POSITIONING AND COMPETITIVENESS OF RECYCLING INDUSTRIES IN FRANCE

June 2014

Study conducted by RDC Environment and AJI-Europe on behalf of ADEME (French Environment and Energy Management Agency), Minister of the Economy, Production Recovery and the Digital Sector (DGCIS) and Minister of Ecology, Sustainable Development and Energy

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Positioning and competitiveness of recycling industries in France - Abstract
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1. Preface

This report, commissioned by ADEME, the Ministry of Productive Recovery (DGCIS) and the Ministry of Ecology, Sustainable Development and Energy (DGPR), is being published as the Ministry of Ecology prepares to publish the French waste management plan for 2014-2025 based on the works conducted by the National Waste Council (Conseil National des Déchets (CND)) and after adoption of the Recycling and Green Materials plan within the framework of the works on New Face of Industry in France.

Based on a target of landfilling less than 50% of wastes compared to 2010, the waste management plan aims to create a strong and competitive French recycling industry at the European level in less than 10 years... The Recycling and Green Materials plan aims at structuring this industrial sector in order to meet the needs and improve the competitiveness of the sector.

Reaching the various targets fixed in the waste management plan should increase the recycling of raw materials by 4.3 million tons by 2025 compared to 2010 (7.8 million tons if wastes sent to composting and methanisation facilities are included). New investment opportunities will develop to build new recycling plants, which will create thousands of new long term jobs.

This report presents some success stories and recommendations for investors based on the visits of 79 European recycling plants working in one or more of 13 recycling sectors analyzed.

The competitive factors are identified and analyzed in this report. In some cases, the market conditions need to be improve to increase the competitiveness of the sectors. The public authorities will have to support the development of more favorable market conditions to spur development of innovative facilities in France. For example, Investment programs like the “Investments for the Future” multiyear program (part on the circular economy) will help the recycling sector become more competitive.

The transition from a linear economy toward a circular economy cannot rely solely on recycling. However, recycling is a key pillar necessary to create a lower resource consumptive economy with lower environmental impact and more resiliency.

**Important note relative to the scope of this study:** the 13 sectors do not cover all of the recycling industries. Additionally, the conclusions pertaining to value creation and the job gains sometimes cover only part of the value chain studied and not the entire value chain of the sectors, since the purpose of the report is to analyze the most sensitive or potential parts of the recycling industry.
2. **Context**

At the national and European levels, recycling contributes in varying degrees to increase of raw material supply and procurement security for industry. This contribution has grown steadily during the last 20 years; the share (in tonnages) of recycled raw materials used in basic industry as a percentage of total raw materials has risen from less than 30% in 1990 to more than 40% today.

Nevertheless, since the beginning of the 1990s the recycling markets continue to face rapid and structural changes linked on one hand to price increases and the increased volatility of raw material and energy prices, and on the other hand to the strengthening of environmental regulations relative to waste at the European level.

Moreover, in the context of increasing openness of recycling markets in Europe to the world market, the choices of localization of these investments have been influenced by a certain number of regional or national factors. Among those factors, the following elements played a key role in the implementation of industrial decisions:

- The characteristics of the industrial ecosystem of the territory,
- The modalities and the level of regulatory implementation at the territory scale
- The implementation of juridical and economic instruments that are positive to recycling.

As a result of all these factors, investments have been sustained globally, but these vary among the European countries and regions, the sectors and the recycling chain links considered. In most of the mature sectors (e.g., paper-cartons, scrap iron, pneumatics), in particular in France, the economic situation of recycling activities downstream of the recovery process has deteriorated sharply in recent years, leading to multiple site closures.

In some European countries, the recycling capacities of basic industries appear to have been generally maintained or even increased. This is particularly the case for the German and Spanish paper industries, and the Italian steel industry. Conversely, everywhere in Europe, the recovery activities upstream of these sectors have experienced steady growth over the last decade, driven by investments in new units and new equipment for dismantling, shredding, sorting, conditioning, etc.

Finally, other recycling sectors emerging today offer new investment opportunities in the European territory, whether it be related to extraction of new material from the incoming recycling streams in the recycling process, or strategic positioning of new waste sources with high growth potential in the coming years. Many recent studies have highlighted the recycling potential of some “strategic metals” essential for some key applications in electronics, transport, energy, etc.

All of these evolutions are at the heart of strategic thinking of industries and public authorities, whether within the workgroup “industrial waste recovery” (GT VID), within the Strategic Committee of Eco-Industries Sectors (COSEI), the workgroup “R&D in the economics of materials, substitution, recovery and recycling,” or the Committee for Strategic Metals (COMES). They raise the question of competitiveness of our industrial recycling parks.

3. **Objectives**

The objective of the study conducted by the consortium RDC Environment/AJI-Europe in 2013 and 2014 is to perform a “strengths/weaknesses” analysis of industrial recycling capacities in France, to identify and measure possible under- and over-capacities and to compare industrial recycling facilities with those in Germany, the United Kingdom, the Benelux, Italy and Spain.

The study also must identify recycling operations with high added value and with re-industrialization potential in our territories, including use of import target streams to benefit from interesting scale effects. Finally, the study should also provide background information relative to the export potential: depending on the sector, evaluate when and at what level of preparation/refining it makes sense to export material or products developed, creating maximum value on our territory before export.
This work should help develop public tools used for recycling and encourage the investment decisions of private companies in the priority sectors.

The Steering Committee (COPIL) of the study was composed of representatives of ADEME, the Ministry of Productive Recovery (DGCIS) and the Ministry of Ecology, Sustainable Development and Energy (DGPR). The Monitoring Committee (COSUI) was composed of representatives of professionals of the selected recycling sectors, including selected members of the GT VID, the COSEI, the GT Recycling, and qualified persons designated by the COPIL.

4. Scope of Study

On the basis of a list of 32 sectors proposed by ADEME, a first analysis was conducted to determine which sectors would be the focus of this study. This work led to the selection of 13 sectors.

Two criteria underlie the methodology used for this selection:

- On one hand, the selected sectors must represent significant competitiveness stakes (in added value, in employment …)
- On the other hand, the selection must reflect the diversity of contexts and situations encountered in recycling activities in France.

<table>
<thead>
<tr>
<th>List of 13 sectors selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>12</td>
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<tr>
<td>13</td>
</tr>
</tbody>
</table>
5. Methodology

The following diagram summarizes the methodology used for this study.

**Figure 1 : Methodology**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MEANS</th>
</tr>
</thead>
</table>
| 32 sectors proposed by ADEME → 13 sectors selected | • Bibliographic analysis
• Experts consultations
• Steering and Monitoring Committees consultations |

**Monograph for each sector**
- Trends and dynamic of recycling in France
- Overview of the recycling capacities in Europe
- Economic data
- SWOT analysis of recycling in France
- Levers

**SYNTHESIS AND KEY FINDINGS**
- Evaluation of the competitiveness by sector
- Position of the obstacles to competitiveness in the recycling chain
- Time horizon of the issue of creation / maintenance of the activity
- Potential levers
- Issues in terms of added value and employment
- Cross-analysis of the sectors
- Prioritization of sectors

**5.1. Links in the recycling chain**

For each sector, the study has targeted one or several link(s) within the recycling chain for which the competitiveness issues are the most important. The links considered are shown in the diagram below.

**Figure 2 : Part of the recycling chain covered by the visits within each sector**

<table>
<thead>
<tr>
<th>RECYCLING CHAIN</th>
<th>Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste production</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13</td>
</tr>
<tr>
<td>Collection</td>
<td>⬜️ ⬜️ ⬜️ ⬜️ ⬜️ ⬜️ ⬜️</td>
</tr>
<tr>
<td>Pre-treatment (dismantling, de-pollution, sorting, shredding, etc.)</td>
<td>⬜️ ⬜️ ⬜️ ⬜️ ⬜️ ⬜️ ⬜️</td>
</tr>
<tr>
<td>Production of recycled raw material</td>
<td>⬜️ ⬜️ ⬜️ ⬜️ ⬜️ ⬜️</td>
</tr>
<tr>
<td>Incorporation / Use of recycled raw material</td>
<td>⬜️ ⬜️ ⬜️ ⬜️ ⬜️</td>
</tr>
</tbody>
</table>

5.2. Sites visits

Seventy-nine site visits were conducted. The purpose of the visits was to compare and deepen the first analysis of the sector and gather the views of industry on the levers necessary to improve competitiveness.

Table 1: List of sites visited

<table>
<thead>
<tr>
<th>Sector</th>
<th>France</th>
<th>Out of France</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Polyolefins (industrial; commercial and agricultural films)</td>
<td>Paprec Plastic Omnium Oxxa Régéfilms Sopave</td>
<td>BPI (United Kingdom) CeDo (Netherlands) Soreplastic (Belgium)</td>
</tr>
<tr>
<td>2 PET</td>
<td>APPE France Plastique Recyclage Freudenberg Politex France Nord Pal Plast</td>
<td>ALIPLAST (Italy) PET Kunststoffrecycling (Germany)</td>
</tr>
<tr>
<td>3 PVC (waste from buildings and public work sector)</td>
<td>Cité plast Broplast VEKA Recyclage</td>
<td>AgPR (Germany) Deceuninck (Belgium)</td>
</tr>
<tr>
<td>4 Office papers (2.05 and 2.06)</td>
<td>Arjowiggins Novatissue Papeco Vertaris</td>
<td>UPM – UK (United Kingdom) SCA (United Kingdom)</td>
</tr>
<tr>
<td>5 Wood waste for manufacture of wood-based panels</td>
<td>Fritz Egger Gautier France Isoroy Kronofrance</td>
<td>Groupe Finsa (Spain) Pfleiderer AG (Germany)</td>
</tr>
<tr>
<td>6 Aluminum</td>
<td>Cie Alpine d’Aluminium (CAA) Regel Affimet Serero</td>
<td>Aurubis (Germany) Metallo-chimique</td>
</tr>
<tr>
<td>7 Copper</td>
<td>AFICA (Affinage Champagne Ardennes) KME France Le Bronze Industriel M Lego Nexans Copper France</td>
<td></td>
</tr>
<tr>
<td>8 Electric cables</td>
<td>Next metal MTB Recycling Recycables</td>
<td>Ekologos - Kargro Group (Netherlands) Estato Umweltservice GmbH (Germany) GENAN Recycling (Denmark)</td>
</tr>
<tr>
<td>9 End of Life Tyres (ELT)</td>
<td>ROLL GOM DELTA GOM HET REGENE RBSI</td>
<td>ARN (Netherlands) Belgian Scrap Terminal (Belgium) Cometsambre S.A. (Belgium)</td>
</tr>
<tr>
<td>10 End-of-life vehicles (ELV) and automotive shredder residue (ASR)</td>
<td>COREPA Galloo RECYLUX - Ecore</td>
<td></td>
</tr>
<tr>
<td>11 Small Household Appliances (SHA)</td>
<td>Les Ateliers Fouesnantais – Ecotri Galloo Triade Electronique</td>
<td>Cool Rec Remondis Elektrorecycling</td>
</tr>
<tr>
<td>12 Electronic Cards (i.e. motherboard, printed circuit board)</td>
<td>Terra Nova Metal Rhodia Bigarren Bizi</td>
<td>Aurubis (Germany) Boliden (Sweden) Unicore (Belgium)</td>
</tr>
<tr>
<td>13 Batteries and accumulators (B&amp;A), lead-free</td>
<td>EURO DIEUZE INDUSTRIE SNAM RECPYLYL SAS Valdi</td>
<td>Revatech Recypilas</td>
</tr>
</tbody>
</table>
6. Key Findings of the report

The key findings of the report are discussed below in the following thematic order:
- Attractiveness of the territory and determinants affecting the decision to invest in France
- Current status of the sector in terms of added value and employment
- Evaluation of competitiveness by sector
- Position of the obstacles to competitiveness in the recycling chain
- Time horizon of the issue of creation / safeguard of the activity
- Potential levers to improve the competitiveness of the sector
- Issues in terms of added value and employment
- Prioritization of sectors

6.1. The attractiveness of the territory and the factors affecting the decision to invest in France

The key to attracting investments in the recycling industry is the economic context of the sector, i.e., the availability of raw materials generated from recycling, the size of the demand market and the positioning of competitors (maturity and supply structure).

The elements of social, local, and national context also affect the decision-making, but in a more secondary way.

The issue of import/export streams of recycled raw material is also a key determinant. One of the objectives of the study is to identify necessary levers for transforming wastes into value-added resources (i.e., “one step further”) within our territory. At various levels, depending on the sector, the general objective is to export finished products (incorporating recycled raw material) instead of simply exporting the recycled raw materials exiting our sorting centers.

The economic context

France has the advantage of being a large country where the regional differences are limited. It is a large market for the upstream and the downstream of recycling. The recycled raw materials are then seen as available and the markets for these materials are important. Thus, after having crossed the barriers of entry, France is seen as a major market. This does not mean that there are no problems in the upstream of the recycling, as we will see in the next sections, but that the market potential is high, all other things being equal.

The maturity and the supply structure seen through the number of actors, the types of actors, the geographical anchoring and the level of competition existing among actors play an important role in the choice of investment. The level of competition in the market for management of household and industrial wastes is generally judged weak in France by the European actors, the average prices being viewed higher in France than in neighboring countries. One of the explanations given for this is the presence of a small number of big, well-implanted actors in a market situation that may resemble a quasi-monopoly in some regions.

The importance of the production cost factors depends on the cost structure of the company. For industries that are highly energy intensive (e.g., aluminum, copper), France is interesting because the energy cost is relatively low. The aspect “taxation and labor cost” rises as an important element to explain the relative lack of competitiveness and constitutes a determinant which can explain why some regions have an investment deficit.
The social, local and national contexts

From interviews with the French market players as well as with foreigners, it is apparent that France may suffer from a “bad image” arising from the difficulty of the social dialogue between employers unions and employee unions. France is often contrasted to Germany which has a positive reputation of fostering a constructive attitude with the unions.

In regard to spoken languages and the knowledge of foreign languages by the population, in particular English, the feedback from foreign investors is that it is necessary to speak French to invest in France, which is perceived as an obstacle.

France is considered as having a good reputation at the international level, which promotes the exports.

Finally, some large French and European manufacturers reported that they received investment aids or loans from public entities at the departmental, regional and national level, possibly by using European funds. The manufacturers who have benefited from such aid indicate that it is not a decisive element in the investment decision-making, but a “plus” which is considered at the end of the decision-making process.

Small manufacturers indicate that they have limited access to those aids, which they linked to a lack of information, and the administrative formalities which are time-consuming and create long delays; they view the latter as incompatible with the decision time-limits for investment within SMEs.

The interviews with numerous persons in charge of industrial sites in France and the rest of Europe (many are members of European groups), as well as with European experts of the recycling industry, did not identify whether there are significant benefits associated with providing public aids for investment on the decisions to invest in one European region or another.

Moreover, several actors reported that the environmental regulations provide few or no opportunities for experimentation, and that these may be overly burdensome. This is reflected in the application of environmental regulation by the DREAL, which can sometimes lack flexibility and adversely affects development of the activity.

Investments linked to recycling in the larger framework of waste management

Competition for landfill disposal remains more important in France than in the northern European countries. The attractiveness of relatively low disposal fees for landfills in France, despite the increases of the landfill tax introduced since 2009, remains an impediment to numerous recycling projects. This problem constitutes an important determinant in the decision to invest in France, but can vary by region because of the market price disparities for landfill disposal fees.

Considering the issue of imports and exports of recycled raw material, it is useful to recall the rupture that occurred in the early 2000s, when France exported more recycled raw material than it imported, in volume as well as in value. Indeed, the industries using these recycled raw materials could not absorb the growing stream generated by activities related to sorting and recycling preparation. In this context, identification of critical actions to allow waste transformation into value-added resources (“one step further”) within our territory constitutes a key issue.

At various levels depending on the sector, it appears desirable to export finished products (incorporating recycled raw material) rather than simply exporting the recycled raw material output of our sorting plants. These recycled raw materials are considered as intermediate goods, and not as the ultimate goal of recycling operations. This objective will allow integration of more recycling activities into the European industrial ecosystem.
6.2. Added value and current employment in the sectors

Currently the sector of wood for manufacture of wood panels is the sector with the highest number of jobs (2100 – 24% of the total of the 13 sectors studied).

Recycling of office paper is also a large sector in terms of employment (about 1800 jobs - 21%), but also in terms of a large volume processed (532 kt).

Recycling of copper and aluminum follows with about 1500 jobs (17% per sector).

The 9 other sector together account for about 1700 jobs (19%). The current number of jobs for the 13 sectors is about 8600 jobs.

Note: These jobs do not include all the jobs that occur within the recycling chain (e.g.: collection is lacking, sometimes the sorting), the indirect jobs and the induced jobs.

The following graph presents the current positioning of the sectors in terms of added value and employment. For some, incorporation of the recycled raw material is achieved by mixing recycled raw material with virgin raw material. When this mix is intrinsic to the recycling process, all of the activity is taken into account (incorporation of recycled raw material and virgin raw material). This pertains to copper, aluminum and wood.

Figure 3 : Positioning of recycling sectors in terms of employment and added value

Currently, the sector wood waste for wood panel is associated with the most jobs (2100 – 24% of the total of the 13 sector studied). This is due to the large volume of the market (5000 kt), but also the fact that the downstream recycling chain, not susceptible to be relocated, is labor intensive (ex: finishing of melamine). Recycling of office paper is also a large sector in terms of employment (about 1800 jobs - 21%), but also because of the large volume processed (532 kt).

Recycling of copper and of aluminum follow with about 1500 jobs (17% per sector).

The other 9 sectors together generate about 1700 jobs (19%). The current total number of jobs for the 13 sectors is of about 8600 jobs.

In terms of added value, there are higher positions (compared with employment) for PET (16% of the total of added value) and aluminum (27% of the total of added value); this is mainly due to the highly automated processes in these two industries.
6.3. Evaluation of competitiveness by sector

Two sectors are in a very satisfactory situation: “ELV-ASR” (at the cutting edge to recover plastics) and “Aluminum – Transformation” (successful companies).

Four sectors have a satisfactory degree of competitiveness: “wood panels” (high-performer but the risk linked to the procurement is more acute in France than in the east), “copper” and “electric cables” (European issue. French issue concerning the cost of labor) and SHA (successful companies).

Five sectors have a medium degree of competitiveness: “PET bottles” (successful companies but less so than other competitors), “PVC buildings-woodwork” (successful companies for woodwork), “office paper” (successful hygiene companies need for waste, risky for the office recycled very white); “ELT” (successful companies, need for downstream development and economies of scale) and “B&A” (delicate positioning relative to European competitors).

One sector and a subsector have a low degree of competitiveness: “LDPE film” (good positioning for difficult but sluggish streams; delay for the stretch films) and the subsector “PVC other that woodworks recycled” (Companies less successful).

Two sectors have a very weak degree of competitiveness: “aluminum-refining” (lack of economies of scale and technical mastery) and “electronic cards” (delay in current technology).

6.4. Barriers to competitiveness in the recycling chain

The problems specifically affecting the French recyclers in terms of competitiveness mainly affect constraints linked to the upstream recycling sector. The constraints linked to the industrial facilities and the market for recycled raw materials in a broad sense, although real, are generally less severe.

The following table presents the main obstacles related to each sector. They are highlighted with a (F) if they concern French actors in particular and with (E) if they concern all the European actors. The number of symbols (i.e., F or E) in each sector indicate the relative importance of the effect of the obstacle (no symbol = no obstacle; 1 symbol = not very important; 2 symbols = moderate concern; 3 symbols = very important).

Table 2: Importance of the obstacles affecting competitiveness of French recyclers and their position in the recycling chain

<table>
<thead>
<tr>
<th>Sector Description</th>
<th>Upstream (waste source, collection rate)</th>
<th>The industrial facilities</th>
<th>The downstream (market for recycled raw materials)</th>
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</thead>
<tbody>
<tr>
<td>Polyolefins (industrial, commercial and agricultural films)</td>
<td>EEE</td>
<td>FF</td>
<td>F</td>
</tr>
<tr>
<td>PET</td>
<td>FFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC (waste from buildings and public work sector)</td>
<td>FF</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Office papers (2.05 et 2.06)</td>
<td>FF</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Wood waste for the manufacture of wood-based panels</td>
<td>EE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum Transformation</td>
<td>EEE</td>
<td>FF</td>
<td>F</td>
</tr>
<tr>
<td>Copper</td>
<td>EEE</td>
<td></td>
<td>F</td>
</tr>
</tbody>
</table>
The upstream European obstacles are:

- Control of illegal exports (ELV-ASR, SHA, aluminum, copper and electric cables)
- Purchase of waste by Asian countries, who are able to produce finished products at lower cost, thanks to their low labor costs (LDPE, cables, ELV-ASR and SHA for the mixed plastics)

The upstream obstacles are more specific to the French and include:

- Collection (PET, PVC, office paper, SHA)
- The valorization by the waste owners of the environmental performance (B&A, SHA, ELV-ASR)
- The competition of landfill disposal (ELV-ASR, PVC)

The French industrial tool is not successful enough for:

- LDPE: technological level insufficient to process stretch and soiled streams, fragile positioning on the promising markets
- Aluminum: there is a high potential for improvement of the processes and the quality of alloys produced
- Copper: there is no refiner in France
- Electrical cables: there is potential for improvement related to sorting of lower grade fractions and plastics
- ELT: there is a deficit in economies of scale
- Electronic cards: there is a delay related to pyrometallurgy from which it is difficult to recover

There are few problems downstream except for:

- Papers: the premium for recycled paper is diminishing, jeopardizing the sector of recycled, very-white office paper
- ELT: there is a development potential related to the demand for rubber powder

6.5. Time horizon related to the issue of creation/safeguard of activity

For 7 sectors (ELT, ELV, SHA, B&A, electronic cards, cables, copper) of the 13 studied, the key issue is activity creation.

In contrast, for 6 sectors (polyolefins, PET, PVC, office papers, wood panels and aluminum – refining) of the 13 studied, the issue in terms of activity focuses on the safeguard of activities rather than on the creation of new activities.

Furthermore, the time horizon to maintain the activities in these 6 sectors is short-term for 4 sectors (polyolefins, PET, PVC and aluminum-refining) and medium-term for the two other sectors (office papers and wood panels).
6.6. Benefits of the identified levers in terms of added value, employment and tonnages

Globally, for the whole of the 13 sectors, the benefits corresponding to implementation of the levers is 316 MEUR in terms of added value and around 2 500 direct jobs. The sectors for which the employment benefits exceed 200 jobs are office paper (510), copper (440), wood panels (260) and SHA (280).

The gains in terms of tonnages are about 1 300 kt. Four sectors account for about 75% of this tonnage (office papers, ELV-ASR, SHA and wood for wood panels).

Important note relative to the scope of this study: the 13 sectors do not cover all the recycling industries. Additionally, the conclusions relative to the value creation and the job gains cover only part of the value chain studied and not the entire value chain of the sector.

Benefits in terms of added value and employment

The following graph presents the potential benefits in terms of added value and employment following implementation of the identified levers for each sectors. By benefits, we mean creating or saving existing added value and employment. Depending on the sector, the benefits can be a saving of an activity, an opportunity to increase the activity or a combination. The sectors represented by a red square are those for which the employment safeguard is a benefit. The sectors represented by a blue circle are those for which of the benefit is activity creation.

Globally, for the whole of the 13 sectors, the benefits corresponding to the implementation of the levers is 316 MEUR and around 2 500 direct jobs. The sectors for which the employment benefits equal or exceed 200 jobs are office paper (510), copper (440), wood panels (260) and SHA (280). These four sectors together account for 62% of the jobs benefits. Then each of the following sectors gains or saves between 150 and 200 jobs: Polyolefins, PET, ELV-ASR and PVC. The five other sectors together represent a benefit of about 260 jobs.

Figure 4 : Benefit in terms of employment and added value
Of the three « plastics » sectors studied, recycling of used PET bottles presents the greatest benefit in terms of added value. However, in terms of employment, the three sectors are similar, providing around 150 jobs each.

Furthermore, we note that the added value per ton rates for PVC and polyolefin film recycling are lower (on average) than the rate for “PET bottles” recycling.

The indicator in kEUR/job shows that the recycling industry of PET bottles is less labor intensive than the two other sectors of “plastics”.

In addition, in the short term, it is the safeguarding of jobs that is targeted by improving the competitiveness of these 3 sectors.

**Office papers**

The market could grow strongly if the collection would increase substantially. This should occur as a result of the additional 200 kt collection target set recently and the ongoing separated sorting obligation. With the radius of the supply basin being reduced, the French recyclers will benefit from this new waste source.

However, it is important to note that at the beginning the recycling office paper industry may see its activity suffer due to European competition but after that it is mainly a creation of activity which is identified.

**Used wood**

France is a large producer of wood panels and the finishing phase in the workshop (cutting, melamine) is relatively labor intensive and takes place on site.

There are overcapacities in Europe and we can assume that a part of the French activity is threatened in the medium-long term if competition from the sector «wood for energy» is realized. This activity threat is estimated to be half of the net exports.

**Aluminum**

It is forecast that a quarter of the aluminum refining activity (75 jobs) is threatened in the medium term by the lack of competitiveness in the sector. This does not concern the activity of aluminum transformation, which does not have any competitiveness problem.

**Copper**

The copper foundry is generally associated with the production of semi-finished products onsite, a labor intensive process. The potential for development (44kt) has been estimated on basis of cutting illegal copper exports by half, estimated to be 30% of the current exports. This represents an increase in activity of 30%.

**Electric cables**

Greater availability of waste in Europe would have the effect of increasing the sorting activity in France, but also of increasing downstream operations related to metal transformation.

At European level, the French actors are competitive, especially against the German competition. The French actors differentiate themselves by integrating the value chain and by diversifying the activity. Increased competitiveness could be achieved by promoting innovation in research projects involving the different actors in the chain: producers of products containing cables, waste holders, sorting operators, producers of sorting machines. The objective is to improve the sorting on the dirtiest fractions, directed today to export.

In this context, all measures to reduce expenses are beneficial to these actors because labor represents about 85% of the added value.
Assuming that these measures will reduce the export balance of waste (estimated at 75 kt) by 50%, 38 kt extra would be recycled in France and the number of direct jobs could rise to about 65 jobs.

**ELT**

If the ELT exports equals ELT imports in the future (exports > imports by 10% currently), an additional 48 kt would be treated by granulation in France, creating about 30 direct jobs and an additional added value of 5.8 M EUR.

**ELV-ASR**

The market could grow substantially

- Especially if the ELV would be treated in Europe (control illegal export), and
- If landfill disposal of the ASR becomes more expensive due to an increase in the landfill tax. There is also a potential linked to the sorting of the plastics coming from the foreign post-shredding installations.

**SHA**

The key lever is to control more illegal exports of SHA out of Europe. It is also recommended to continue the communication on selective collection of SHA in order to ensure their routing to the treatment centers of the SHA.

In addition, R&D work to recycle the rare earths is ongoing. If this work demonstrates the feasibility (economic and/or environmental) of recovering these rare earths, it is recommended to study the possibility of recovering these rare earths in computer magnets.

Globally, the employment creation potential is estimated to be 280 jobs.

**Electronic Cards**

The potential added value of this sector in France is:

- Either uncertain: in the pretreatment of poor cards before sending to pyrometallurgy. Ten percent of the cards are currently pretreated in France in order to produce a copper concentrate. However, this sector is subject to the risk of loss of profitability when commodity prices are low and that treatment capacities already exist. The added value of Terra Nova comes from the reduction of gas, organic material and energy, and from the recovery of fibers in replacing silica. Energy recovery from plastics and resins is not an improvement over the copper foundries or integrated foundries/refineries because they recover this energy directly in their processes.
- Or difficult to estimate if a technological breakthrough is supported by the public authorities. The technological breakthrough (e.g., mechanical treatment or hydrometallurgy), such as the research and development of the project of Bigarren Bizi, can be risky during the transition to an industrial operation phase, because existing processes in copper foundries and integrated foundries/refineries already exist to capitalize on the potential added value linked to the recovery of high value metals. The competitive advantage of a new process should come from reduced treatment costs.

**B&A**

The employment creation would involve 50 jobs. For this to occur, it is necessary to stimulate the efficient technologies by providing an adequate return on investment linked to process improvement and the associated R&D,

- by including in the specifications of producer compliance schemes some criteria linked to
• Processes efficiency
• Added value of final products
• Environmental performance of the process or the hygiene, security, environment practices of operators
  • or by proposing price conditions based on these criteria.

Benefits in terms of tonnages

The following graph shows, for each sector, the benefit linked to developing the activity or to safeguarding the activity, in terms of tonnages. Total change in tonnage is of about 1 300 kt; 4 sectors account for about 75% of these tonnages.

Figure 5: Benefits linked to developing or safeguarding the activity per sector, in terms of tons

Benefit in terms of added value

The change in added value is of about 316 MEUR and 5 sectors represent about 75% of this added value.
6.7. Hierarchy of the sectors

The sectors Aluminum, PVC and PET are priorities because the levers are rather easy to implement and there are short term benefits in terms of safeguarding employment. Moreover, the benefits in terms of added value and employment are globally significant.

The sectors ELV-ASR, B&A, SHA, office paper and wood for panels represent important benefits in terms of added value and employment. The associated levers are more or less easy to implement but the benefits of these sectors arise in the medium term.

The following graph presents the sectors by level:

- Of potential increase of added value due to the implementation of the levers (size of the circles)
- Of urgency in terms of loss/creation of activity on a time scale (abscissa)
- Of ease of implementation of the levers and their efficiency (ordinate)
Figure 7: Criteria « added value »

Note: the farther to the right a circle is placed, the more urgent it is to apply the associated lever; the higher the placement of the circle on the graph, the easier it is to implement the associated lever; the size of the circle corresponds to the relative magnitude of added value.

The following graph presents the sectors by level:

- Of potential increase of the number of direct jobs due to the implementation of the levers (size of the point)
- Of urgency in terms of loss/creation of activity on a time scale (abscissa)
- Of ease of implementing the levers and its efficiency (ordinate)

Figure 8: Criteria « employment »

Note: the farther to the right a circle is placed, the more urgent it is to apply the associated lever; the higher the placement of the circle on the graph, the easier it is to implement the associated lever; the size of the circle corresponds to the relative magnitude of jobs.

The observations in terms of employment are mainly similar to those for added value.
7. Recommendations

On the basis of the identified levers to improve the competitiveness of each of the 13 sectors studied (see appendix), of the benefits in terms of jobs and added value per sectors, of the urgency in terms of loss/creation of activity on a time scale, and of ease of implementing the levers and their efficiency, the recommendations are:

- Actions from the public authorities
  - Regulations
    - Giving a competitive advantage to the recycling processes with higher environmental performance by integrating (in the European framework directive on waste and its daughter directives) environmental criteria in the calls for tenders and/or minimal environmental requirements for recycling processes.
    - Making it more difficult for the landfill disposal (LDPE, PET, PVC, ELV-ASR) through implementation of quotas, an increase in the landfill tax and/or a different rate of the landfill tax for the ultimate and recycling waste (ELV-ASR, PVC).
    - Promoting market demand for products incorporating recycled raw materials (PVC, paper, ELT) via Eco labels (environmental labelling), specifications for public procurements and communication.
  - Controls
    - Controlling the illegal exports in all the European ports by applying the principles of auto sufficiency and of proximity\(^1\) (LDPE, PET, PVC, Aluminum, ELV-ASR, SHA, cables and copper).
  - Support companies
    - Helping companies in some sectors with their R&D (electronic cards, Li batteries) and their investments (LDPE, PVC, SHA, B&A).
    - Encouraging coherent management of the wood resource between wood energy and wood recycled in wood panels.
    - Decreasing labor costs. This recommendation is general and applies to all industrial activities.

- Actions from the industry / the sectors / the companies
  - Partnerships and synergy
    - Encouraging partnerships and synergy between actors of a same sector. The recycling industry involves, above all, a chain of actors and it is often possible, even desirable, for the actors to organize themselves by incorporating themselves in one way or another to strengthen the investment decision-making. There is no unique model of partnership or prior agreement linked to a new investment in recycling, but we can provide several examples:

\(^{1}\) Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity) : §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.». §3 : « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health»
the mode of organization in a joint-venture (Nexans, France Plastic Recyclage, Artenius Beaune, Paprec and St Gobain for the PVC windows);

the downstream positioning of an EPR system, with the role of priming the target recycling sectors for the mobilization of a new waste source and the establishment of procurement contracts guaranteed for several years (case of the SHA in France);

- Developing technical and business centers (like the CTIF\textsuperscript{2}, the CETIM\textsuperscript{3} or the CTP\textsuperscript{4}) to promote synergies in research and investment (LDPE, PET, PVC, Aluminum). There is a strong need to create links between actors of a same value chain. This lever can be an alternative investment aid mobilizing the public spending given the current pressure on public finances. Indeed, creation of research and development synergies could encourage the emergence of private financing for industrialization. Pooling of actors in the value chain of one sector could reassure the investor.

- Extended Producer Responsibility
  - Giving a competitive advantage to the recycling processes with higher environmental performance by
    - Pushing the producer compliance schemes to integrate/strengthen the impact of environmental performance criteria in the calls for tender (SHA, B&A, ELV)
    - Increasing the duration of waste supply contracts (B&A, ELV)
  - Encouraging the quantitative and qualitative increase of selective collection (LDPE, PET, PVC, B&A, office papers, SHA), which, in addition to having a direct effect of market increase, also indirectly allows investments (R&D, capacities) and economies of scale. This increase can be stimulated by setting high recycling targets in the context of the extended producer responsibility, voluntary agreements and/or sorting obligations.

\textsuperscript{2} CTIF: Centre Technique des Industries de la Fonderie
\textsuperscript{3} CETIM: Centre Technique des Industries Mécaniques
\textsuperscript{4} CTP: Centre Technique du Papier.
8. Appendix : Summary of the 13 sector analysis and examples of success stories

8.1. Polyolefins (industrial, commercial and agricultural film)

In France, 3 recycling sites exist with a capacity in excess of 8 kt/year of pellets (35 exist in Europe) and 5 to 10 sites have lower capacity (135 exist in Europe). In Spain, France, Germany, Italy and Portugal, these are mainly SMEs (about 50 employees). In France, several of them have been acquired over the last four years by specialized waste management groups, enabling them to secure their market for recycled raw materials by optimizing synergies between “waste collection” and “regeneration”. Garbage bags (containing up to 70% of regenerated plastic with a thickness of up to 20µm) constitute the principal market in tonnage for regenerated LDPE film. Each year, the recyclers of UE produce about 600 kt of garbage bags, more than 50 kt of agricultural films and 15 kt of pipes from recycled LDPE.

The French recycling industry for industrial, commercial and agricultural polyolefins packaging films has an industrial park of regeneration facilities among the most important in Europe (after Italy and Spain) and an indisputable technological expertise allowing it to manufacture high-quality pellets. However, this sector is structurally deficit and the recyclers are confronted with competitiveness disadvantages which threaten their economic viability. The risks of site closure are high in the short/medium term.

There are multiple barriers to the competitiveness of French recyclers:

- **One obstacle linked to the waste supply**: the constraints linked to the use of highly soiled waste.
- **Five obstacles linked to the production tool**: delay in updating industrial facilities for the treatment of stretch films, low regeneration capacities, the difficulty of some regenerators to communicate with their equipment suppliers, difficulty structuring processes for an optimized and quick implementation, and need for an improved R&D process.
- **Two obstacles linked to the markets of recycled materials**: the weak demand of recycled materials of downstream sectors and the aggressive strategy of Italian regenerators.
- **Two obstacles linked to the economic and fiscal context**: landfill disposal prices too low and the high tax burden on labor costs.

More globally, European recyclers face several obstacles that limit their competitiveness compared to the international competition: the shortage of waste (despite recent improvement of the situation related to the closure of the Chinese market for soiled waste plastic films), decreasing quality of the used films, the low proportion of recycled material in polyethylene finished products and the low selling price of regenerated LDPE.

**Example of a successful public/private partnership**

The Belgian company Soréplastic is a public/private partnership between a manufacturer (Gibelplast), whose mission is to develop recycling plants for plastic material and a local authority (the intercommunal association AIVE-Idelux).

The recycling plant started in November 2011 in Wallonia is based on the synergies of the activities of Soreplastics and the waste management site of the department “Recovery and cleanliness” of the intercommunal association located nearby (recovery of organic material, of sewage sludge and of inert construction waste): Soreplastics effluents (sludge) are sent to the nearby inert construction debris treatment center. This leads to significant transportation cost savings. On the other hand, the proximity of the AIVE installations allows Soreplastics to benefit from “green” heat and electricity coming from the recovery of biogas generated from the biomethanization of organic waste and the treatment center.
Among the levers identified to improve the competitiveness of the sector, the main levers are:

Avoid illegal export of waste
This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity.
It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

Increase the collection rates of waste
The increase of the waste volume to recycle will indirectly promote the size of the recyclers, which will generate a larger investment capacity and economies of scale.

Counter the aggressive commercial strategy of Italian recyclers
French recyclers have been suffering for about two years from the very aggressive commercial strategy of Italian recyclers who flood the French market for waste bags, at a price sometimes inferior to the price of granulates. This phenomenon has been acute since the beginning of 2012 when several Italian recyclers won the contracts with big French municipalities. The study did not allow us to highlight the causes of non-competitiveness of French recyclers towards their Italian competitors.

Provide incentives for distributors to better pre-sort the waste
This lever requires implementation of incentive systems and communication campaign. Relevant efforts that have been implemented so far have not been highly successful. The combination of local and national initiatives, as it is done in Belgium, could improve the situation.

Encourage the companies to increase their capacities of treatment
The facilities with too small capacities of treatment result in an increase of the production costs and so a small negotiation capacity of regenerators for the purchase of waste. The lever consists of helping financially the recycling companies to invest for more capacities. The measures that encourage the (French) market increase indirectly contribute to the scale increase.

Encourage investments
This lever consists of assisting recyclers secure investments to purchase new equipment (e.g., to recycle plastic films that are difficult to treat), to reduce production costs through automation and smart logistics.

Reduce labor cost
This lever requires a modification of fiscal rules. This first requires achieving a political decision, which an economic framework that is much broader than the recycling sector.

Define strategies for creating potential alliances within the recycling sectors to optimize the future investments

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Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity) : §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.» §3 « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.»
In the case of the sector « PET bottles », this could consist of optimizing the partnership schemes between the regenerators and the bottlers. In Germany for example, the principal recyclers of PET bottles are looking to optimize their economic model by integrating into a consortium that encompasses collection/sorting/recycling.

For the French recyclers, the strategic choices in terms of industrial cooperation with the upstream and the downstream of the recycling chain will have decisive impacts on their future competitiveness. A concerted approach at the national level is important in order to optimize the industrial tool as a function of the location of PET waste sources and the location of the bottling facilities. Two schemes are possible:

- « downstream » partnerships with conditioners (like the cases of Coca-Cola and Cristalline)
- « Upstream » partnerships with companies that master the waste collection (Pap'Rec, Veolia, Sita…)

Promote the development of pooled resources for technical support and support of R&D and testing

The objective is to create technical centers that provide testing facilities, experts who are able to support the recyclers in negotiations with foreign equipment suppliers, and methodologies to evaluate the feasibility of an investment, similar to what currently exists for glass or cardboard.

The public sector could provide help in the financing of this center and encourage consolidation of the competencies of existing organizations (CRITT, COTREP…).

It is important to note the current feasibility study of an ITC (industrial technical center) dedicated to plastic processing. This study has been launched within the Strategic Committee of the Sector “Chemistry & Materials” with the support of the public authorities (DGCIS). This ITC, consisting of pooled resources for R&D and for technical support to companies involved in plastic processing, would have in particular the mission to address problems linked to the recycling plastic material. The conclusions of this study (perimeter, missions, means, financing…) are expected sometime in 2014.

Make landfill disposal more difficult by implementing disposal quotas, increasing the landfill tax and/or implementing a lower landfill tax for the recoverable waste.

Three points of attention must be specified at this stage:

- The objective of increasing the landfill disposal tax is not to generate additional revenues. The tax is an incentive tool whose desired effect is to transfer recoverable waste towards other types of treatment. Thus, the tax doesn’t have to be paid if the waste is not landfill.
- The tax is only one tool to leverage more environmentally friendly waste treatment processes. The objective is then to diminish the competition from landfill disposal and to divert the wastes toward more environmentally friendly processes. Another approach to diminish this competition is to prohibit landfill disposal and required waste sorting.
- Under French law, it is possible to discriminate the waste based on its destination (landfill disposal tax is variable as a function of the quality of the landfill disposable or the type of treatment center), but it does not seem possible to tax the waste differently as a function of its origin or quality. However, this is the proposed action. This action needs then to be subject to a legal analysis to validate the possibility of taxing the waste as a function of its origin or its quality. The Ministry of Ecology has launched a study on the possibilities of taxing landfill disposal of certain types of recoverable wastes (wood, plastic, metal …) or even to prohibit it.

The “Comité pour la fiscalité Ecologique” is working on the development of the landfill tax under condition of iso-fiscality, which means the elimination of some modulations and the creation of new ones, always with the objective of improving the environmental performance of waste elimination centers.
8.2. PET bottles

PET bottle recycling activity has undergone a profound structural change between 1996 and 2009, with the development and approval by the health authorities of methods for manufacturing bottles designed for food contact (recycling “bottle to bottle”). Long confined to markets turned towards the manufacture of fibers, PET recycling has achieved rapid mutation by making massive investments in new recycling capacities. There are 10 recycling plants recycling more than 1 000 t/year in France (130 in Europe, against only 35 in 2 000). At the European level, a trend towards multi-site international groups was observed, including production sites that have high unit capacities, and significant financial resources.

About 310 kt of PET bottles are consumed annually in France. In 2010, 51% of the post-consumer waste was been collected by the sector (European average: 51%; Germany, Belgium and Switzerland exceed 70%). The applications “food contact” progressively prevail over the “fibers” applications in terms of recycled PET tonnage.

The French companies of PET bottles recycling dispose of an important reserve of recycling capacity to respond to the needs of the growing market. The recycling unities of PET are in a whole enough modern and successful on the fields of fibers for non-woven as on that of R-PET for alimentary contact.

At the opposite, the French recyclers of PET bottles (as well as the Spanish and the Italian ones, and in a lesser extent the Dutch and the German ones) are subjected to a “scissor effect” threatening their competitiveness compared to their European competitors and to Asian waste buyers: at one side the rarefaction and the deterioration of the quality of waste, at the other side the trend of diminution of the price of recycled flakes. If nothing is done, we can expect at short term several sites closures. The recyclers manufacturing PET fibers (padding, clothing, automobile…) are in an even more difficult situation than the manufacturers of recycled bottles as the recycled fibers have a lower added value. The delocalization risk is high.

Five principal obstacles to competitiveness of French recyclers have been identified:
- In terms of supplies, the lack of waste due to the low collection rate of used bottles
- Two obstacles linked to the production facilities: recycling capacities averaging less than those of the major competitor EU countries and an unfavorable environment for development of technological innovations by recyclers.
- Two obstacles linked to the tax environment: the low landfill tax and the tax burden on labor.

In addition, the competitiveness of European PET bottle recyclers facing extra-EU competition (in particular from the buyers of Asian waste) is reduced by the competition of virgin PET, by the competition of bio-sourced PET, by the cumbersome certification processes of the EFSA and by the progressive drift of color bottles made from recycled material.

An example of industrial partnership

Situated in the region Nord-Pas de Calais, Nord Pas Plast is an independent SME specialized in the regeneration of used PET bottles. The company works on the basis of a partnership agreement with a bottling site of the mineral water company Cristalline. Its waste collection area is mainly regional. Nord Pal Plast prepares the clear PET flakes and sells them to Cristalline which conducts the polycondensation phase, followed by the manufacture of preforms, followed by bottles. Production based on dark PET waste is dedicated to the manufacture of fibers for automobile floor mats. In 2011, Nord Pal Plast has stopped its project to double its production capacity of flakes for bottles, due to the difficulties of finding the adequate waste volumes.

Among the levers identified to improve the competitiveness of the sector, the main levers are:
Avoid illegal export of waste

This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity\(^6\).

It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

Increase the collection rates of waste

The increase of the waste volume to recycle will indirectly promote the size of the recyclers, which will generate a larger investment capacity and economies of scale. The multiple possible levers necessary to increase the tonnages collected are:

- Evaluate the interest of achieving a higher recycling objective for used PET bottles: Discussions are underway at the European level for revising the recycling objectives for packaging. A medium recycling objective of 75% for household packaging waste was fixed in the framework of the law Grenelle 2. To assess the interest in setting a higher recycling objective for PET bottles, it will be necessary evaluate the advantages/disadvantages and to consider the potential impact on all of the packaging.
- Mobilization the « out of the home » waste source constitutes a strong lever to increase the collected quantities. Currently, there is no “at the source” collection system for bottles consumed in cafés, hotels, restaurants, stations, airports, stadiums, sport fields and other collective infrastructures ... In practice, Eco-Emballages only organizes collection of household packages. Several solutions are possible:
  - Incite Eco-Emballages to become engaged in quantitative collection objectives « out of home » and encourage the emergence of initiatives to collect this waste source;
  - Set up an “aid to the collection of diffuse waste sources”
- Study the possibility of establishing a deposit on PET bottles. Several countries have implemented (or started to implement) a deposit system for PET bottles (Germany and Netherlands, in particular). Facing these different developments, a critical analysis is necessary to understand how such deposit systems could be developed in the French context. A state-of-the-art compilation of the organizational, economic and environmental issues linked to the development of a deposit system for PET bottles in the French context appears as essential.
- Improve the communication directed at owners of PET waste in order to sensitize them to selective collection. Communications by the French producer compliance scheme to their members and the public about the recycling collection appears as quite poor in comparison with what is done in other countries. Indeed, we note that sensitization operations that are voluntary and concentrated in time can have very significant effects. As such, during two years, the Swiss have implemented intensive communication campaigns for PET waste which have resulted in a collection rate of 98%! There is no particular obstacle to the implementing of this lever.

Provide incentives for distributors to better pre-sort the waste

This lever requires implementation of incentive systems and communication campaign. Relevant efforts that have been implemented so far have not been highly successful. The combination of local and national initiatives, as it is done in Belgium, could improve the situation.

\(^6\) Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity) : §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.» §3 : « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health»
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The facilities with too small capacities of treatment result in an increase of the production costs and so a small negotiation capacity of regenerators for the purchase of waste. The lever consists of helping financially the recycling companies to invest for more capacities. The measures that encourage the (French) market increase indirectly contribute to the scale increase.

Reduce labor cost

This lever requires a modification of fiscal rules. This first requires achieving a political decision, which an economic framework that is much broader than the recycling sector.

Define strategies for creating potential alliances within the recycling sectors to optimize the future investments

In the case of the sector « PET bottles », this could consist of optimizing the partnership schemes between the regenerators and the bottlers. In Germany for example, the principal recyclers of PET bottles are looking to optimize their economic model by integrating into a consortium that encompasses collection-sorting/recycling.

For the French recyclers, the strategic choices in terms of industrial cooperation with the upstream and the downstream of the recycling chain will have decisive impacts on their future competitiveness. A concerted approach at the national level is important in order to optimize the industrial tool as a function of the location of PET waste sources and the location of the bottling facilities. Two schemes are possible:

- « downstream » partnerships with conditioners (like the cases of Coca-Cola and Cristalline)
- « Upstream » partnerships with companies that master the waste collection (Pap'Rec, Veolia, Sita…)

Promote the development of pooled resources for technical support and support of R&D and testing

The objective is to create technical centers that provide testing facilities, experts who are able to support the recyclers in negotiations with foreign equipment suppliers, and methodologies to evaluate the feasibility of an investment, similar to what currently exists for glass or cardboard.

The public sector could provide help in the financing of this center and encourage consolidation of the competencies of existing organizations (CRITT, COTREP….).

It is important to note the current feasibility study of an ITC (industrial technical center) dedicated to plastic processing. This study has been launched within the Strategic Committee of the Sector “Chemistry & Materials” with the support of the public authorities (DGCIS). This ITC, consisting of pooled resources for R&D and for technical support to companies involved in plastic processing, would have in particular the mission to address problems linked to the recycling plastic material. The conclusions of this study (perimeter, missions, means, financing…) are expected sometime in 2014.

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- The tax is only one tool to leverage more environmentally friendly waste treatment processes. The objective is then to diminish the competition from landfill disposal and to divert the wastes toward more environmentally friendly processes. Another approach to diminish this competition is to prohibit landfill disposal and required waste sorting.
• Under French law, it is possible to discriminate the waste based on its destination (landfill disposal tax is variable as a function of the quality of the landfill disposal or the type of treatment center), but it does not seem possible to tax the waste differently as a function of its origin or quality. However, this is the proposed action. This action needs then to be subject to a legal analysis to validate the possibility of taxing the waste as a function of its origin or its quality. The Ministry of Ecology has launched a study on the possibilities of taxing landfill disposal of certain types of recoverable wastes (wood, plastic, metal …) or even to prohibit it.

The “Comité pour la fiscalité Ecologique” is working on the development of the landfill tax under condition of iso-fiscality, which means the elimination of some modulations and the creation of new ones, always with the objective of improving the environmental performance of waste elimination centers.

8.3. Buildings PVC

The principal types of post-consumer PVC waste coming from the building applications are the pipes, cables, carpentry/joinery (windows, shutters, and doors), floor coverings and thick films. The waste source is very heterogeneous and only a small part of the French post-consumer PVC waste is currently collected and recycled. The recycling rate reached 17 kt in 2010, while it was nearly inexistent in 2000. On average in the last 10 years, France represents 7% to 10% of the recycled PVC in Europe. Together, Germany, the Netherlands and the United Kingdom represent 2/3 of the post-consumer PVC waste recycling activity in West Europe. We count about 20 accredited Recovinyl recyclers in France. The recycling capacities have sensibly increased in 2009/2010 as a consequence of incentives of PVC Recycling and Recovinyl to keep PVC waste out of the landfill. Other PVC recyclers are not members of the Recovinyl program.

The PVC carpentry/joinery recycling industry has started to restructure and has the technical capacity to develop competitive technologies. Several recent industrial initiatives, show that development of the sector PVC carpentry/joinery recycling seems to be on a good track, the French market being stimulated by the fact that its share of PVC is one of the highest of Europe. Some large actors in the field of waste collection and treatment have taken measure of the issue and should, in the coming years, provide expertise and resources to ensure competitiveness of this emerging sector.

The situation is more worrisome for recycling other PVC wastes, whether it originates from deconstruction (other than carpentry/joinery), floor coverings or cable jackets. Priorities to improve the competitiveness of this activity focus on improvement of waste supply and optimization of the recycling facilities.

Three major obstacles to competitiveness of French PVC building waste recyclers have been identified: the low waste collection rate, the low landfill disposal prices and the high tax burden on labor costs.

On the other hand, some recyclers emphasize the short-term risk posed by extremely strict specifications pertaining to the content of “forbidden” substances (for example the lead salts) in the recycled raw materials manufactured from waste PVC. Since the beginning of 2013 they observe the appearance of growing constraints, perhaps from the influence of the “REACH” regulations. And recyclers affirm their inability to measure, and so to declare, the content of forbidden products in the recycled raw materials manufactured. This would oblige them to invest in very expensive testing instruments.
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### A precursor of PVC carpentry/joinery recycling: the VEKA group

Founded in 1969, the family-owned German group Veka manufactures 240 kt/year of PVC products in 16 production plants spread around the world and 3 recycling plants situated in Europe.

Since 1993, long before most of its competitors, the group started to implement a collection system for PVC carpentry/joinery in Germany. Gradually, this system has been extended to France and the United Kingdom.

The group’s largest recycling site for used windows manufactures more than 50 kt/year of regenerated PVC flakes. In 1997, the company Veka Umwelttechnik was the first to be certified by the TÜV for the material recovery of waste PVC windows. Meanwhile, the group has invested regularly to maintain its technological edge in terms of regeneration processes.

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**Among the levers identified to improve the competitiveness of the sector, the main levers are:**

- **Increase the collection rates of waste**

  The increase of the waste volume to recycle will indirectly promote the size of the recyclers, which will generate a larger investment capacity and economies of scale. E.g.: improve the process of pre-sorting upstream for the PVC waste from buildings: The system implemented by the glass industry in Belgium, consisting of the development of a network of glass collection centers, including PVC, constitutes a good example of what could be developed in France. Currently, there are about 50 centers of this type in Belgium where the professionals and the collectors can bring their used windows. These centers ensure the dismantling of the glass from the window frame. When separated from the glass, the PVC window frames are directly usable by the PVC recyclers. Support of voluntary initiatives such as this could be enhanced translation and diffusion of good practices to the different actors concerned (waste owners, collectors, etc.). There is no particular obstacle to the implementation of this lever.

- **Ensure the effective application of the « prior waste diagnostics » on the construction worksites (measure 256 of the Environmental Grenelle).** This new regulation should cause an increase in the collected waste steam. This requires a rigorous enforcement of the control means.

- **Provide incentives for distributors to better pre-sort the waste**

  This lever requires implementation of incentive systems and communication campaign. Relevant efforts that have been implemented so far have not been highly successful. The combination of local and national initiatives, as it is done in Belgium, could improve the situation.

- **Encourage investments**

  This lever consists of assisting recyclers secure investments to purchase new equipment (e.g., to recycle plastic films that are difficult to treat), to reduce production costs through automation and smart logistics.

- **Reduce labor cost**

  This lever requires a modification of fiscal rules. This first requires achieving a political decision, which an economic framework that is much broader than the recycling sector.

- **Promote the development of pooled resources for technical support and support of R&D and testing**

  The objective is to create technical centers that provide testing facilities, experts who are able to support the recyclers in negotiations with foreign equipment suppliers, and methodologies to evaluate the feasibility of an investment, similar to what currently exists for glass or cardboard.

  The public sector could provide help in the financing of this center and encourage consolidation of the competencies of existing organizations (CRITT, COTREP,...).
It is important to note the current feasibility study of an ITC (industrial technical center) dedicated to plastic processing. This study has been launched within the Strategic Committee of the Sector “Chemistry & Materials” with the support of the public authorities (DGCIS). This ITC, consisting of pooled resources for R&D and for technical support to companies involved in plastic processing, would have in particular the mission to address problems linked to the recycling plastic material. The conclusions of this study (perimeter, missions, means, financing...) are expected sometime in 2014.

Make landfill disposal more difficult by implementing disposal quotas, increasing the landfill tax and/or implementing a lower landfill tax for the recoverable waste.

Three points of attention must be specified at this stage:

- The objective of increasing the landfill disposal tax is not to generate additional revenues. The tax is an incentive tool whose desired effect is to transfer recoverable waste towards other types of treatment. Thus, the tax doesn’t have to be paid is the waste is not landfilled.
- The tax is only one tool to leverage more environmentally friendly waste treatment processes. The objective is then to diminish the competition from landfill disposal and to divert the wastes toward more environmentally friendly processes. Another approach to diminish this competition is to prohibit landfill disposal and required waste sorting.
- Under French law, it is possible to discriminate the waste based on its destination (landfill disposal tax is variable as a function of the quality of the landfill disposal or the type of treatment center), but it does not seem possible to tax the waste differently as a function of its origin or quality. However, this is the proposed action. This action needs then to be subject to a legal analysis to validate the possibility of taxing the waste as a function of its origin or its quality. The Ministry of Ecology has launched a study on the possibilities of taxing landfill disposal of certain types of recoverable wastes (wood, plastic, metal …) or even to prohibit it.

The “Comité pour la fiscalité Ecologique” is working on the development of the landfill tax under condition of iso-fiscalité, which means the elimination of some modulations and the creation of new ones, always with the objective of improving the environmental performance of waste elimination centers.

8.4. Office paper (2.05 and 2.06)

France is the second largest recycler after Germany, which recycles nearly 3 times more, notably through a volume effect (they produce more office paper) and because they incorporate newspaper waste into the recycled printing-writing paper. Italy, Spain and the United Kingdom are not far behind. Regarding incorporation of high grade papers, France is third, after Germany and the United Kingdom.

The industry of hygiene paper production is characterized by productive plants able to create added value. Three industries incorporate office paper recycling:

- The hygiene paper industry (cellulose cotton balls), which incorporates approximately half of the waste source and is characterized by strong competitiveness.
- The recycled graphic paper industry, which is not lagging behind in terms of process but suffers from competition with virgin, paper, which is cheaper and benefits from a good environmental image due to the communication on the fiber sourcing from sustainably managed forests and the associated eco-labeling. In addition, the production costs of recycled paper are high, due to a market orientation towards very white products, which require intense processing and/or use of recycled raw material of a higher quality. As a consequence, the recycled printing/writing paper industry is dependent on the consumer to pay the premium for recycled paper.
- The white top industry, for which no specific competitiveness issue has been identified.
These industries incorporate recycled papers, either directly (integrated plants), or through the purchase of recycled market pulp. In this case, the incorporation takes place at the pulp production site. At the European level, the very white recycled market pulp production is a French specialty. The principal actor is Greenfield and a second actor should develop rapidly: Vertaris. Those two plants are equipped with efficient equipment. The French business activity related to separate collection and sorting of office paper is not in competition with the foreigners, but it could double its level of activity in France. In practice, this requires an implementation of separate collection in all the offices.

In the medium-long term, the prospect of a growing market demand for recycled pulp is real. It is linked to the increase in the value of wood, caused by the development of the wood-energy sector and by taking into account the environmental impacts of forest exploitation in Asia and South America (in particular on the for Eucalyptus).

**Among the levers identified to improve the competitiveness of the sector, the main levers are:**

**Increase the collection rates of waste**

The increase of the waste volume to recycle will indirectly promote the size of the recyclers, which will generate a larger investment capacity and economies of scale. Several levers are proposed to increase the collection rate for office paper. It concerns the following:

- Decrease the collection cost and increase the collection quality by communicating with the offices and proposing innovative collection systems, such as using bins to store used office paper, allowing a reduction in collection frequency and cost.
- A key component of this initiative would be to educate the offices on pre-collection techniques and strategies that are available to reduce collection frequency and the associated costs.
- Implement the Special fee (Redevance spéciale in French). Make sure that local authorities in charge of waste collection apply the Special fee that allows the companies to support the management cost of their waste in proportion to the service provided. This lever provides an incentive for a company to lower these costs by optimizing its waste management and choosing selective collection. This has been mandatory for more than 20 years, but seldom applied.
- Require the offices to collect paper separately. A study was conduct by ADEME on this subject due to the application of the article L. 541-21-2 of the Environmental Code. This one stipulates that every waste producer or holder must set up a source separation of waste and, when the waste is not treated on the place, a separate collection of the waste, among others paper, metals, plastics and glass, so far as this operation is realizable at a technical, environmental and economic point of view.

**Provide information on the impacts of eucalyptus culture**

Evaluate the environmental issues linked to eucalyptus cultivation and import, provide consumer information about the associated environmental impacts and allow the consumer to identify paper manufactured with eucalyptus.

**Implement the environmental labeling on the products**

Experience indicates that this is a long-term process.

**Reduce the white of the product and purchase less expensive used paper: the 1.11 (Newspapers, journals, magazines)**

Change the historical orientation of the French industry, which needs to change the message to the consumer, in order to accept a less white paper. This is the German model. In practice, it is the coordination with industrials to educate the consumer through communication campaigns.
8.5. Used wood for the manufacture of panels

France, a large net exporter of particle board panels, is a major actor in the panels industry in Western Europe. In France, there are 14 large industrial plants manufacturing wood panels using used wood. The panels and wood veneer industry is highly capital-intensive. Most of the companies are part of an international group, which promotes commercial trade. Two-thirds of the companies belong to foreign groups with family ownership (Egger, Swiss Krono, Ikea and Finsa).

The economies of scale and the wood purchasing costs are among the major determinants of the production cost. The market works with very low margins and investments are amortized over the long term. France is at the bottom of the European range in terms of the used wood incorporation rate. The differences in incorporation rate can be explained by the relative availability of fresh wood and recycled wood, i.e., the presence of forest (and so of fresh wood), the collection efficiency for used wood and the growing competition of the wood-energy sector. However, the French recyclers benefit from the geographical proximity to used wood sources. The proximity of wood wastes from sawmills, generally situated close to the zones rich in forests, is a key element. The French industry is oriented toward quality products, characterized by a moderate rate of used wood incorporation (about 30%). As an example, the Italian wood panel manufacturers incorporate used wood at a rate of more than 90%, targeting a lower added-value market. The rising price of wood eligible for energy applications weakens the competitive position of the French industry compared to the countries where the increase is lower (in particular Eastern European countries, which currently represent 30% of the European production).

Success story - Egger Rambervilliers

Egger Rambervilliers based in the Vosges, is a wood panel plant and has belonged to the Austrian family group Egger since 2003. It produces more than 500 000 m³ of gross and melamine particle panels per year consisting in part of used wood. It is the biggest producer in France, producing one out of eight wood panels in France, from which 40% is exported. The facility represents an investment of more than 200 MEUR and generates sales of approximately 150 MEUR for more than 350 employees, an increase of about 25% since 2003. Although Egger does not display significant revenue surplus, the company manages to remain balanced in a difficult competitive climate in Europe, characterized by numerous plant closings, a dynamic strengthened by the competition from the wood-energy sector. This success can be explained by the following successful investments over the last 15 years for a total amount of more than 30 MEUR:

- Integrations of a sorting unit for mixed wood coming directly from recycling centers to reduce the supply cost and dependence on upstream actors.
- Integration of a biomass boiler classed « incinerator », allowing onsite incineration of coated B wood rejected by the sorting unit to generate the heat and electricity used by the panel production unity.
- Integration of a melamine unit, which is very labor intensive and significantly increases the added value of the panels.

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Promote better exploitation of forestry resources, in particular of softwood

This can be done through a change in the attribution criteria in the framework of CRE\(^7\) projects, but also through a targeted communication directed at the small forestry owners.

Reduce labor cost

This lever requires a modification of fiscal rules. This first requires achieving a political decision, which an economic framework that is much broader than the recycling sector.

\(^7\) CRE : Commission de régulation de l’énergie
8.6. Aluminum

Aluminum waste recycling involves refining plants producing ingots out of waste and transformation plants that produce laminated, extruded or molded products using high quality waste as raw material and the aluminum from a first or second fusion. In 2010, the sites were distributed in France as follows:

- 12 refining plants (compared to 17 in 2004)
- 7 metallurgic plants using high-quality aluminum waste and aluminum from second fusion (transformation activity)

Between 2005 and 2011, the total production of recycled aluminum has increased by about 15% in France. During the same period, 6 refiners have disappeared and the quantity produced by the remaining refiners has decreased by 12%. There is a structural change that resulted in a downward trend in total capacity, combined with a gradual transfer of refining capacity to the transformation capacity. The refining plants suffer from a lack of competitiveness compared to foreign plants because of:

- The supply difficulties linked to the competition of the large European producers of lower quality alloy combined with the overcapacity of French shredders who mix the alloys. This effectively results in a lower-quality product destined for large producers of inferior quality alloy located abroad.
- The lack of demand for non-specific alloy producers, whose customers are moving towards the East or out of Europe (automobile constructors).
- Their high production cost (the French plants are smaller than the foreign plants and benefit less from economies of scale) and the lower metallurgic expertise.

Transformation plants are generally competitive, even very competitive, compared to the foreign competition, in particular for the aeronautic applications (e.g., recent investment of Constellium in a new technology at Issoire). An indicator of this competitiveness is that France is a net importer of quality waste.

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Avoid illegal export of waste
This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity.

It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

Encourage the companies to increase their capacities of treatment
The facilities with too small capacities of treatment result in an increase of the production costs and so a small negotiation capacity of regenerators for the purchase of waste. The lever consists of helping financially the recycling companies to invest for more capacities.

The measures that encourage the (French) market increase indirectly contribute to the scale increase.

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8 Source: [http://www.societechimiquedefrance.fr/extras/Donnees/metaux/alum/texalu.htm](http://www.societechimiquedefrance.fr/extras/Donnees/metaux/alum/texalu.htm)
9 Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity): §2: «The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.». §3: «The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.»
Promote the development of pooled resources for technical support and support of R&D and testing

The objective is to create technical centers that provide testing facilities, experts who are able to support the recyclers in negotiations with foreign equipment suppliers, and methodologies to evaluate the feasibility of an investment, similar to what currently exists for glass or cardboard.

The public sector could provide help in the financing of this center and encourage consolidation of the competencies of existing organizations (CRITT, COTREP, etc.).

For aluminum, the proposition is to encourage and finance a cluster of refining plants that would allow exchange technical information and/or to create a pool of experts in metallurgy in order to dispense technical advice to plants.

Support R&D

For aluminum, facilitate the exchanges between universities and alloying plants by financing applied research projects involving technical manager from the plants.

8.7. Copper

The combined production capacity of copper produced from waste or pure copper is about 350 kt/year in France, a portion (about 50%) of which can be fed by copper waste. It is spread over about 15 industrial sites. It has declined since 2006 as a consequence of the closing of several production plants, including Chauny, le Palais and Sérifontaine.

The two big actors in France are Nexans and KME, which melt and transform copper respectively into wires, bars and tubes. The other actors are smaller and also smelters and transformers of copper into intermediate products, except AFICA, which refines the copper to produce ingots.

All European actors suffer from overcapacity linked to competition of alternative materials and to Asian competition in supply. The French actors, therefore, find themselves in a highly competitive environment.

The big actors benefit from the advantages of belonging to international groups: KME and Nexans. The small actors, often with family shareholders, compete by increasing the added value with the transformation of finished products, either on site or by integrating companies (Le Bronze Alloys), by playing on flexibility (small orders quickly executed), by diversifying the offer of alloys produced and by investing in tools to increase productivity.

All the actors try to secure their supply of waste by integrating the sorting operators (JV Recycables between Nexans and Sita) or by recovering as much transformation waste as possible from clients, or by implementing a strategy of vertical integration to better manage the waste recovery (LBA). There are no copper smelters in France. Indeed, the big smelters are concentrated in Germany, Belgium and Sweden.

- Only one company performs copper refining in France, AFICA, a small manufacturer (15 000 t/year), specializes in the quality alloys (in particular, lead free) for the fittings industry.
- The French refiners and transformers face large European smelters who are able to influence the market prices. Some of them, like Aurubis, vertically integrate (repurchase smelters and bar transformers, in particular), which further reduces the competitive position of French actors. This is especially the case for small manufacturers.
Le Bronze Alloys produces a broad range of products and semi-finished products in special copper alloys – for the aeronautic, shipping and petrochemical industries, and non-special copper alloys for the energy and automobile industries. LBA has a revenue of 175 MEUR, of which 78% goes to export, and it invests more than 5 MEUR/year.

Le Bronze Industriel (now LeBronze Alloys) was created in 1924 and is now a family-owned company based in Suippes. Since inception, it has specialized in the niche market of high added value intermediate goods composed of special alloys. The company has pursued an active policy of investment and acquisition between 2004 and 2013, going from 450 to 1100 employees, and targeting to
- modernize production facilities and increase capacities: create a new plant in Suippes.
- extend the range of products and alloys, thereby increasing diversity and offering complete solutions to clients.
- integrate the downstream side of the production chain (10 industrial sites). This allows recovery of all the production losses, inventoried by alloy type, then recycled internally maintaining the quality of each alloy rather than be re-sold to competitors outside Europe, often recycled and mixed with other alloys. For a finished good of 1 kg, 3 kg comes out of the foundry and 2 kg of losses can be recovered.

These investments are key to the sustainability of the group because they can secure the supply in a context of fierce competition with the Asian actors in the market of copper waste.

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Avoid illegal export of waste
This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity\textsuperscript{10}

It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

Reduce labor cost
This lever requires a modification of fiscal rules. This first requires achieving a political decision, which an economic framework that is much broader than the recycling sector.

Support R&D
For copper, create research funds focusing on special alloys of copper.

8.8. Electric cables
A significant proportion of used cables generated in France escapes French transformers and is exported to Asia (principally China and India). Since early 2013, there was a slowdown in the export demand, but it is difficult to say if this evolution is structural or the consequence of the economic climate. This may be due to the implementation of the operation “Green fence” by China.

\textsuperscript{10} Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity) : §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.». §3 : « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.»
This is an operation intended last 10 months seeking to enhance customs controls on waste importers and to refuse entry of wastes not meeting the legal requirements into the territory, i.e. the quantity of waste is too small or too dirty.

It is a market with low added value per ton, in which the competition is strong, including among French actors. The ability to purchase wisely and to get the most copper flow from the stream purchased constitute the two main factors of competitiveness of a site.

France has modern and efficient equipment to sort the cables. The two principal actors have adopted different strategies: MTB manufactures and markets cable sorting equipment for the world market and, as such, is an innovator in improving the sorting quality. Next Metal is integrated into the group Sita (access to the waste source by the buyer) and to the group Nexans (access to the waste source captured by Nexans and securing the market).

The high level of competition and the difficulty in predicting the Asian competitor positions require the actors to quickly adapt the process in order to treat the less pure cable waste and improve the productivity (speed and finesse of the sorting). At European level, the French actors are competitive, especially against the German competition. In addition to maintaining a competitive tool, the French actors stand out by integrating the value chain and by diversifying the business.

**Success story – MTB Recycling**

Based in Trept, a rural municipality of the department of Isère. MTB Recycling has over 30 years of experience operating two complimentary processes: sorting of waste containing non-ferrous metals (cables, WEEE, automobile shredders residue) and the development and manufacturing of sorting equipment for non-ferrous metals. The sorting activity allows to MTB to better understand the needs of users of sorting equipment and helps MTB to design quality and durable product lines. Since the purchase of the company in 2009 by the current president, the company has invested 15 MEUR in the development of new sorting machines in new sorting buildings and in assembly of sorting lines. In association with partner SME’s, the company has developed two highly innovative technologies which it has been marketing since 2013:

- Separation of copper waste through the innovative use of the eddy current: the MagPro technology
- An efficient treatment process for recycling energy-saving light bulbs and flat screens that protects the equipment operators from mercury emanations: the BluBox technology

The company has a turnover of about 80 MEUR of which 97% is exported. The company has also doubled the number of employees since 2005 from 50 to 100 employees.

**Among the levers identified to improve the competitiveness of the sector, the main levers are:**

**Avoid illegal export of waste**

This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity

It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

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11 Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity) : §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.» §3 « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.»
Support R&D
For the cables, finance the R&D projects focused on improving the plastics recycling from cables shredding.

8.9. End of Life Tyres (ELT)

The waste involved is the non-reusable end-of-life tyres, i.e., which cannot be reused as is or retreaded. The study focused on the competitiveness of material recycling sites (granulation only) and integrated sites (granulation to manufactured product). Two reasons explain this choice: first, this segment focuses the greatest development potential for business development; second, this type of recovery is a priority according to the ordinance of 17 September 2010. Competitiveness issues have focused on the granulators, which are in competition with the foreign competitors. We estimate that the net export rate of tyres sent to granulation is about 10%. The quantity of tyres directed to granulation in France has decreased 16% since 2005, despite an increase in the amount collected for the benefit of energy recovery.

The total current capacity of active or soon to be active granulation sites in France is estimate at about 110 kt/y of which 40 kt is from Sita Regene, which should be purchased soon or closed.

There have been a series of business closures during the last 10 years. They may be due to a lack of investment, a lack of economies of scale for the affected granulators and cumulative competition among granulators and with other types of waste recovery operations, leading to a sharp reduction of the gate-fee.

There is currently a dynamic relating to creation of new treatment lines in France (HET, Collet Environnement), driven mainly by the availability of waste (France is net exporter of ELT and the transportation cost is high, even in the form of shredded tyres). Existing facilities show some advantages in terms of competitiveness, either because the lines are new and they produce quality products, or because the sites are integrated into a facility that uses the granulates, which brings the advantage of securing granulate demand and management of quality control issues.

Success story: Roll Gom
Each year, the company Roll Gom transforms 10% of the French used tyre supply into rubber wheels which are used for waste containers and pressure washers throughout Europe. The site, located in Arras in the Pas de Calais for nearly 25 years, employs 95 people, 71 of which are laborers, and has a turnover of about 14 million euros. The process consists of transforming entire tyres into hard tyres for casters (undriven, single, double, or compound wheel that is designed to be mounted to the bottom of a larger object (the “vehicle”)). The steel and the textile from tyres are used as raw materials at manufacturing sites in the region. The company’s success lies in its ability to produce 100% recycled finished products from wastes better than the competition. The added value comes mainly from the transformation into wheels, but integration of the granulation of ELT permits the necessary quality control on the crumb rubber. Since 2006, the company belongs to the French group Auréa composed of SME’s active in the recycling. Since 2012, the company has made about 1.4 million euros worth of investments in shredding, sorting and pelletization technology to maintain its competitiveness against two Polish competitors and against virgin wheels produced in Europe. The wheels manufactured with recycled tyres account for more than 80% of the market. We note that the company diversifies its activities by producing pieces for automobiles (bumpers and silent blocs).

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Encourage the companies to increase their capacities of treatment
The facilities with too small capacities of treatment result in an increase of the production costs and so a small negotiation capacity of regenerators for the purchase of waste. The lever consists of helping financially the recycling companies to invest for more capacities.
The measures that encourage the (French) market increase indirectly contribute to the scale increase.

In the calls for tenders, encourage processes which have high environmental performance

The French recyclers for the affected sectors have developed recycling processes with higher environmental performance (e.g., applications of the WEELABEX norms in France) than their European counterparts. This performance also has an added cost. If this enhanced environmental performance is not perceived as an added value by the recyclable waste producers, the French industry has a competitive handicap. On the other hand, if it is taken into account, it can allow companies to gain market shares.

As a first step, the French authorities should create an environmental performance clause in the markets managed by the French recyclable waste producers. In a second step, they should push the European Commission to make these clauses mandatory in all waste recycling markets.

For the ELT, the increased demand would have a positive effect on the level of activity and, as a consequence, on competitiveness.

Support R&D

Development of ELT recycling: Financially support industrial development projects applicable to powder and granulate through the launch of a call for projects.

8.10. End of life vehicles and automobile shredder residue

The monograph focuses on the light and heavy automobile shredder residue (ASR), which accounts on average for 25% of the weight of a decontaminated and dismantled ELV. This results in a potential waste source of 488 kt (based on 2.3 million tons of decontaminated and dismantled ELV resulting in a tonnage of 1 953 kt) and a current waste source of 289 kt\textsuperscript{12} (based on 1.36 million decontaminated and dismantled ELV for a tonnage of 1 155 kt). The existing capacity in France (1 065 kt) greatly exceeds the estimated need. However, all existing technologies do not allow production of recyclable mono-products or products for energy recovery.

French post-shredder sorting units are globally competitive compared to the units of other European countries. In France, 13 post-shredder sorting units (out of 16)\textsuperscript{13} are backed by groups with significant financial resources, which gives them the capacity to invest in R&D and in facilities. The other advantage is the knowhow regarding the ASR recovery (the group Galloo played a pioneer role in the development of the recovery of non-metal fractions at the beginning of the 2000s. In the last 3 or 4 years, other large groups involved in the recovery of ELV in France, such as Derichebourg and Ecore/guy Dauphin Environnement, have also invested in upgrading recovery facilities for plastic-rich fractions) and improving the quality of plastics coming out of French post-shredder sorting facilities. Conversely, several obstacles penalize the French post-shredder sorting facilities. They are linked to the supplies of waste (constraints linked to illegal exports, constraints linked to exports of pre-processed shredder residue to Asia), to the low cost of landfill disposal, to the over-capacity of Belgian shredders (it imposes a competition which obliges them to re-buy the ELV at higher prices than those of the French shredders), to the need for quality improvement of the waste entering the shredders, to the questionable quality of decontamination of the ELV. Finally, the profitability of the plastics sorting is subject to sharp fluctuations commodity prices. This uncertainty is an entry barrier for actors who have not yet invested in a new production equipment for separating the plastics before sending them to recycling.

\textsuperscript{12} The sector professionals (SBF, syndicate of the French Shredders) consider the yearly tonnage processed in France as equal to 270 kt.

\textsuperscript{13} Source: Federec
Success story: Galloo Plastics

The company Galloo Plastics processes about 25 kt/year of plastics waste. This plastic comes from Galloo Metal shredder residue, from shredder residue of other facilities conducting post-shredder sorting, or from large packaging waste coming from all over Europe. The site, established in Halluin in the North of France 14 years ago, employs 60 people and has a turnover of about 25 MEUR.

The process consists of an initial pre-concentration step (extraction of thermoplastic material), a second step involving washing and sorting of plastics by resin (PP–PE–PS–ABS), and a third and final step involving compounding and extrusion.

The success of the company is mainly due to its capacity to obtain recycled raw plastics of very good quality (purity of 95 to 98%). Over time, the buyers of recycled raw plastics out of shredder residue (50% automobile sector and 50% household appliances, hangers, etc.) have developed confidence in the quality of the mechanical properties of these plastics and ask for more. Moreover, Galloo Plastics is currently the only industrial site in France producing recycled raw plastics out of shredder residue. Finally, Gallo Plastics is part of the Galloo group and is, therefore, integrated into the industrial process of post-shredder sorting; it has then assured access to plastics from Galloo Metal shredder residue and good knowledge of the shredded fractions.

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Avoid illegal export of waste

This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity\(^\text{14}\)

It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

Make landfill disposal more difficult by implementing disposal quotas, increasing the landfill tax and/or implementing a lower landfill tax for the recoverable waste.

Three points of attention must be specified at this stage:

- The objective of increasing the landfill disposal tax is not to generate additional revenues. The tax is an incentive tool whose desired effect is to transfer recoverable waste towards other types of treatment. Thus, the tax doesn’t have to be paid if the waste is not landfilled.
- The tax is only one tool to leverage more environmentally friendly waste treatment processes. The objective is then to diminish the competition from landfill disposal and to divert the wastes toward more environmentally friendly processes. Another approach to diminish this competition is to prohibit landfill disposal and required waste sorting.
- Under French law, it is possible to discriminate the waste based on its destination (landfill disposal tax is variable as a function of the quality of the landfill disposal or the type of treatment center), but it does not seem possible to tax the waste differently as a function of its origin or quality. However, this is the proposed action. This action needs then to be subject to a legal analysis to validate the possibility of taxing the waste as a function of its origin or its quality.

\(^\text{14}\) Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity): §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.» §3: « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.»
The Ministry of Ecology has launched a study on the possibilities of taxing landfill disposal of certain types of recoverable wastes (wood, plastic, metal …) or even to prohibit it.

The “Comité pour la fiscalité Ecologique” is working on the development of the landfill tax under condition of iso-fiscality, which means the elimination of some modulations and the creation of new ones, always with the objective of improving the environmental performance of waste elimination centers.

8.11. Small household appliances (SHA)

The monograph focuses on pre-treatment of SHA and production of recycled raw material. The pre-treatment involves decontamination, dismantling, shredding and sorting.

The potential waste source of household SHA is estimated at 312 kt. No information is available regarding the potential waste source from SHA from commercial/industrial/business activities. In 2012, 104 kt of household SHA were collected in France. This tonnage showed a rapid increase since the start of the EPR in 2006. Moreover, 18.8 kt of professional SHA were collected in 2011.

Since 2009/2010, we have been assisting in the restructuring of the sector around a few large groups. These restructurings have induced multiple groupings or closings of small treatment centers. The number of truly major industrial sites is probably about twenty. Among these sites, some actors have developed facilities in France for decontaminating plastics, separating them by resin and compounding them, in particular, Galloo Plastics (annual capacity of 50 kt of WEEE and forecasts of 80 kt for 2014). We note several investments of foreign actors in France, like Remondis (Germany) which has invested 16 MEUR in 2008 in the installation of SHA treatment close to Troyes in France, and Immark (Switzerland), who started a facility dedicated to WEEE recycling (focus on SHA and computer and electronic equipment in 2010) near Nîmes in France (capacity of 40 kt/year). France is rather advanced in terms of technological expertise for the SHA treatment. Through the eco-contribution, some R&D work has led to recycling plastics present in SHA as well as recycling rare earth elements present in computer magnets.

The French manufacturers are rather advanced in terms of compliance with standards developed in 2011 by the WEEE Forum in the framework of the WEELABEX project. This favors the French manufacturers compared to other European manufacturers (e.g., German and English manufacturers).

Furthermore, thanks to the publication of the circular of 30 November 2012 about the management of WEEE plastics, the management of treatment for WEEE plastics in France (required by the different regulations) have been clarified. France is ahead compared to other countries relative to publication of the Cenelec standards which mandates decontamination of BFR plastics.

The principal obstacles to the competitiveness of French recyclers are linked to:

- the supply of waste (difficulty accessing the market for SHA treatment for lots of new actors entering on the market in France, difficulty obtaining a contract with a producer compliance schemes (called éco-organismes in France)
- the fluctuations of the resin prices and the duration of the contracts with the producer compliance schemes
- the different rules of operation in the sector between, on the one hand, France and on the other hand the United-kingdom and Germany.

Source: ADEME
Source: Interview with ERP France
Source: Ecosystèmes. No precise data is available.
In these two countries, a significant portion of the flow is treated with lower quality standards and thus lower costs --not in compliance with the “waste” designation of the European regulations (some European companies affirm treating plastics originating from SHA, but they do not treat BFR plastics. So, they meet the “product” regulation requirements for the recycled raw material content that must be incorporated into the production of new products, but they do not comply with the “waste” regulation which requires decontamination of BFR).

In addition, the phenomenon of illegal export of used SHA for use as second-hand SHA outside Europe is generating a loss of value linked to the loss of recovery of metals and recyclable plastics by the national actors. This phenomenon has increased progressively over the years in most of the EU countries, due in a large part to the inefficiency of controls and increase in the benefit of illegal export.

Success story: Triade électronique

<table>
<thead>
<tr>
<th>The WEEE treatment center of Triade électronique, situated in the municipality of Saint-Sylvain d'Anjou, treats about 35 kt/year of WEEE and employs 160 people.</th>
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</thead>
<tbody>
<tr>
<td>A treatment line dedicated to SHA and professional WEEE (printers, phones, ticketing appliances) has been in operation since 2008. Manual pretreatment of the waste provides a first-level of decontamination- and prepares the waste for mechanical treatment. The WEEE fall into a cylinder with large chains in the bottom and are shattered into pieces. The different materials will separate from each other without being shredded, which save the batteries and the capacitors. The metals and the plastics are then recovered separately.</td>
</tr>
<tr>
<td>The company’s success is due to the development of an innovative industrial process to identify and separate the plastic material. This process relies on the exploitation of an exclusive database created by the company. This database contains the principal formulations of plastics used for the EEE manufacture. The separation is done using sequential auto-adaptive sorting (TSA2) developed and patented by VEOLIA: the waste is analyzed by light beams, infrared beams and X-rays which allow detection of the various plastic formulations and distinguishing the different plastics with a purity rate of up to 90%. The sorted plastics are then sent to buyers of recycled raw plastics (e.g., sector of household appliances). This facility treats 15 kt/year of plastics.</td>
</tr>
<tr>
<td>The company has invested a total of 20 MEUR of which 2.8 MEUR is for the plastics identification and separation facility. The investments have been supported by Angers Loire Métropole (8 MEUR for the building) and ADEME (0.832 MEUR for the plastics identification and separation facility).</td>
</tr>
</tbody>
</table>

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Avoid illegal export of waste

This lever requires implementation of regulations or incentives using economic tools based on the principle of proximity.

It can be applied only at a European scale because more rigorous controls in the French ports only would simply move the illegal export towards other European ports. Obtaining a European consensus and its rigorous application in practice would constitute long term work.

20 Directive 2008/98/CE of the European Parliament and of the Council of 19 November 2008 – article 16 (Principles of self-sufficiency and proximity) : §2 « The network shall be designed to enable the Community as a whole to become self-sufficient in waste disposal as well as in the recovery of waste referred to in paragraph 1, and to enable Member States to move towards that aim individually, taking into account geographical circumstances or the need for specialized installations for certain types of waste.» §3 « The network shall enable waste to be disposed of or waste referred to in paragraph 1 to be recovered in one of the nearest appropriate installations, by means of the most appropriate methods and technologies, in order to ensure a high level of protection for the environment and public health.»
Increase the collection rates of waste

The increase of the waste volume to recycle will indirectly promote the size of the recyclers, which will generate a larger investment capacity and economies of scale. The multiple possible levers necessary to increase the tonnages collected.

Encourage the companies to increase their capacities of treatment

The facilities with too small capacities of treatment result in an increase of the production costs and so a small negotiation capacity of regenerators for the purchase of waste. The lever consists of helping financially the recycling companies to invest for more capacities.

The measures that encourage the (French) market increase indirectly contribute to the scale increase.

Encourage investments

This lever consists of assisting recyclers secure investments to purchase new equipment (e.g., to recycle plastic films that are difficult to treat), to reduce production costs through automation and smart logistics.

Reduce labor cost

This lever requires a modification of fiscal rules. This first requires achieving a political decision, which an economic framework that is much broader than the recycling sector.

In the calls for tenders, encourage processes which have high environmental performance

The French recyclers for the affected sectors have developed recycling processes with higher environmental performance (e.g., applications of the WEELABEX norms in France) than their European counterparts. This performance also has an added cost. If this enhanced environmental performance is not perceived as an added value by the recyclable waste producers, the French industry has a competitive handicap. On the other hand, if it is taken into account, it can allow companies to gain market shares.

As a first step, the French authorities should create an environmental performance clause in the markets managed by the French recyclable waste producers. In a second step, they should push the European Commission to make these clauses mandatory in all waste recycling markets.

Standardize the exploitation conditions in France and in Europe, and develop and impose a certification of the European operators (plants and process(es)) through use of official approvals delivered by producer compliance schemes or through Directive.

8.12. Electronic cards

The monograph focuses on pretreatment of electronic cards (manufacture of a copper concentrate) and the production of recycled raw material. The electronic cards are present in the WEEE and the ELV.

The French electronic cards waste source is estimated at 37 kt/year without considering production waste. In 2012, 10 kt of printed circuit cards were extracted from household and industrial WEEE treated in France.

Electronic cards treatment is a very capital intensive activity, with large economies of scale. As a consequence, there are very few (3) European actors active in the producing recycled raw material from electronic cards.

Ecosystème estimates that 10% of the French electronic cards collected are first treated in France and that the remaining 90% are treated directly abroad, mainly at Boliden (Sweden) and Umicore (Belgium). The two principal actors in France for the treatment of electronic cards are Terra Nova (Isbergues plant, Pas-de-Calais) and Bigarren Bizi (project in development in Bordeaux).
The market of electronic cards is a world market. Nine large recycling companies (copper foundries, integrated foundries/refineries) exist in the world, of which there are 3 in Europe (Boliden in Sweden, Umicore in Belgium and Aurubis in Germany), 1 in Canada (Xstrata), 1 in Korea and 4 in Japan.

The principal industrial facility for recycling electronic cards in France is not competitive with similar facilities in other European countries.

The principal barriers to the competitiveness of French recyclers are linked:

- To the value of electronic cards: given the high added value of the recycled raw material from electronic cards, the cards can be transported anywhere in the world. There is no significant advantage to being close to a waste source.

- To the actors present: globally, there are 9 large copper foundries or integrated foundries able to treat electronic cards and produce recycled raw material; 3 are situated in Europe (Sweden, Belgium, Germany). Hence, the entry cost for a French company is very high because of the important economies of scale and the technological expertise of these 9 large copper foundries or integrated foundries, which is difficult to acquire.

- To the treatment capacity: according to EERA and Umicore, the current electronic cards treatment capacities are sufficient to recycle all the electronic cards that could be collected. There is no place for the entry of a new actor. The three large recycling companies in Europe are trying to increase the rate of electronic cards in their process as their revenues mainly come from treated electronic cards. However, even if there is enough treatment capacities in the world, the number of foundries which could accept recycled raw materials coming from electronic cards could increase thanks to the technology developed by Terra Nova.

- To the fragility of pretreatment activities in front of the volatility of the metals prices: if the value of metals present in electronic cards decreases significantly, pretreatment of poor cards (as Terra Nova in France) would no longer be profitable. Indeed, the profit margins for precious-metal-poor cards are clearly inferior to the margins for precious-metal-rich cards.

- To the lack of expertise in metallurgy: to work on electronic card treatment, expertise in metallurgy is necessary. However, there is currently a shortage of competency in metallurgy in Europe, except for some countries like Belgium where there are still prestigious universities and research centers of metallurgy. France is handicapped in this regard, compared to Belgium, for example.

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Support R&D
Identify alternative technologies to existing technologies of the smelters
Identify not recycled metals for which there is an economic interest
Develop processes to recycle metals identified above

8.13. Batteries and accumulators (B&A) – Lead-free

The monograph concerns all the types of the lead-free B&A (portable, automobile and industrial).

In 2012, the quantity of lead-free B&A treated in France and coming from abroad was about 5.4 kt.
The lead-free P&A that are most imported for treatment in France are the Ni-Cd accumulators and the AS and Zn-air batteries. They represent 53% and 39%, respectively, of the quantities treated in France.

Seven treatment operators of lead-free B&A are registered in the B&A register. They are spread out over ten sites in France.

The French operators possess an important, constantly evolving expertise (efficiency rate, value of output products, respect of HSE constraints). For example, the majority of the actors have projects in progress to acquire the two complementary technologies of pyrometallurgy and hydrometallurgy. On the other hand, the French operators possess the necessary competencies to manage R&D projects focusing on optimizing the existing processes or developing new processes. Numerous projects are underway.

However, several obstacles reduce the competitiveness of French recyclers:

- The sorting step, crucial for the quality of recycling, represents a significant cost in France compared to Spain or the Eastern countries because it is not highly automated and labor is more expensive in France.
- French advanced expertise (hydrometallurgy for the AS batteries, Zn-air and Li; process in development for the Li-ion accumulators) does not lead to the economic parity under the current market conditions.
- The lack of uniformity of practice in terms of treatment and the cases of end-of-waste status could create a distortion of competition compared to the other European actors.

The B&A sector is still fragile. There will undoubtedly be an evolution of the actors in the coming years. Some partnerships between operators are likely to ensure their sustainability.

Among the levers identified to improve the competitiveness of the sector, the main levers are:

Increase the collection rates of waste
The increase of the waste volume to recycle will indirectly promote the size of the recyclers, which will generate a larger investment capacity and economies of scale.

Encourage investments
This lever consists of assisting recyclers secure investments to purchase new equipment (e.g., to recycle plastic films that are difficult to treat), to reduce production costs through automation and smart logistics.

In the calls for tenders, encourage processes which have high environmental performance
The French recyclers for the affected sectors have developed recycling processes with higher environmental performance (e.g., applications of the WEELABEX norms in France) than their European counterparts. This performance also has an added cost. If this enhanced environmental performance is not perceived as an added value by the recyclable waste producers, the French industry has a competitive handicap. On the other hand, if it is taken into account, it can allow companies to gain market shares.

As a first step, the French authorities should create an environmental performance clause in the markets managed by the French recyclable waste producers. In a second step, they should push the European Commission to make these clauses mandatory in all waste recycling markets.

Standardize the exploitation conditions in France and in Europe, and develop and impose a certification of the European operators (plants and process(es)) through use of official approvals delivered by producer compliance schemes or through Directive.
ABOUT ADEME

The French Environment and Energy Management Agency (ADEME) is a public agency under the joint authority of the Ministry of Ecology, Sustainable Development and Energy, and the Ministry for primary, secondary and higher Education and Research. The agency is active in the implementation of public policy in the areas of the environment, energy and sustainable development.

ADEME provides expertise and advisory services to businesses, local authorities and communities, government bodies and the public at large, to enable them to establish and consolidate their environmental action. As part of this work the agency helps finance projects, from research to implementation, in the areas of waste management, soil conservation, energy efficiency and renewable energy, air quality and noise abatement.