement and management model.

In France, the overall recycling rate of packaging waste has gradually increased over the last 11 years, from 41,5% in 1998 to 56,4% in 2009. As can be seen in table 2, the global targets imposed by PPW Directive were achieved. Eco-Emballages (2011) had a relevant increase in 2009 in terms of recycling, reaching the value of 64,3%.
Table 1 – Local authorities with waste collection and treatment competences in 2009

<table>
<thead>
<tr>
<th>Type and number of local authorities</th>
<th>EPCI’s without their own tax scheme</th>
<th>EPCI’s with their own tax scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SIVU 58</td>
<td>Métropoles 0</td>
</tr>
<tr>
<td></td>
<td>SIVOM 75</td>
<td>CU 14</td>
</tr>
<tr>
<td></td>
<td>SM 215</td>
<td>CA 95</td>
</tr>
<tr>
<td></td>
<td>EPCI’s with their own tax scheme</td>
<td>CC 669</td>
</tr>
<tr>
<td></td>
<td>Métropoles 0</td>
<td>SAN 0</td>
</tr>
<tr>
<td></td>
<td>EPCI’s with their own tax scheme</td>
<td>Municipalities 130</td>
</tr>
<tr>
<td></td>
<td>SIVU 58</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIVOM 75</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM 215</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EPCI’s with their own tax scheme</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Métropoles 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CU 14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CA 95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CC 669</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SAN 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Municipalities 130</td>
<td></td>
</tr>
</tbody>
</table>

Source: adapted from SINOE (2009)

Figure 3 – Local authorities of waste management in the French region of Ile de France

Source: adapted from SINOE (2009)
### Task 3 – Financial Flows

3. Institutional and legal framework

Table 2 – Recycling and recovery of packaging waste in France, in 2009 (Eurostat, 2011)

<table>
<thead>
<tr>
<th>Material</th>
<th>Packaging waste generated (ton)</th>
<th>Total recycling&lt;sup&gt;a&lt;/sup&gt; (ton)</th>
<th>Total recovery&lt;sup&gt;b&lt;/sup&gt; (ton)</th>
<th>Recycling rate (%)</th>
<th>Recovery rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass</td>
<td>3.133.377</td>
<td>1.966.000</td>
<td>1.966.000</td>
<td>62.7</td>
<td>62.7</td>
</tr>
<tr>
<td>Plastic</td>
<td>2.046.728</td>
<td>460.540</td>
<td>1.167.525</td>
<td>22.5</td>
<td>57.0</td>
</tr>
<tr>
<td>Paper and cardboard</td>
<td>4.283.537</td>
<td>3.721.400</td>
<td>4.124.698</td>
<td>86.9</td>
<td>96.3</td>
</tr>
<tr>
<td>Metals</td>
<td>717.684</td>
<td>432.289</td>
<td>437.088</td>
<td>60.2</td>
<td>60.9</td>
</tr>
<tr>
<td>Wood</td>
<td>2.641.660</td>
<td>500.000</td>
<td>673.000</td>
<td>18.9</td>
<td>25.5</td>
</tr>
<tr>
<td>Total</td>
<td>12.822.986</td>
<td>7.080.229</td>
<td>8.368.311</td>
<td>55.2</td>
<td>65.2</td>
</tr>
</tbody>
</table>

<sup>a</sup> Total recycling includes material recycling and other forms of recycling like composting;

<sup>b</sup> In France, total recovery includes total recycling and incineration with energy recovery.
4. Financial transfers

4.1 Introduction

In France, the Eco-Emballages only supports the household packaging waste flow. The green dot value, paid by packaging producers, should cover 60% of the costs of collection and treatment services carried out by local authorities until 2010. In order to achieve the new national target of 75% of household packaging waste recycling, imposed by the Grenelle Act, a new agreement (called Barème E) was established for the financial support given to local authorities (EIMPack, 2011b), aiming to cover 80% of the selective collection and sorting of the (benchmark) costs of packaging waste and coming into force for the period 2011-2016 (Eco-Emballages, 2011).

Figure 4 shows the model of funding for the recycling system of packaging waste.

Source: adapted from Eco-Emballages (2010b)

Figure 4 – Funding model for the recycling of household packaging waste in 2010
Task 3 – Financial Flows

4. Financial transfers

The non-household packaging waste flow has been supported by packaging recyclers through voluntary base specific structures in order to help enterprises comply with the national regulations (ADEME, 2008). In 2008, about 63% of the packaging placed on the French market was non-household packaging (and more than 50% was recycled). ADEME (2008) also anticipated that this trend would continue in the next years. Although the total amount of non-household packaging waste produced is representative, this flow will not be covered by this study.

4.2 Green dot scheme

In France, the management of household packaging waste is financed through the Green Dot fee (from the industry), the sale of sorted materials and local taxes on refuse collection (Eco-Emballages, 2010b). Packers and importers calculate their contribution (i.e. the Green Dot fee) according to the method described below.

The Green Dot fee comprises a variable component (weight fee) and a fixed component (unit fee). The weight fee is determined by multiplying the total weight of each packaging placed on the market by the respective fee (that varies with the type of material, as table 3 shows).

**Table 3 – Green dot fee for 2010 (PRO EUROPE, 2011)**

<table>
<thead>
<tr>
<th>Fees by packaging material</th>
<th>(€/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass</td>
<td>0,0045</td>
</tr>
<tr>
<td>Plastic</td>
<td>0,2222</td>
</tr>
<tr>
<td>Paper and cardboard</td>
<td>0,1526</td>
</tr>
<tr>
<td>Steel</td>
<td>0,0282</td>
</tr>
<tr>
<td>Aluminium</td>
<td>0,0566</td>
</tr>
<tr>
<td>Others</td>
<td>0,1526</td>
</tr>
</tbody>
</table>

Concerning the unit fee, it depends on the value achieved for the weight fee. If the weight fee is greater than or equal to € 0,0014, the unit fee is a flat rate of € 0,0014. If the contribution on weight is less than € 0,0014, the unit fee is equal to the weight contribution
and the total fee is twice the weight fee. In case of packages weighting more than 1 kg their contribution to the “weight fee” is limited to 1 kg.

In 2010, the industry (encompassing 49,200 economic operators – covered by 22,771 contracts – that are members of the Eco-Emballages system) transferred a total of 518 million euros in contributions to Eco-Emballages (Eco-Emballages, 2011), which aimed to cover 60% of the (benchmark) costs.

4.3 Financial support for local authorities

As we have seen, companies pay the Green Dot fee to Eco-Emballages in order to transfer their responsibility for packaging waste recovery. Eco-Emballages must use these resources to cover operating expenses and fund the selective collection and sorting activities carried out by local authorities. 2010 was a transitional year where Eco-Emballages was still adapting to the requirements of the Grenelle Act on environmental issues. In fact, the Green Dot company only had to cover 60% of the efficient benchmark costs that local authorities had with the selective collection and sorting activities, but this value will have to reach about 80% until the end of 2012. Besides this significant source of revenue, local authorities also rely on the sale of sorted materials and on the tax-payers contributions.

In 2010, the financial support for the local authorities (FSLA) was calculated based on their performance and the take-back quantities for different packaging materials. The model for FSLA calculation is indicated in Table 4.

The quantities of materials taken back should be in accordance with material standards (see Eco-Emballages and Adelphe, 2011) documented and reported by local authorities and guarantors. The corresponding support and performance for each material are indicated in table 5.

For local authorities, with different selective collection structures for coloured glass and colourless glass, the financial support for the colourless one is 7 €/t. The financial support for the coloured glass is then calculated according to the model referred to (Table 4).


Table 4 – Financial support by local authority performance

<table>
<thead>
<tr>
<th>Level</th>
<th>Performance (P) in Kg/inh./year</th>
<th>Financial Support (S) in €/t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>P ≤ Nb</td>
<td>( S = S_b )</td>
</tr>
<tr>
<td>2</td>
<td>Nb &lt; P ≤ Nh</td>
<td>( S = \frac{(Nb \times Sb) + (P - Nb) \times S_i}{P} )</td>
</tr>
<tr>
<td>3</td>
<td>Nh &lt; P ≤ Np</td>
<td>( S = \frac{(Nb \times Sb) + (Nh - Nb) \times S_i + (P - Nh) \times S_p}{P} )</td>
</tr>
<tr>
<td>4</td>
<td>P &gt; Np</td>
<td>( S = \frac{(P - Np + Nb) \times Sb + (Nh - Nb) \times S_i + (Np - Nh) \times S_p}{P} )</td>
</tr>
</tbody>
</table>

Where:

\( S_p \) – plafond support; \( S_i \) – intermediary support; \( S_b \) – bottom support; 
\( Nb \) – lower level; \( Nh \) – high level; \( Np \) – plafond Level.

**Source:** adapted from Eco-Emballages (2010c)

Table 5 – Values of the variables to calculate the financial support per material

<table>
<thead>
<tr>
<th>Material</th>
<th>( Nb )</th>
<th>( Nh )</th>
<th>( Np )</th>
<th>( S_b )</th>
<th>( S_i )</th>
<th>( S_p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>45</td>
<td>62.5</td>
<td>80</td>
</tr>
<tr>
<td>Aluminium</td>
<td>0.1</td>
<td>0.2</td>
<td>1</td>
<td>230</td>
<td>280</td>
<td>330</td>
</tr>
<tr>
<td>Paper/Cardboard(^3)</td>
<td>4</td>
<td>8</td>
<td>18</td>
<td>120</td>
<td>200</td>
<td>280</td>
</tr>
<tr>
<td>Plastic</td>
<td>1.6</td>
<td>3.2</td>
<td>8</td>
<td>310</td>
<td>575</td>
<td>840</td>
</tr>
<tr>
<td>Glass</td>
<td>15</td>
<td>30</td>
<td>45</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>EMR(^4)</td>
<td>4</td>
<td>8</td>
<td>18</td>
<td>60</td>
<td>100</td>
<td>140</td>
</tr>
</tbody>
</table>

**Source:** adapted from Eco-Emballages (2010c)

For metals derived from incineration and composting, the financial support is indicated in table 6.

### 4.4 Complementary supports

Besides the recycling of packaging waste, Eco-Emballages also funds the packaging waste incinerated with energy production (whether for electricity, heat or both by

---

\(^3\) mixture of various qualities of used paper and cardboard packaging, free from newspapers and magazines and liquid packaging cardboard.

\(^4\) mixed recovered paper and board (unsorted paper and board, separated at source).
cogeneration) or the MBT for composting. These financial supports are calculated based on amounts treated (in tonnes) and a unit support fee (in €/t). In Annex II, all requirements associated with the additional supports calculation are clarified.

Table 6 – Metals from incineration and composting

<table>
<thead>
<tr>
<th></th>
<th>Incineration</th>
<th>Composting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>12 €/t</td>
<td>45 €/t</td>
</tr>
<tr>
<td>Aluminium</td>
<td>75 €/t</td>
<td>230 €/t</td>
</tr>
</tbody>
</table>

Local authorities may have their funding increased depending on their global performance rate (TPG, in French acronym) or if they serve a restricted group of population (buildings and/or dispersed rural housing).

Other transfers are carried out by the Green Dot company, such as financial supports for optimization and communication. Supports for optimization are given to local authorities that serve more than 10,000 inhabitants and propose, by a contract with Eco-Emballages and ADEME, to report all costs of their waste management systems (including selective collection and sorting of household waste) and to identify the main factors that promote a technical, economic and social improvement of their systems. The support provided for communication compels the local authorities to report an annual communication plan specifying all measures, tools and resources required for communication on the selective collection and sorting of household packaging waste. To make local authorities able to receive support for capacity building, an annual report, including all the communication activities carried out by sorting ambassadors, is required.

In 2010, the direct funding paid to local authorities amounted to 416 million euros (Eco-Emballages, 2011). The new agreement, already mentioned in this report, aims to encourage a higher performance of the local authorities’ service with the increase of FSLA (according to a coefficient of increase of recycling performance) on the one hand and, on the other hand, to strengthen preventive measures to encourage the eco-design, raising the green dot fees.
4.5 Sale of sorted materials

The sale of sorted packaging waste to guaranters / recyclers corresponds to another financing source for selective collection and sorting activities beyond the financial support of the Eco-Emballages. Take-back prices of materials are set out according to the specific take-back scheme (Option Filières, Option Federations and Option Individual) chosen by each local authority (see EIMPack, 2011b). However, the same local authority can choose different options for different materials.

Table 7 shows the take-back prices of several packaging materials applied in 2010 for each take-back option. In some cases, the average take-back values varies significantly since the negotiation of materials price is made directly with the recycling industry in the last two options, either through the national federations or individually. However, Adelphé estimates that the quality of the materials should not differ greatly in the three options because, in general, the recycling operators are the same (Adelphé, 2010).

Table 7 – Take-back prices in 2010 (Adelphé and Eco-Emballages, 2011)

<table>
<thead>
<tr>
<th>Material</th>
<th>Option Filières</th>
<th>Option Federations</th>
<th>Option individual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Price</td>
<td>Avg Price</td>
<td>Price Range</td>
</tr>
<tr>
<td>Steel from selective collection (packs)</td>
<td>111,6</td>
<td>126,4</td>
<td>79-174</td>
</tr>
<tr>
<td>Steel from bottom ashes</td>
<td>41,5</td>
<td>49,3</td>
<td>6-93</td>
</tr>
<tr>
<td>Aluminium from selective collection</td>
<td>451</td>
<td>499,3</td>
<td>348-651</td>
</tr>
<tr>
<td>Aluminium from bottom ashes</td>
<td>552</td>
<td>635,8</td>
<td>573-998</td>
</tr>
<tr>
<td>Plastics</td>
<td>196,3</td>
<td>189,6</td>
<td>151-229</td>
</tr>
<tr>
<td>Paper/cardboard</td>
<td>72,3</td>
<td>75,6</td>
<td>55-96</td>
</tr>
<tr>
<td>Glass</td>
<td>22,42</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

n.a. – not available
The values presented in table 7 were the highest after 18 months of economic crisis, leading to a strong increase in the revenue generated by local authorities which was around 158 million euros in that year (Adelphe, 2010).

4.6 Local taxes

The tax-payer contributions partially fund the cost of household waste collection and treatment and, in particular, of packaging waste selective collection and sorting, as can be seen in Figure 5.

![Figure 5 – General funding scheme of household waste collection and treatment](source: adapted from SIVaTRU (2010))

Local authorities can opt for financing the services through a tax on household waste disposal (TEOM in French acronym), a fee for household waste disposal (REOM in French acronym) and/or their general budget (see EIMPack, 2011b).

According to AMORCE and ADEME (2010), TEOM is the most used option, being adopted in 67.7% of the local authorities in 2009 (using or not the general budget as a complementary financial support).

In 2009, the amount received through TEOM was about 5 billion euros (for waste management) while the REOM contributed with 522 million euros (AMORCE and ADEME, 2010).
5. Economic analysis methodology

The present report intends to analyse the economic viability of packaging waste recycling in France. The methodology is based on an economic-financial model which establishes a balance between costs and benefits allocated to the activities of selective collection and sorting carried out by local authorities.

On the costs side, the costs of operation and maintenance (taking into account the cost associated with service provision), depreciations of fixed assets and return on capital employed (debt and equity) were considered in the financing of fixed assets allocated to the activities referred to above.

Regarding the benefits, the aspects taken into account were the FSLA (carried out by the Eco-Emballages), the sale of packaging materials (through the option Filière, Federations or Individual), the financial support and sale of non-packaging materials (as newspapers and magazines) and government grants (where applicable). In an economic perspective the savings from the diversion of packaging waste of refuse collection circuits and landfilling were also considered as another benefit.

Figure 6 shows the various variables assumed in the economic analysis. The costs and benefits were calculated based on tonnes of packaging waste taken back (quantities that are effectively financed by the Green Dot Company). In order to establish an international comparison, the analysis was also performed based on tonnes collected.

Forty five local authorities, in charge of collection and treatment of household waste, were analysed. They are located in several French regions (covering about 20% of the National population), where the largest sample corresponds to the Ile de France region, as shown in Table 8. Some of the required variables were obtained from the annual activity reports for the year 2010.
Figure 6 – The benefits and cost of recycling in France

However, the majority of the information used was obtained directly by the local authorities (through their annual account and activity reports).

Regarding the financial support, the other revenues are related to the sale of non-packaging paper (discarded in drop-off containers), among others and the subsidies are accounted for annually and adjusted in the same proportion as the depreciation of the assets. The “other benefits”, obtained from the waste diverted from landfill, were calculated considering the costs of refuse collection and the other types of waste treatment, being calculated separately and according to equations (1) and (2).
5. Economic analysis methodology

\[
\text{Costs avoided with refuse collection (€/year)} = \text{Unit cost of refuse collection (€/t)} \times \text{Quantity of waste selectively collected (t/year)} \tag{1}
\]

\[
\text{Costs avoided with waste treatment (€/year)} = \text{Unit cost of treatment and disposal (€/t)} \times \text{Quantity of waste taken back (t/year)} \tag{2}
\]

Table 8 – Type and number of local authorities used for the cost-benefit analysis

<table>
<thead>
<tr>
<th>Region</th>
<th>Local authorities</th>
<th>Type</th>
<th>Number</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ile de France</td>
<td>SIVU</td>
<td>1</td>
<td>5.660.214</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SIVOM</td>
<td>1</td>
<td>173.519</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>16</td>
<td>3.760.967</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CA</td>
<td>1</td>
<td>191.795</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>19</td>
<td>9.786.495</td>
<td></td>
</tr>
<tr>
<td>Rhône-Alpes</td>
<td>SIVU</td>
<td>1</td>
<td>98.300</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>2</td>
<td>403.086</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>6</td>
<td>449.608</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CA</td>
<td>1</td>
<td>404.196</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>10</td>
<td>1.017.314</td>
<td></td>
</tr>
<tr>
<td>Bretagne</td>
<td>SM</td>
<td>3</td>
<td>278.841</td>
<td></td>
</tr>
<tr>
<td>Picardie</td>
<td>CA</td>
<td>1</td>
<td>51.500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>2</td>
<td>13.777</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>3</td>
<td>65.277</td>
<td></td>
</tr>
<tr>
<td>Centre</td>
<td>SM</td>
<td>2</td>
<td>89.718</td>
<td></td>
</tr>
<tr>
<td>Pays-de-la-Loire</td>
<td>SM</td>
<td>1</td>
<td>34.719</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CU</td>
<td>1</td>
<td>306.504</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td>2</td>
<td>341.223</td>
<td></td>
</tr>
<tr>
<td>Aquitaine</td>
<td>SM</td>
<td>1</td>
<td>189.448</td>
<td></td>
</tr>
<tr>
<td>Auvergne</td>
<td>CA</td>
<td>1</td>
<td>78.000</td>
<td></td>
</tr>
<tr>
<td>Haute-Normandie</td>
<td>CA</td>
<td>1</td>
<td>243.348</td>
<td></td>
</tr>
<tr>
<td>Midi-Pyrénées</td>
<td>CA</td>
<td>1</td>
<td>71.869</td>
<td></td>
</tr>
<tr>
<td>Poitou-Charentes</td>
<td>SM</td>
<td>1</td>
<td>240.000</td>
<td></td>
</tr>
<tr>
<td>Provence-Alpes Côte d'Azur</td>
<td>SM</td>
<td>1</td>
<td>168.513</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>45</td>
<td>12.570.046</td>
<td></td>
</tr>
</tbody>
</table>

20
The previous equations are based on the variables and values presented in Table 9.

Table 9 – Variables and values used in the methodology

<table>
<thead>
<tr>
<th>Value</th>
<th>Observation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit costs of refuse collection</td>
<td>85 €/t</td>
<td>These assumptions were taken from a study conducted by Eco-Emballages, using a sample of 369 local authorities and considering the different types of collection (as detailed in chapter 2). Eco-Emballages (2010a)</td>
</tr>
<tr>
<td>Unit cost of other treatment (incineration, landfill, MBT)</td>
<td>96 €/t</td>
<td></td>
</tr>
</tbody>
</table>

Efficiency:
- Glass 99%
- BCMPJ 80%
- BCMP 80%
- BMP 76%
- CJ 95%
- J 98%

Notes:
- B – Composite packaging for foodstuffs (*Briques alimentaires* in French)
- C – Cardboard packaging (*Cartons* in French)
- M – Metal packaging (*Métaux* in French)
- P – Plastic packaging (*Plastiques* in French)
- J – Newspapers (*Journaux* in French)

The percentage of packaging waste that is rejected in the sorting process is usually incinerated; hence this cost is not avoided (note that for mixed flows this percentage is not irrelevant).

On the costs side, the operational costs of selective collection and sorting and the depreciation of the assets allocated to these activities were obtained from the survey results and from the annual accounts of the local authorities. Concerning the return of capital employed on the investments made on selective collection and sorting equipment and infrastructure, it was calculated through equations (3) and (4).  

---

5 WACC – Weighted Average Cost of Capital
Task 3 – Financial Flows

5. Economic analysis methodology

\[
\text{Return on capital employed (€/year)} = \frac{(\text{Depreciation-subsidies} - \text{WACC}) \times (\text{Useful life of the assets} - \text{WACC})}{\text{WACC}} (3)
\]

\[
\text{WACC} = \frac{\text{Cost of equity} \times \text{Equity}}{(1 - \text{marginal corporate tax})} + \frac{\text{Cost of debt} \times \text{Debt}}{} (4)
\]

The values of the variables are presented in table 10.

Table 10 – Variables used to measure the return on capital employed

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Useful life of the assets (years)</td>
<td>9,6</td>
<td>This value was achieved considering the assets and their depreciation. This value was weighted by the waste selectively collected.</td>
</tr>
<tr>
<td>Cost of equity (%)</td>
<td>6,0</td>
<td>This value takes into account a non-risk (of 3%) and a risk premium (of 3%, related to the German Treasury Bonds).</td>
</tr>
<tr>
<td>Equity in the capital structure (%)</td>
<td>19</td>
<td>This value was defined considering the weight that equity has on the capital structure of the utility (i.e. in relation to the liability). This value was weighted by the waste selectively collected.</td>
</tr>
<tr>
<td>Marginal corporate tax (%)</td>
<td>11,1</td>
<td>This value was taken from the General Tax Code of France (33,3 / 3 %) because only about one third of French companies paid this tax (CFE, 2011).</td>
</tr>
<tr>
<td>Cost of debt (%)</td>
<td>4,5</td>
<td>This value was achieved considering the average interests paid for the utilities’ loans. This value was weighted by the waste selectively collected.</td>
</tr>
</tbody>
</table>
6. Economic analysis of Recycling

The balance between the economic and financial costs and benefits of selective collection and sorting activities, undertaken by the 45 selected French local authorities, was computed and the graphical result is shown in Figure 7. Two different analysis were developed, the first one is based on the waste collected (the one internationally used) and the second one on the waste recovered, taking into account the services’ efficiency (and allows us to know the real cost of each ton of recycled material).

Regarding both analyses performed, it was found that, on average, the costs and benefits per tonnes taken back are significantly higher (about 60%) than the ones per tonnes collected. In the first case, local authorities benefited 526 € per tonne of packaging waste sorted and sent for recycling in 2010. In a strictly financial perspective (not taking into account the opportunity costs and without any public money), the benefits represented only 223 € per tonne. On the other hand, each tonne of packaging waste sent to the recycling system of local authorities had a total cost of 389 € per tonne. Based on tonnes collected, the economic costs and benefits decreased to 232 € per tonne and 314 € per tonne, respectively.

The cost recovery is around 135%, from an economic perspective but only 57% if the cost savings due to recycling are not taken into account. Assuming that the financial transfers should follow an economic approach, the FSLA, for 2011, could be eliminated. However, if the industry was 100% responsible for the processing of their waste packaging, the FSLA should have increased about 121%.
Unexpectedly, the results show that the depreciation of assets and the return on capital represents a small share in the total costs of the recycling system in France. This could mean that outsourcing and private sector participation in this market is quite relevant for this country. Perhaps these capital costs are embedded in the operational expenditures of the local authorities.

Concerning the recycling of each flow of packaging waste, there are several distinct characteristics that should be considered when computing unit costs. Although the local authorities did not provide information on the cost per flow, Eco-Emballages (2010) reported these values for the selective collection service; costs are estimated to be of 72 € per tonne collected for glass, 167 € per tonne collected for paper and cardboard and, finally, 788 € per tonne collected for plastic and metals. Figure 8 separates the service costs into the costs of selective collection and the costs of sorting of packaging waste in France.
From Figure 8, we may observe that the global cost of sorting is 142 € per tonnes effectively sent for sorting (not all packaging waste selectively collected is sorted), and the global cost of selective collection is 144 € per tonnes collected. These results show us that the recycling costs (selective collection + sorting) of the paper/cardboard and plastics/metal flows are substantially higher when compared to the costs of the glass flow (glass packaging waste is not sorted).

Figure 8 – Cost of a) selective collection and b) sorting for recycling system

Figure 9 represents the level of cost recovery in a strictly financial perspective of the service benefits. 

Figure 9 – Cost recovery of local authorities excluding subsidies and other benefits
Figure 9 shows the whole participation of the industry in the cost recovery of selective collection and sorting of packaging waste in France. In fact, only 56% of the cost is being supported by the industry. From this perspective, the sustainability of the service would require an increase of 125% of the FSLA.

Figure 10 illustrates the cost recovery of the service, considering also the subsidies to investment.

![Cost recovery of local authorities excluding other benefits](image)

From figure 10 it is observed that under a financial point of view the costs of selective collection and sorting are recovered only about 56%. Although we are considering here the subsidies, which in a situation of full recovery of service costs, this (public) money could be allocated (invested) in other services.

Although the French model of FSLA set the recovery of the service (benchmark) on 60%, according to our analysis FSLA only covered 35% of the costs of collection and sorting of packaging waste in 2010. This provides evidence that, globally, the actual costs of the service do not correspond to the ones defined as “benchmark costs".
The economic and financial model was also performed according to the population density of the local authorities. Thus, the sample was split into rural and urban utilities, corresponding to the following two levels: utilities with a population under 250 inhabitants per km² and over 250 inhabitants per km², respectively. Figures 11 and 12 show graphically the results for each level.

**Figure 11** – Cost coverage for local authorities under 250 inhabitants per km²

**Figure 12** – Cost coverage for local authorities over 250 inhabitants per km²
The best balance between costs and benefits was achieved by the rural authorities (i.e. under 250 inh/km²). In fact, the rural local authorities present, on average, unit operational costs lower than urban ones, as shown in Figure 13. This result may be due to the need for more investment on technology in order to deal with greater amounts of waste. Moreover, it can also be explained by the lower level of service efficiency in the urban areas.

![Figure 13 – Operational costs of local authorities based on quantities taken back](image)

The dispersion of local authorities according to their financial and economic benefits is similar (Figures 14 to 17). Obviously, a substantial increase in total benefits is noted, considering the economic approach. The great difference between the economic and financial approaches concerns the opportunity cost. Although it is not a cash flow, it corresponds to a real significant cost avoided by local authorities when the recycling plan is adopted. Regarding the analysis per tonnes taken back, that difference is variable (181
to 517 €/t) depending on the efficiency of the sorting process (among other externalities), while in the analysis per tonnes collected, the difference is constant (181 €/t).

Figure 14 – Economic benefits based on quantities taken back

Figure 15 – Financial benefits based on quantities taken back
Task 3 – Financial Flows

6. Economic analysis of Recycling

Figure 16 – Economic benefits of local authorities based on quantities collected.

Figure 17 – Financial benefits of local authorities based on quantities collected.
Figures 18 and 19 present the dispersion of local authorities according to their financial and economic cost recovery, respectively. In a strictly financial perspective, most local authorities achieve costs recovery rates less than 100%, as opposed to a scenario adopting an economic approach, which shows the relevance of considering (or not) the opportunity cost.

![Figure 18 – Cost recovery in a financial perspective](image)

![Figure 19 – Cost recovery in an economic perspective](image)
7. Concluding remarks

In France, the implementation of the European Directive 94/62/EC on PPW has been successful (at least in terms of recycling rates). Eco-Emballages has the main role managing the recycling system of the household flow. In 2010, the green dot value paid by the industry should cover 60% of net benchmark costs for an optimized waste service. The sales of packaging and non-packaging materials, government grants and local taxes should cover the remaining costs of collecting and sorting packaging waste.

This report intended to analyse the economic viability of packaging waste recycling in France. Therefore, an economic-financial model was applied, determining the balance between costs and benefits of selective collection and sorting activities. The methodology implemented included two innovative components: the return on capital employed, on the costs side, and the avoided cost (opportunity cost) with the refuse collection and other types of waste treatment, as a benefit.

The assessment of the opportunity cost in the economic-financial balance of selective collection and sorting of packaging waste seems to be quite relevant, since the cost of refuse collection and waste treatment avoided with packaging recycling were significant (304 € per tonne taken back and 181 € per tonne collected). Adopting this perspective, one might conclude that the financing model of French “recycling system” was sustainable in 2010. In opposition, financial benefits only covered 57% of the total service costs.

On the other hand, the analysis by typology (according to the population density) showed that the highest economic-financial balance is presented by the rural local authorities. The higher expenses on technology, the great volume of waste volume to manage, and perhaps the lower efficiency revealed by some urban utilities that show higher unit operational costs, might explain this unexpected result.
Finally, we should highlight that public authorities are bee encouraged to protect the environment and municipalities should educate their citizens so that they can adopt better practices in terms of urban waste management. In this regard, a new agreement (called \textit{Barème E}) between the Eco-Emballages and local authorities was established to face the new recycling targets (75% until the end of 2012) imposed by national legislation ("Grenelle Act"). This national effort intends to adjust the financial support for local authorities in order to encourage a better performance of waste collection and treatment of the public services in the next years.
References


References


Annexes
Annex I

Local authorities for waste collection and treatment by region

According to the database created by ADEME (SINOE, 2009)

Alsace Region

[Map showing local authorities by region]
Aquitaine Region
Auvergne Region

SIVU (Single-Purpose Intermunicipal Syndicate)
SIVDIM (Multiple-Purpose Intermunicipal Syndicate)
Mixed Syndicates

SIVU with own tax system:
- Metropoles
- Urban communities (CU)
- Agglomeration communities (CA)
- Communities of municipalities (CC)
- New agglomerations (SAN)

Municipal systems
Bourgogne Region

Task 3 – Financial Flows
Annexes
Centre Region
Champagne-Ardenne Region

- FCI without own tax system:
  - SIVU (Single-Purpose Intermunicipal Syndicate)
  - SIVOM (Multiple-Purpose Intermunicipal Syndicate)
  - Mixed Syndicates

- FCI with own tax system:
  - Métropoles
  - Urban communities (CU)
  - Agglomeration communities (CA)
  - Communities of municipalities (CC)
  - New agglomeration syndicates (SAN)

- Municipal systems
Corse Region

**Task 3 – Financial Flows**

**Annexes**

![Map of Corse Region with different regional structures highlighted, including SIVU (Single-Purpose Intermunicipal Syndicate), SIVOM (Multiple-Purpose Intermunicipal Syndicate), Mixed Syndicates, Métropoles, Urban communities (CU), Agglomeration communities (CA), Communities of municipalities (C2), and New agglomeration syndicates (SAN).]
Franche-Comté Region
Haute-Normandie Region
Languedoc-Roussillon Region
Lorraine Region

**EPCI without own tax system:**
- SHU (Single-Purpose Intermunicipal Syndicate)
- SWDM (Multiple-Purpose Intermunicipal Syndicate)
- Mixed Syndicates

**EPCI with own tax system:**
- Métropoles
- Liban communautés (CU)
- Agglomeration communautés (CA)
- Communautés of municipalities (CC)
- New agglomeration syndicates (SAA)

- Municipal systems
Midi-Pyrénées Region
Nord-Pas-de-Calais Region
Pays-de-la-Loire Region
Picardie Region

--

FCL without own tax system:
- SYU (Single-Purpose Intermunicipal Syndicate)
- SVDM (Multiple-Purpose Intermunicipal Syndicate)
- Mixed Syndicates

FCL with own tax system:
- Métropoles
- Urban communities (CU)
- Agglomeration communities (CA)
- Communities of municipalities (CC)
- New agglomeration syndicates (SAN)

- Municipal systems
Provence-Alpes-Côte d’Azur Region
Rhône-Alpes Region

- FPCI without own tax system:
  - SUU (Single-Purpose Intermunicipal Syndicate)
  - SIVOM (Multiple-Purpose Intermunicipal Syndicate)
  - Mixed Syndicates

- FPCI with own tax system:
  - Métropoles
  - Urban communities (CU)
  - Agglomeration communities (CA)
  - Communities of municipalities (CC)
  - New agglomeration syndicates (CAA)

- Municipal systems
Annex II

Eco-Emballages complementary financial supports for local authorities

Translation based on the original document (Eco-Emballages, 2010 c)

Financial Support for Energy Recovery

Access Conditions

The incineration of household packaging waste enables a financial support provided that the following conditions are met and fully justified:

- fulfillment of a global performance rate (TPG in the French acronym) of 25 % (overall);
- fulfillment of a performance of no less than 1Kg/inh./year and 2.5 kg/inh./year for the plastic and paper/cardboard materials, respectively;
- use of a facility in compliance with the standards and regulations in force;
- significant production of energy used, being an annual average beyond to the following thresholds:
  1. electricity production: 250 kWh/t of waste incinerated;
  2. heat only or cogeneration: 400 kWh/t of waste incinerated;
  3. in case of cogeneration, the calculation is performed by adding the electrical and thermal kWh.

Calculation

The support regarding energy recovery is the product of the quantity in tonnes and an unit support fee (€/ton):
- 55 €/t for energy recovery.
- 70 €/t for other forms of recovery.

**Amounts guaranteed**

The amounts guaranteed are supported based on the recovered quantities of matter, in the following proportion:

- One tonne for one tonne of aluminium.
- One tonne for one tonne of paper/cardboard.
- Three tonnes for one tonne of plastic bottles.

In any case the amount supported for paper/cardboard and plastics, both in material and energy recovery, cannot exceed the refuse of these materials after collection and for aluminum, the amount supported through energy recovery may not exceed 25% of the refuse (fraction considered to be the share of flexible aluminium, excluding the aluminium from the composite and complex materials).

The rules established above are applied to a local authority which eliminates all residual waste by incineration. The amount determined shall be allocated (as appropriate) on a proportional basis reflecting a partial elimination by incineration in accordance to the incineration rate as follows:

\[
\text{Incineration rate} = \frac{\text{Tonnes of household waste incinerated (including composting and selective collection refuse)}}{\text{Total treated tonnes (except selective collection)}}
\]

On the other hand, the Global Performance Rate (TPG) is calculated from the following formula (cannot exceed 100%):

\[
\text{TPG} = \left( \frac{\text{Perf Metal}}{\text{tonnage Metal}} + \frac{\text{Perf P/C}}{\text{tonnage P/C}} + \frac{\text{Perf Plast}}{\text{tonnage Plast}} + \frac{\text{Perf glass}}{\text{tonnage glass}} \right) / 4
\]
Where the performances of the corresponding material (in kg/inh./year) are:

AC = steel from selective collection
AL = aluminium from selective collection
ACB = bottom ashes steel
ALB = aluminium extracted from bottom ash
ACA = quality steel extracted from compost similar to the selective collection (double grinding)
ALA = quality aluminium extracted before and after compost comparable to the selective collection
PC = household paper/cardboard from selective collection
COMP = paper/cardboard composted or anaerobic digested eligible for financial support
PL = plastics of selective collection
V = glass

Financial Support for Composting and Anaerobic Digestion (or Methanisation)

Local authorities are entitled with a support per tonne of paper and cartons of household packaging waste composted provided that this material is, at least in part, effectively treated in a composting facility.

Support for composting

This support is calculated by the product of quantity financed and the unit support fee of 75 €/t.

The supported tonnages correspond to the national average waste production subtracting the total of waste treated by other treatments except selective collection.
Support for methanisation

The quantities (tonnes) of paper/cardboard (EMR type) from organic fraction of household waste collection, which are conducted to a methanisation facility, are financed as the composting support.

The quantities (tonnes) of paper/cardboard (EMR type) from refuse collection are financed as the energy recovery support. The financial support for paper/cardboard (EMR type) is equal to the amount provided for composting (75 €/t), subsidized as follows, in case of biogas recovery:

- + 5 €/t if the value in electricity alone has an average yield > 100 kWh per tonne digested. The unit support will be 80 €/t.
- + 15 €/t if the value in cogeneration or heat alone has an average yield > 200 kWh per tonne digested. The unit support will be 90 €/t.
- + 25 €/t if the biogas is recovered in biofuel. The unit support will be 100 €/t.

Extra Support for the Sorted Materials

Local authorities can see their financing increased in three ways:

1. Extra support by their global performance – It is applied to the local authorities that serve more than 50% of their population and recycle the five materials. The extra support is achieved applying a multiplier coefficient of supports (per tonne) for sorted materials from selective collection. This coefficient is indexed to the global performance rate (TPG):

- For TPG < 25 %, coefficient = 1.
- For TPG between 25% and 50%, coefficient = 0.7 +1,2 x TGP.
- For the local authorities with a vertical housing rate\(^1\) equal or higher to 30%, the formula is 1 +0,6 x TPG (the coefficient 1 to 25% is 1,15).
- For TPG between 50% and 100%, the coefficient is 1,3.

---

\(^1\) Vertical housing rate is the ratio of number of dwellings in buildings with 4 floors or more and total number of housing land.
2. **Extra support for vertical housing** – This support is due to for local authorities with over 10,000 inhabitants and serving more than 50% of their collective housing. It is calculated as follows:

\[
\% \text{ extra support} = 0.6 \times (\text{vertical housing rate} \ (THV \text{ in French acronym}) \times 100)
\]

3. **Extra support for the dispersed rural housing** – The application of this extra support applies only to local authorities that serve more than 10,000 inhabitants and with a population density lower than 70 inh./km². This support takes the form of an extra financing (per sorted tonne) for the metals, paper/cardboard and plastics packaging waste from selective collection, calculated as follows:

\[
\% \text{ extra support} = (1 - \text{THV}) \times 0.5 \times (70 - d) \times S / 1000
\]

where:

- \(d = (\text{total population} - \text{population in a vertical housing}) / S;\)
- \(S = \text{local authority influence area (km}^2)\).

if \(S < 1000 \text{ km}^2\), the following formula is applied:

\[
\% \text{ extra support} = (1 - \text{THV}) \times 0.5 \times (70 - d)
\]

**Financial Support for Optimization**

Local authorities have the opportunity to engage a process for improving their selective collection systems of household packaging waste in several technical, economic, social and environmental aspects. Selective collection cannot be analysed independently of the other types of collection and the household waste treatment. Therefore, the means are often shared with ADEME as part of its observatory costs whose mission includes the implementation of procedures to ensure the quality of information and obtained results. The data obtained will be in strict accordance with the rules of confidentiality. The optimization process can be accomplished in three steps:

- the first phase is the knowledge of the costs, including collection and sorting;
- the second phase is the knowledge of the levers to improve the selective collection and sorting operation in its technical, economic and social aspects;
- finally, the practical implementation of these levers for improvement.
This support is proposed to achieve the first two steps for local authority or group of local authorities, which serve more than 10,000 inhabitants, through a contract.

**Support for knowledge of costs (SCC in French acronym)**

The fixed amount for this support is 0.5 € per inhabitant served, by more than one year for the selective collection of five packaging materials in accordance with those Standards.

This support helps funding a study to be conducted in one or more steps over a period of three years, at most, after signing the contract with Eco-Emballages. Support shall be paid the local authority that is obliged to submit the final report of the study.

This study will focus mainly on the cost of collection, but also on the treatment. On the other hand, the study should not focus only on the sorting operations. It should be performed with a software (or other tools previously approved) supplied by Eco-Emballages or ADEME, which guarantee the users training.

**Support for knowledge of optimization levers (SCLO in French acronym)**

The fixed sum for this support is 0.5 € per inhabitant covered by the study referred above, being restricted to local authorities that had to report the economic results and received the support for knowledge of costs.

The study identifies the levels of optimization and quantifies the impacts caused by implementation of these levers.

**Financial Support for Communication**

Supports for communication about selective collection of household packaging waste are given to local authorities in two forms:

1. for reporting the awareness actions and information tools of how citizens should separate their used packaging.
2. for training related to the waste separation (including animations, school activities, etc.).
In the first case, the support is calculated based on a limit value of 0.6 € per inhabitant covered (and per year). For local authorities, covering more than 10,000 inhabitants, total support may not exceed 50% of the incurred expenditure, excluding staff costs. For local authorities, serving less than 10,000 inhabitants, total amount supported may not also exceed 50% of incurred expenses but including personnel costs up to 0.3 € per inhabitant and the deductions of other subsidies.

Therefore, local authorities must carry out an annual communication plan with respective budget and schedule, approved by the deliberative bodies, and report to Eco-Emballages by 30 June of each year.

In the second case, the financial support is 10,000 € per year and per ambassador employed dedicated exclusively to selective collection of household packaging. If the ambassador dedication is not exclusive, the financial support is 10,000 € per year * ETP (French acronym), the latter being the percentage of dedication full-time equivalent. In this case, the number of funded ambassadors (N) is calculated using the following formula:

\[ N = \frac{(\text{population covered}) \times (1 + \text{THV})}{20,000} \]

where, THV is the vertical housing rate.

The training coordinator can also be financed if he coordinates five ambassadors supported by the Green Dot company.