Evaluation of the implementation of a self-regulation tool in the French Vehicle Equipment Industries

FRANCOIS AVRIL

Department of Energy and Environment
Division of Environmental Systems Analysis
CHALMERS UNIVERSITY OF TECHNOLOGY
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Preface

This report is the result of my thesis work, which I have done in the scope of the Industrial Ecology master programme at Chalmers University of Technology. My combined master thesis work and engineering training have been performed at the French Vehicle Equipment Industries (FIEV) in the midst of the Technical Department, from June to November 2005.

My work at FIEV was composed of two main missions. The first one, which constitutes the basis of my thesis work, was to coordinate and follow a project of energy diagnostics of the industrial sites of the FIEV's adherents. That project, called RESEDA, is the environmental voluntary tool which I have decided to study. My second mission, which was to help implementing a Sustainable Development pole at FIEV, is also indirectly linked to the field of this study. Actually, it enabled me to have a better view of the performances of the sector's companies in terms of environment.

Acknowledgements

I would like to thank all the persons I met at FIEV. They made the atmosphere really pleasant during the five months I spent there. I salute especially my colleagues from the Technical Department who integrated me warmly in their team, as well as Mr Lamodière and Mr Délétang, my industrial advisors.

Finally, I do not forget to thank Henrikke Baumann who directed this thesis work at Chalmers.

Abstract

The study focuses on the application of a self-regulation project developed by the automotive supply industries in response to the global warming issue. The project, called RESEDA, was carried out within the scope of a cooperation protocol signed by the French Vehicle Equipment Industries' federation (FIEV) and the French Environment and Energy Control Agency (ADEME). It developed an energy diagnostic tool intended for the industrial sites of the companies adhering to the FIEV.

This study shows that the RESEDA project has reached quite significant results in terms of energy saving and has helped to make companies aware of the rational energy use issue.

It appears however that the economic aspects were crucial for the success of the project's implementation, which tends to show that self-regulation within the automotive supply industry can not really be extended to the realms where economic gains are not expected.

Keywords

Automotive supply industry, self-regulation, rational energy use, diagnostic tool

Résumé

Cette étude évalue la mise en oeuvre d'un projet volontaire développé par l'industrie des équipementiers automobiles dans le cadre de la lutte contre le changement climatique. Ce projet, nommé RESEDA, est l'une des principales mesures d'un protocole de coopération signé entre la Fédération des Industries des Equipements pour Véhicules (FIEV) et l'Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME). Il développe un outil de diagnostic énergétique à destination des sites industriels des entreprises adhérentes de la FIEV.

La présente étude a montré que l'opération RESEDA a pu atteindre des résultats significatifs en terme d'économies d'énergie et a contribué à la sensibilisation des entreprises au problème de l'utilisation rationnelle de l'énergie.

Il apparaît cependant que les aspects économiques ont joué un rôle prépondérant pour le succès de la mise en œuvre de ce projet. Ceci tend à montrer que la réglementation volontaire au sein de l'industrie des équipementiers automobiles ne peut s'appliquer qu'aux domaines permettant de réaliser des gains financiers.

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List of main abbreviations used

ADEME: French Environment and Energy Control Agency (Agence de l'Environnement et de la Maitrise de l'Energie)

CCFA: French Car Manufacturer Committee (Comité des Constructeurs Français d'Automobiles)

DGEMP: French General Office of Energy and Raw Materials (Direction Générale de l'Energie et des Matières Premières)

DIDEME: French Office of Demand and Energy Markets (Direction de la Demande et des Marchés Energétiques)

ECODIS: Ecodesign Interactive Systems

ETS: European Trading Scheme

EU: European Union

FIEV: French Vehicle Equipment Industries (Fédération des Industries des Equipements pour Véhicules)

ISO: International Standard Organization

LCIA: Life Cycle Impact Assessment

RESEDA: project dealing with energy rationalization among the automotive supply industry (Rationalisation Energétique des Sites des Equipementiers De l'Automobile)

SME: Small and Medium size Enterprise

US: United States of America

1. Introduction

1.1. Problem formulation

In order to reach the French targets of greenhouse gas reduction defined by the Kyoto protocol, some companies have started to collaborate with public organizations. For instance, several federations representing small “emitters” of greenhouse gases have voluntarily decided to have a pro-active behaviour to face that issue. In that context, the French Vehicle Equipment Industries’ federation (FIEV) and the French Environment and Energy Control Agency (ADEME) have decided to establish a partnership by signing a cooperation protocol whose objectives are to reduce the emissions of six greenhouse gases in the automotive sector and promote the actions leading to a rational energy use.

Climate change is one area where the debate between the proponents of self-regulation and the advocates of imposed regulations is particularly discussed. By signing the protocol with the ADEME, the automotive supply industry has committed itself to the self-regulation option and anticipated a potential imposed regulation.

Proponents of self-regulation assert that this option has many advantages beyond the economic aspects. First, they notice that self-regulation enables the implementation of more flexible and more adapted solutions for the companies, especially for international companies which have to take into account so many national regulations otherwise. Besides, they put forward that the monitoring of the implemented solutions is easier in the case of self-regulation. For them, better flexibility, adaptability and monitoring are bound to lead to a better efficiency, which is beneficial for the whole society. Moreover, they believe that the opportunities to have new market shares or to communicate about the implemented voluntary actions are strong drivers for the companies, which are anyway responsible enough to take appropriate actions to preserve the environment. This is regarded as doubtful by proponents of imposed regulation, who don’t believe in the responsibility and sincerity of companies. On the contrary, they are convinced that economic profitability is the only driver for all the actions taken in a company.

So, should self-regulation be restricted to the realms where economic gains are possible (even probable), or could it be extended and generalised to every realms?

1.2. Aims and objectives

The RESEDA project is one of the main measures included in the protocol signed between the FIEV and the ADEME. It aims at auditing the industrial sites of the FIEV's adherents and helping them to decrease their energy consumption. Since it is a voluntary project, it is considered as an environmental self-regulation.

- ⇨ The first objective of the present work is to study if other drivers than the economic ones have really played a role or not for the implementation of the RESEDA project.
- ⇨ The second objective is to assess the efficiency of the RESEDA project as a voluntary environmental work in the automotive supply industry.

1.3. Scope and limitations

The present study was done in the scope of the automotive supply industry. To respect the confidentiality of some strategic data, the names of the companies involved in the project are not mentioned in this report.

The work presented in this report was empirical and based on a specific example stemmed from the automotive supply industry. Consequently, one has to be cautious with the extrapolation of the obtained results, especially in other sectors.

Besides, the data coming from the companies involved in the project were sometimes quite imprecise. Thus, one should focus on the result's order of magnitude instead of the precise numbers.

1.4. Methodology

In order to reach the aims and objectives presented above, the work has been realized following an outline constituted of four steps:

1. **Examination of the background of the RESEDA project by studying the automotive supply industry and the energy situation in France**. Although the present study was mainly empirical, its context needed to be specified. As a consequence, a literature research on the energy situation in France, the French answers to the Kyoto protocol and the characteristics of the automotive supply industry has been conducted first.
2. **Determination of what can be expected of the RESEDA project as an energy diagnostic tool by proceeding to a theoretical analysis of the tool**. Before evaluating the application of the tool developed by the project, its potential had to be

determined. Thus, based on an analytical framework, a theoretical study of the tool has been proceeded.

Besides, to have a feedback about other volunteer environmental tools used in the automotive supply industry, several meetings and commissions were visited. These meetings dealt with eco-conception, recycling, substances issue and lead substitution.

3. **Collection and analysis of the effective results of the RESEDA project**. The first step was to collect the relevant data from the 61 companies which had participated to the first phase of the project. With this intention, a survey has been sent twice: the first time in July 2005 and a 2nd time in September 2005 to the companies which had not answered the first time. Moreover, several phone calls have been useful either to precise the incomplete answers, to discuss about the effects of the RESEDA project in the industrial sites, or to convince new companies to participate to the RESEDA project and test the arguments in its favour.

   Besides, a presentation of the results of the first phase was done to the CEII commission (Energy and Industrial Installations Commission). This has leaded to a discussion with several FIEV's adherents and a collection of their feelings about the results.

   Finally, to have a better knowledge of the performances of the companies belonging to the automotive supply industry sector in term of Sustainable Development, another specific survey has been sent twice.

4. **Discussion about the perspectives and the lessons of the RESEDA project**. A comparison between the results which could have been theoretically expected and the effective results has been done to assess the efficiency of the tool application. The future perspectives of the tool have also been considered. Finally, the learnings of the study in terms of self-regulation have been identified.

2. Background - The French automotive supply industry seen in the perspective of the energy situation in France

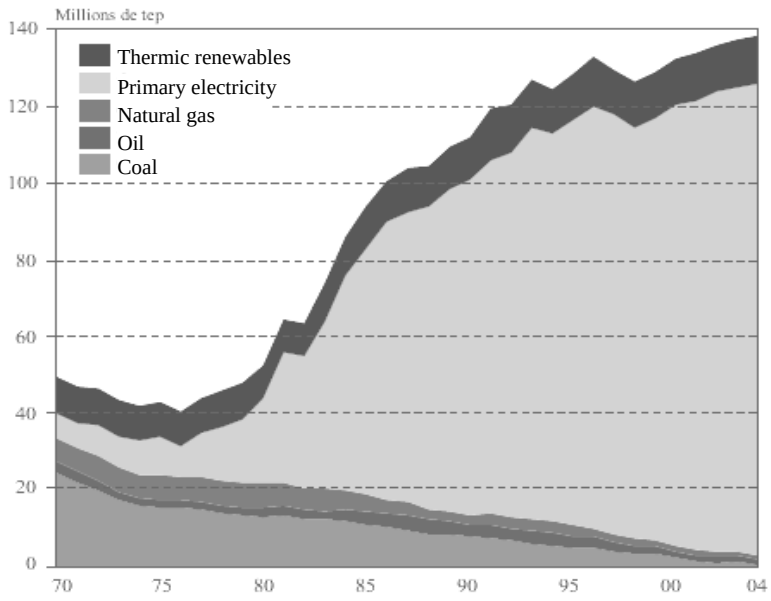
2.1. The energy situation in France

The RESEDA operation deals with energy diagnostics. However, realizing energy savings does not have the same effects depending on the countries where they occur. That is why it is essential to study first the energy situation in France, which constitutes the context of the RESEDA operation.

2.1.1. Description

In this part, it will be focused on the years 2002, 2003 and 2004, which are the years corresponding to the first phase of the RESEDA project.

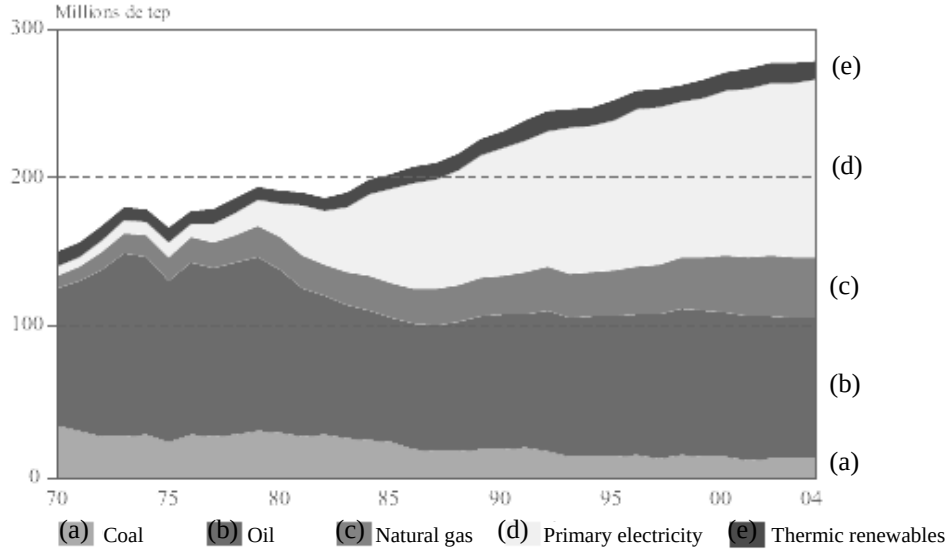
In 2004, according to the French ministry of Economics and Industry (2005), the French primary energy production has been 138 Mtoe/yr. That figure corresponds to 1.3% of the world primary energy production and 17% of the European (15 countries) one.



Graph 1: Evolution of the French primary energy production in Mtoe (From the French ministry of Economics and Industry (2005). « L'énergie en France. Repères »)

It can be easily observed that the major part of the French energy production is electricity. It comes from the scarcity of energy resources in the French territory.

The global French energy production is however not enough to supply all the demand and France relies on energy importations. In 2004, the French primary energy consumption has been 276 Mtoe/yr, which corresponds to 2.6 % of the world primary energy consumption and 18 % of the European one. Consequently, in 2004, France has imported 138 Mtoe of energy, which is around half of its energy consumption.



Graph 2: Evolution of the French primary energy consumption in Mtoe (From the French ministry of Economics and Industry (2005). « L'énergie en France. Repères »)

	2002	2003	2004	
	Mtoe	Mtoe	Mtoe	%
Coal	13	14	13	**5**
Oil	94	93	93	**34**
Natural gas	40	40	40	**14**
Primary electricity	114	115	117	**42**
Thermic renewable (wood products)	13	13	13	**5**
Total	275	274	276	100

Table 1: French primary energy consumption in 2002, 2003 and 2004 (from the French minsitry of Economics and Industry (2005). « L'énergie en France. Repères »)

It can be observed that the energy consumption in France has been quite stable the last three years. Moreover, around 53% of the energy consumed in France comes from fossil fuels and 42% from primary electricity.

To really define the sources of the energy used in France, electricity production has to be studied in detail.

	2002	2003	2004	
	TWh	TWh	TWh	%
Hydropower	67	65	66	**12**
Nuclear	437	441	448	**78**
Fossil fuels	56	61	58	**10**
Total	560	567	572	100
Importations	4	7	7	
Exportations	81	73	69	

Table 2: French electricity production sorted by source in 2002, 2003 and 2004 (from the French minsitry of Economics and Industry (2005). « L'énergie en France. Repères »)

First, it can be noticed that France hardly imports electricity. Consequently, it can be assumed that all the electricity consumed in France is produced in France.

The major part of the electricity produced, 78%, comes from nuclear. Only 12% comes from hydropower and 10% from fossil fuels. The parts coming from woods products, and renewable like wind and solar are trifling.

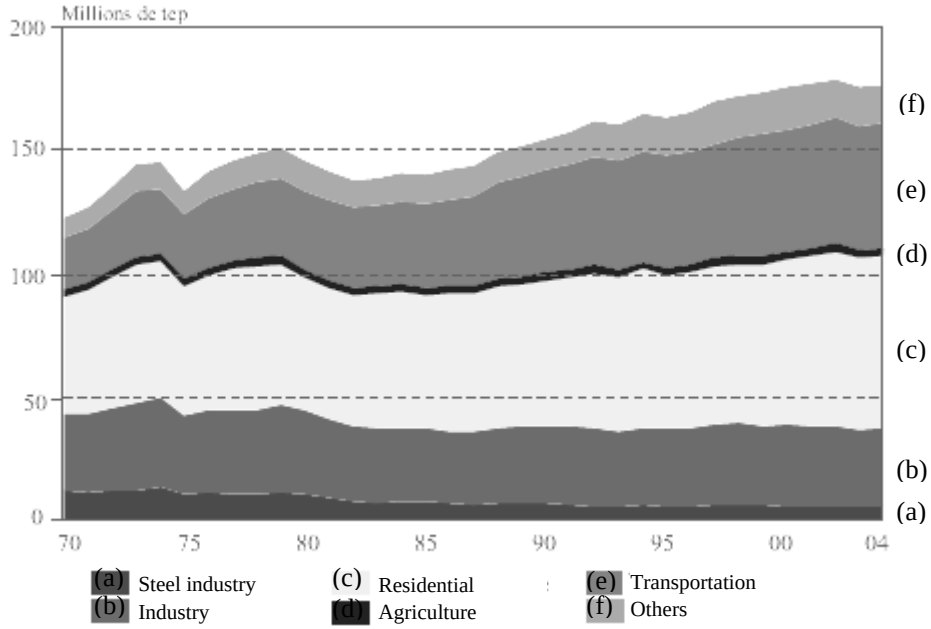
The combination of the two previous tables leads to the following table, which represents the French consumption of energy sorted by sources:

	%
Fossil fuels	57
Nuclear	33
Hydropower	5
Thermic renewable	5
Total	100

Table 3: French energy consumption sorted by source in 2004

This table shows that 57% of the energy consumed in France comes from fossil fuels and 33% from nuclear power. Only 5% comes from hydropower and 5% from thermic renewable.

Let's consider now the energy consumption per sector (the energy sector consumption is not represented on the following graph).



Graph 3: Evolution of the French final energy consumption per sector in Mtoe (from the French minsitry of Economics and Industry (2005). « L'énergie en France. Repères »)

	2002	2003	2004	
	Mtoe	Mtoe	Mtoe	%
Industry	33	32	32	20
Steel industry	6	6	6	4
Residential	71	70	70	43
Agriculture	3	3	3	2
Transportation	51	50	51	31
Total	164	161	162	100

Table4: French energy consumption per sector in 2002, 2003 and 2004 (from the French ministry of Economics and Industry (2005). « L'énergie en France. Repères »)

As it can be observed, the industry in France represents around 20% of all the energy consumption, and thus has a quite big influence on it.

2.1.2. Main issues related to the energy use in France

The French authorities are aware of the importance of the issues related to energy. The law of the 13th July 2005 of the programme setting the orientations of the energy policy stipulates that the energy consumption control is a national priority. The objectives of that law are:

- ⇨ To contribute to the national energy independence and to guarantee the supplying security.

- ⇨ To assure a competitive price of energy
- ⇨ To preserve human health and the environment, particularly by fighting the worsening of the greenhouse effect
- ⇨ To guarantee the social and territorial cohesion by giving an access to energy to everybody

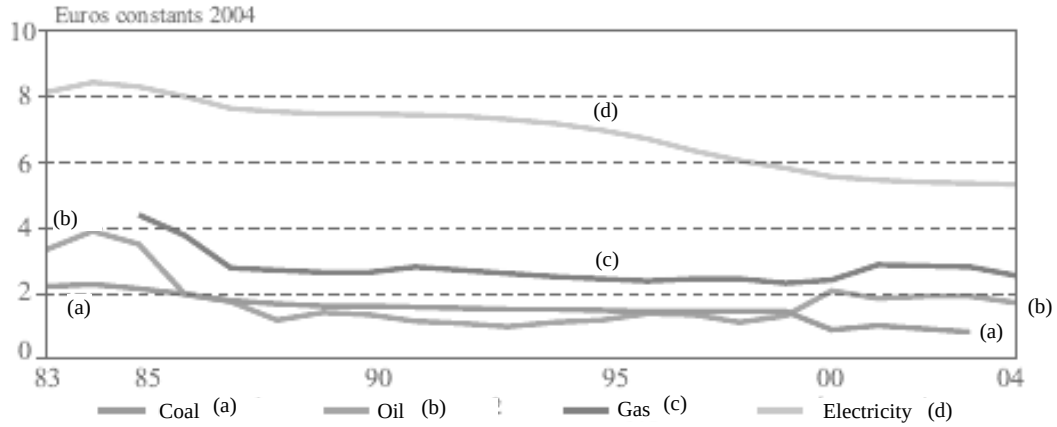
Those objectives are related to various issues.

- ⇨ **Strategic issue:**

It has been already noticed that France import a great part of its energy. As a consequence, the country is dependant of its energy providers and could suffer a lot of any crisis affecting the world energy market.

- ⇨ **Economic issues:**

The following graph gives an idea of the costs of energy for the industry. It gives the evolution between 1983 and 2004 of the energy prices (constant euros 2004), excluding VAT, in industry per 100kWh.



Graph 4: Evolution of the costs in constant euros of energy for industry between 1983 and 2004 (from the French ministry of Economics and Industry (2005). « L'énergie en France. Repères »)

- ⇨ **Environmental issues:**

As it has been seen in the previous paragraph, the main energy sources in France are fossil fuels and nuclear. Hydropower is also non negligible. Those sources lead to a lot of various environmental problems. The main ones are described below sorted by sources.

- ***Fossil fuels***: the burning of fossil fuels emits several compounds in the ecosphere.
    - Some of them, the greenhouse gases (primarily carbon dioxide), play a central role in the on-going global warming on a global scale. For instance, the carbon dioxide emissions related to energy in France have been 103 MtC/yr in 2002 (from AIE/OCDE, 2002). It represents 1.5% of the world CO2 emissions.
    - The releases of sulphur dioxide in the atmosphere have a regional impact on the environment, potentially leading to acidic precipitations.

- ***Nuclear***: on a global scale, the main problem implied by nuclear is the question of the permanent waste disposal. Presently, the French radioactive wastes are sorted in three categories (very low radioactivity, low and medium radioactivity, and high radioactivity) and permanently stored in the French territory.

  Potential environmental impacts in case of leakage or nuclear accident should also be considered, on both local and global scales.

- ***Hydropower***: on a local scale, it can lead to important disturbances for the aquatic environment of the harnessed streams.

2.1.3. The Kyoto protocol in Europe and in France

As it has been seen in the previous chapter, the issue related to the worsening of the greenhouse effect is explicitly quoted in the French law about the orientations of the energy policy. Not only is that issue recognized as a major one, but on top of that an international regulation set a legislative framework for it. That is why that part will focus on the Kyoto protocol and the French application of it.

2.1.3.1. The Kyoto protocol

In 1992, in the Rio summit, the world's richest countries undertook to stabilize their emissions at the 1990 level. It has been the Kyoto protocol which has translated in 1997 that will into quantitative and juridical commitments.

The greenhouse gases concerned by the protocol are the following ones: carbon dioxide (CO2), methane (CH4), hydrofluoro carbons (HFC), perfluoro compounds (PFC), nitrous oxide (N2O) and sulfur hexafluoride (SF6).

According to DGEMP & DIDME (2005), the developed countries and countries in transition which have signed the protocol have globally accepted to reduce by 5.5% compared to the 1990 level their greenhouse gas emissions on the 2008-2012 period. Among them, the US have accepted a reduction of 7%, Japan 6% and EU 8%. EU has however decided to distribute its objective between its 15 states, each state having its own reduction objective. As a consequence, France will have to stabilize its greenhouse gas emissions to the 1990 level (0% reduction compared to 1990). According to CCFA (2004), it corresponds to an emission of 144 MtC/yr.

The enforcement of the protocol started the 16th of February 2005 since 55 countries taking part of the convention and representing 55% of the 1990 greenhouse gas emissions have ratified the protocol. However the US, representing between 30 and 35% of the emissions (DGEMP & DIDEME, 2005), have not ratified it.

Three flexibility mechanisms have been created to help the countries to reach their goals.

- **Emissions Trading**: it allows to sell and buy rights to emit between nations
- **Joint Implementation** (also known as Activities Implemented Jointly): it allows developed countries to invest in emission-reducing activities in other industrialized countries, and gaining reduction units as a result
- **Clean Development Mechanism**: it is similar to the joint implementation, but where developed countries invest in Southern or developing countries.

2.1.3.2. Implementation of the Kyoto protocol inside the EU

The European Trading Scheme (ETS), which exists since the 1st of January 2005, is based on the Kyoto protocol, but adapts the principles. Here are the main adaptations:

- Although the Kyoto protocol targets the nations, the European Trading Scheme (ETS) targets some industrial installations which are allocated some quotas to emit greenhouse gases. Those installations come from the sectors that emit the most (paper, glass, cement, energy…). It corresponds to around 50% of industry's CO2 emissions and 12,000 installations are concerned in Europe.
- Although the conformity to Kyoto is checked after 5 years, the conformity to ETS is yearly checked.

2.1.3.3. Implementation of the Kyoto protocol in France

In accordance with the European regulation, a National Quotas Allocation Plan has been adopted in France the 25th February 2005. That plan aims at decreasing within 2008 by 2.43% (compared to the 2003 level) the CO2 emissions of 1126 industrial installations. The concerned installations, which are allocated CO2 quotas, are from the following sectors (from the French ministry of Ecology and Sustainable Development, 2005):

- ⇨ The energy sector: combustion installations having a power higher than 20 MW
- ⇨ The industry sector: paper industry, mineral industry (cement, glass, etc) and iron industry

The national quotas allocation plan is however not enough to reach the Kyoto's target, which would necessitate a decrease by 13% of the yearly CO2 emissions instead of 2.43%. As a consequence, a "Climate Plan" has been adopted in 2004, which cover the 2004-2010 period. It concerns in various ways every greenhouse gases emitters: private people, transportation users, industrials, farmers, local authorities and the French State.

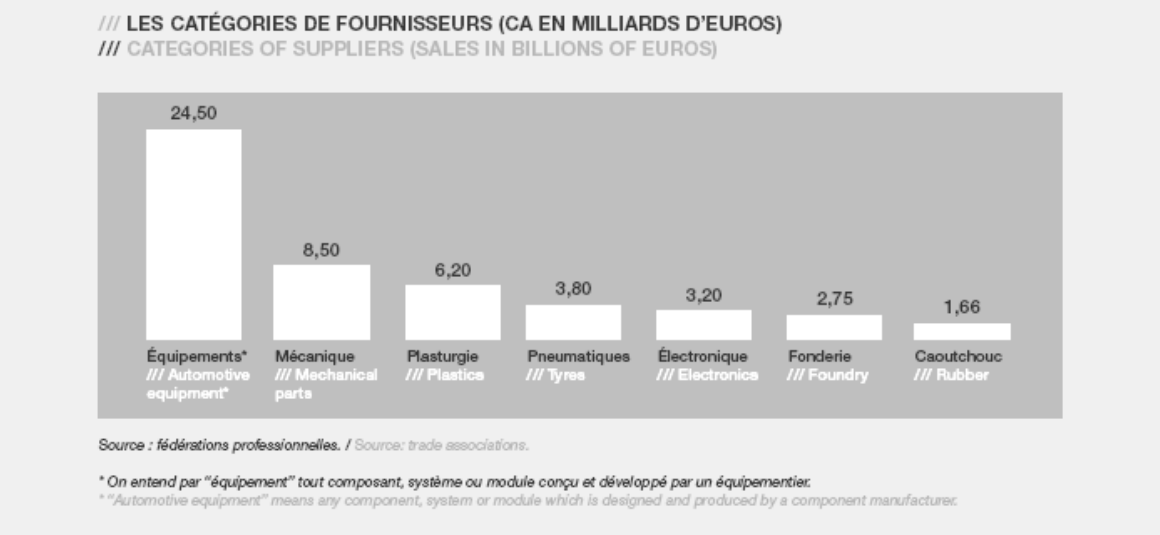
Many measures are included in that Climate Plan, as it can be seen in the Official Journal of the French Republic, 14th July 2005. For the industry sector, the plan focuses on incentives given to voluntary actions. It is estimated that those actions could lead to a saving of 10.8 Mt of CO2 within the next 5 years.

2.2. Automotive suppliers and manufacturers of automotive equipments and parts in France

After having studied the energy situation in France, it is necessary to focus on the automotive supply industry structure to have a complete view of the context in which the RESEDA operation is included.

2.2.1. Description of the automotive suppliers sector

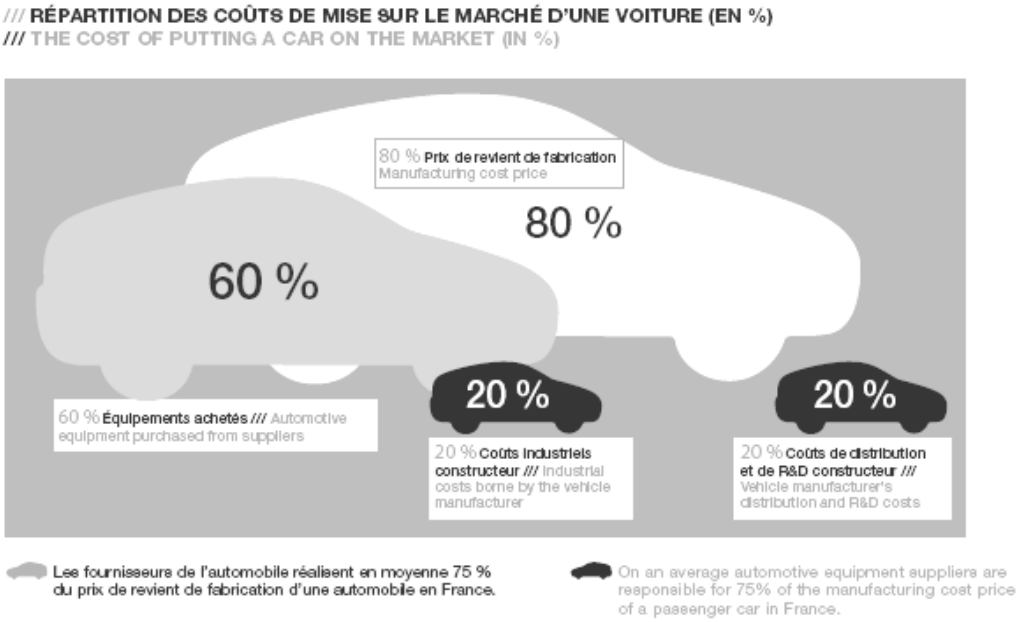
The automotive component supply industry is one of the biggest industries in France. It is composed of various suppliers: equipment, mechanical parts, plastics, tyres, electronics, and foundry and rubber suppliers. In 2004, in France, it employed around 320,000 people and reached nearly 50 billions of sales (according to Trade Associations, 2003).



Graph 5: Sales of the different categories of automotive suppliers (from trade associations)

Even if automotive equipment suppliers are not as known as car manufacturers, they have a major influence on the final product. In fact, they are responsible on average for 75% of the industrial cost price of a passenger car produced in France; the remaining 25% corresponding to assembly.

Besides, 60% of the cost of putting a car on the market corresponds to automotive equipments purchased from suppliers.



Graph 6: The cost of putting a car on the market (in %)

2.2.2. The manufacturers of automotive equipment and parts in France

The following document gives a good overview of the automotive components manufacturers sector.

/// LES ÉQUIPEMENTIERS AUTOMOBILES DANS L'INDUSTRIE
/// AUTOMOTIVE COMPONENT MANUFACTURERS' WEIGHT

	2004	Part dans l'industrie automobile, hors fabricants de carrosserie et de caravanes * Share of the motor vehicle industry (excl. body and motor home manufacturers)*	Part dans l'industrie manufacturière, hors énergie Share of the manufacturing industry (excl. energy)
Nombre d'entreprises Number of companies	310	86,8 %	1,5 %
Effectifs ** Number of employees**	126 779	43,4 %	4,5 %
Chiffre d'affaires HT (M€) Sales (excl. of VAT) (M€)	24 472	22,7 %	3,9 %

* *Équipementiers (343 Z) et constructeurs (341 Z).* / *Component suppliers (343 Z) and vehicle manufacturers (341 Z).*
** *Hors personnels intérimaires* / *Excluding temporary staff.*

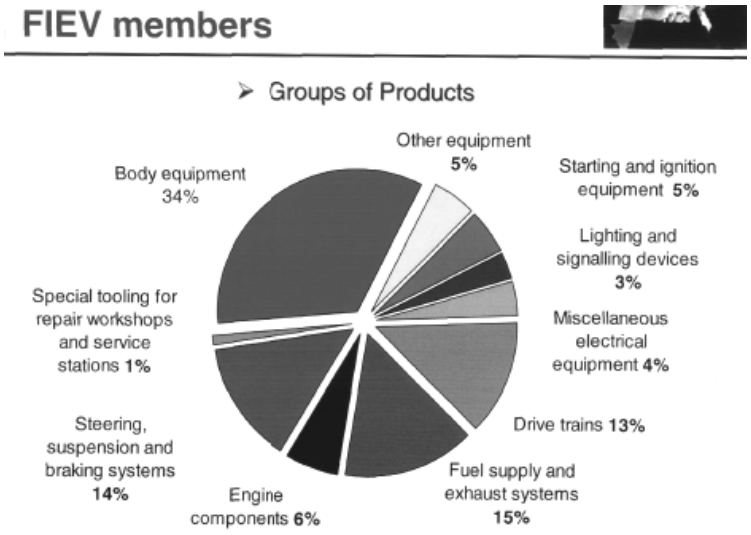
Source : enquête annuelle d'entreprises, ministère de l'Industrie, 2004 (données 2003).
Source: annual business survey based on 2003 data – French ministry of Industry, 2004.

Graph 7: Automotive components manufactures' weight (from the annual business survey based on 2003 data - French ministry of Industry)

It can be added that among the 310 companies of the sector, multinational companies as well as small and medium size companies are present. Besides, the industrial sites can differ a lot depending on the companies' activities.

2.2.3. FIEV description

Considering the total sales, the French Vehicle Equipment Industries federation (FIEV) represents around 85% of the automotive components manufacturers' profession in France (FIEV, 2004). Many groups, having various sizes and activities, are FIEV members.



Graph 8 :Different activities of the FIEV members

The FIEV aims at representing its members when interacting with public institutions as well as the customer sector. It is the spokesman of the equipment industry when common interests are at stake.

The federation has several missions (FIEV website, 2005):

- ⇨ To represent and to defend the common interests of the adherents, vis-à-vis:
  - o French public authorities and international organizations
  - o Large French employers associations
  - o Trade associations representing the customers
- ⇨ To coordinate the adherents' initiatives:
  - o Elaboration of technical standards and regulations
  - o Any action on an international level
  - o Participation in international trade shows
  - o Collective publicity campaigns on specific products
- ⇨ To advise and help the adherents:
  - o Legal and financial aids (innovation, investments, exports…)
  - o European and international regulations (technical, commercial…)
  - o Technical and economic surveys
- ⇨ To inform and promote:
  - o Publications and multimedia
  - o Trade shows and seminars
  - o Relations with economic and specialist media

To face all those missions, the FIEV has created several commissions. Those commissions are based on several specialized working groups, constituted on average of about 20 members each. Some commissions, called "mixed", gather both equipment-makers and car manufacturers.

Each year, more than 400 meetings are organized by around 90 commissions.

2.2.4. The energy and the FIEV

There are around 250 production sites belonging to FIEV members. Each site has an energy consumption between 150 and 10 000 toe/yr. The global energy consumption of the FIEV members is about 800 000 toe/yr, or 33E6 GJ/yr. Around two third of that consumption is electricity.

Most of the FIEV's adherents are not concerned by the implementation of the Kyoto protocol in France. Only a few big companies providing glasses or metal parts must deal with CO2 quotas.

3. Theoretical analysis - Implementing self-regulation in the French automotive components manufacturers industry

3.1. Examples of tools which are already used for self-regulation in the French automotive supply industry sector

Several environmental tools based on self-regulation exist. The objective of this part is not to set an exhaustive list of these tools, but just to show by using two examples that self-regulation tools can be implemented in the French automotive components manufacturers industry.

3.1.1. Ecodesign tool: Ecodis

ECODesign Interactive Systems (ECODIS) is a European ecodesign project supported by the European Commission and more specifically dedicated to Small and Medium Enterprises.

It aims at providing to the industry an innovative ecodesign tool, so that the enterprises representing the automotive, electrical and electronic, mechanical engineering and plastics industries could develop their own product environmental improvement strategy and design their product in a life cycle/supply chain approach (Ecodis website, 2005).

3.1.2. Lists of substances

Because of environmental regulations, more and more substances are not allowed anymore in cars. As a consequence, to anticipate future regulations, car manufacturers develop their own list of substances which are either prohibited, restricted or monitored by the automotive industry. Those restrictions are based on both existing legislation and self-imposed regulations.

There are several lists, depending on the car manufacturers.

3.2. Description of a self-regulation energy diagnostic tool: the RESEDA project

3.2.1. Global description of the RESEDA project

RESEDA is an acronym meaning « Rationalisation Energétique des Sites des Equipementiers De l'Automobile » in French. A translation in English can be: Energy Rationalization of the Automotive Equipment Manufacturers' Sites.

The operation is managed by the FIEV, with a methodological and financial contribution of the ADEME, and realized by a provider specialized in energy diagnostics.

More than the direct environmental and financial gains, the objective of the operation is to realize energy pre-diagnostics and diagnostics of industrial sites having different sizes in order to determine significant consumption ratios. Another aim is to list the “success stories” of that operation and diffuse them so that other companies would take the initiative in realizing their own diagnostics.

At the same time, an « Energy » commission (CEII) has been created at FIEV, gathering people in charge of maintenance, energy and environment in the adherents’ industrial sites. The commission is the opportunity for the participants to communicate and exchange their experiences on various topics such as energy regulations, gas and electricity buying, etc.

3.2.2. Concrete realization of the RESEDA project

A cooperation protocol concerning the reduction of greenhouse gases emissions from small and medium-sized emitters has been signed between the ADEME and the FIEV. The aim of that protocol is to reduce the greenhouse gases emissions of the sector by implementing a program promoting the rational use of energy. The protocol includes many commitments of the ADEME and the FIEV. The main point is however the decision to launch the RESEDA operation and create the energy commission.

The RESEDA operation is constituted in two different steps. The first step took place between July 2001 and February 2004. During that step, 51 energy pre-diagnostics and 10 energy diagnostics have been realized by AM’TECH Industries, an expert in energy diagnostics, under the direction of the FIEV. Sixty industrial sites belonging to FIEV’s adherents, and representing 25% of the FIEV’s adherents in term of sales, have been audited during that step. A convention, signed by the ADEME and the FIEV, had set the amount of the subsidies given by the ADEME and the specifications of the diagnostics.

The second step has been launched in October 2005. It is planned to realize 20 pre-diagnostics and 12 diagnostics. A new convention had been signed for the 2nd step, and the APAVE, a new energy diagnostics expert, has been chosen to realize the diagnostics.

3.2.3. Description of the energy pre-diagnostics and diagnostics

Two different actions are proposed by the REDEDA operation.

- ⇨ ***The energy pre-diagnostic***: It is based on the available documents given by the industrial and on a one or two days visit of the industrial installations. The aims are:
    - o To proceed to an inventory of primary (electricity, gas, oil, etc) and secondary (vapour, compressed air, cold, etc) utilities and to roughly assess the global energy situation of the site
    - o To identify potential improvement axis
    - o To define the opportunity to realize simple actions
    - o If necessary, to prepare another complementary study

    The potential financial gains implied by the recommendations are also estimated. The cost of a pre-diagnostic is 2300 € (around 21000 SEK). 70% of that price is paid by the ADEME as a subvention.

- ⇨ ***The energy diagnostic***: It is a thorough study of one or several utility, such as compressed air, cold, vapour, etc. The aims are:
    - o To precisely assess the global energy situation of the site
    - o To precisely quantify the potential energy savings
    - o To give recommendations to optimize the studied utility
    - o To determine the needed modifications in the processes and their exploitation

The study is based on detailed measurements lasting around one week on average. The conclusions are complete and deal with the equipments state, the utility production and the appropriateness with the needs, costs, etc.

There again, the financial gains implied by the recommendations are estimated. The price of a diagnostic depends on several factors: size of the site, studied utility, etc. It is usually around 8000 € (around 74000 SEK). 50% of the price of a diagnostic is paid by the ADEME.

For both diagnostics and pre-diagnostics, the recommendations are sorted as follows:

- ⇨ Immediate actions: lead to energy saving with no investment
- ⇨ Priority actions: actions to realize in a short term because of a high level of profitability
- ⇨ Useful actions

3.3. Theoretical analysis of the RESEDA project as an energy diagnostic tool

In that part, the "Framework for tool description" from Analytical tools for environmental design and management in a system perspective (Wrisberg and al, 2000) will be used as a basis to analyse the environmental tool developed by the RESEDA operation.

Besides, the analysis will be done for the energy pre-diagnostics and diagnostics together. In fact, pre-diagnostics and diagnostics have a lot of similarities and doing two different analyses would be redundant. Anyway, when necessary, a distinction between them will be done.

3.3.1. User characteristics

- ⇨ ***Goal***: the main objective of the energy (pre-)diagnostics is to proceed to energy saving, which is economically viable for the companies.
- ⇨ ***Scope***: to reach that objective, the tool realizes first an inventory of the primary and secondary utilities of the industrial site. If a diagnostic is done, it also focuses on one utility. Then the tool assesses the potentials of energy reduction, and gives technical solutions to achieve them. Finally, it estimates the investments needed implied to achieve the saving, the costs and the expected financial benefits.
- ⇨ ***Types of applications***: the RESEDA (pre-)diagnostics are only dedicated to the automotive equipment and parts industry, and especially to FIEV adherents.

	User characteristics		
	Goal	Scope	Types of applications
Energy (pre-) diagnostics	Economically viable energy saving	Inventory of the primary and secondary utilities. Assessment of the potentials of energy reduction Technical solutions Financial estimations	Dedicated to FIEV adherents

Table 5: Summary of the user characteristics of the RESEDA tool

3.3.2. Technical characteristics

- ⇨ ***Object of analysis***: the (pre-)diagnostics of the RESEDA operation globally analyse industrial sites. In the case of a diagnostic, the analysis can focus on a special process.

- ⇨ ***System definition***: since the (pre-)diagnostics take into account all the processes of given industrial sites (or focus on a subsection in the case of diagnostics), the tool can be defined as region-oriented.
- ⇨ ***Modes of analysis***: the (pre-)diagnostics first proceed to an inventory of the energy situation, which is a descriptive part. But that part is just a step, and not a goal. Their final goal is to give recommendations to realize effective energy saving. It means that they also study the impacts, in energy and financial terms, of some technical solutions which have been recommended. As a consequence, they are a change-oriented tool.

  It can also be precised that the tool is based on a full mode, because the studied processes are selected on a yes/no basis and not because they are linked to some functions.
- ⇨ ***Spatial characteristics***: the RESEDA tool is both a global and site-specific tool. In fact the benefits of energy saving operate on both a global and regional scale.
- ⇨ ***Temporal characteristics***: the RESEDA tool is static and not dynamic. Even if it aims at analysing future effects, it models a steady state situation.
- ⇨ ***Methodological steps***: the (pre-)diagnostics include only 2 steps. The system definition and the data collection are not followed by an impact assessment step. The environmental effects related to the recommended interventions are not calculated. Only the financial gains are calculated.
- ⇨ ***Environmental interventions***: the (pre-)diagnostics intervene on the energy carriers
- ⇨ ***Position in cause-effect chain***: the results of the (pre-)diagnostics are expressed in terms of amount of energy used and potentially saved, which are directly linked to the production of those energies and their related emissions. Thus, the results are expressed in terms of environmental interventions. “Environmental policy themes”, such as climate change or acidification, and the damage level are not tackled.
- ⇨ ***Evaluation***: the (pre-)diagnostics do not include a weighting step. Consequently, an evaluation is not possible.
- ⇨ ***Level of details***: That characteristic is quite relative. It can however be noticed that the diagnostics’ level of details is higher than the pre-diagnostics’ level.
- ⇨ ***Type of data***: most of the needed data are quantitative and are either measured during the diagnostic or have been measured before as a site’s monitoring.
- ⇨ ***Safeguard subjects***: RESEDA deals with energy saving. As a consequence, the main safeguard subject is the resources needed to provide energy to the industry.

Human health and eco-systems are also indirect safeguard subjects, for the saved emissions implied by an energy consumption reduction.

	Technical characteristics				
	Object of analysis	System definition	Modes of analysis	Spatial characteristics	Temporal characteristics
Energy (pre-)diagnostics	Industrial sites, processes	Region-oriented system (all the processes of a given industrial site are studied)	Change-oriented tool. Simplified for pre-diagnostics and detailed for diagnostics. Full mode	Global and site-specific.	Static

Table 6: Summary of the technical characteristics of the RESEDA tool

Technical characteristics (continued)						
Methodological steps	Environmental interventions	Position in cause-effect chain	Evaluation	Level of detail	Type of data	Safeguard subjects
2 steps : system definition, data collection	Energy carriers	Intervention level	None	low for pre-diagnostics, high for diagnostics	Most of the needed data are quantitative	Resources, and indirectly human health and ecosystems

Table 7 : Summary(continued) of the technical characteristics of the RESEDA tool

3.3.3. Suitability of the RESEDA's energy diagnostics tool

- ***Limitations***: that characteristic will be studied in the chapter 3.3.5.2 (Weaknesses)
- ***Handling of uncertainties***: uncertainties do not matter so much for pre-diagnostics since they only aim at a rough evaluation of the energy potentials.
- ***Data requirement and availability***: all the data have either been measured as part of the industrial site's monitoring or are measured during a diagnostic.
- ***Human resource requirements***: to proceed to a (pre-)diagnostic one consultant is needed. For some pre-diagnostics, depending on the size of the site, several experts may be necessary. In the audited company, one energy manager is necessary to interact with the auditors. After that, to exploit the results of the (pre-)diagnostic, one master of works has to put into practice the recommendations.
- ***Compatibility with other types of information***: the RESEDA tool is not limited to energy saving. The (pre-)diagnostics include economic indicators such as investments, returns on investments and expected financial gains. Thus, the tool is compatible with economic information. By advocating technical solutions, the tool is

also linked to technological information. However, the RESEDA tool is not compatible with social information.

Suitability of the tool						
Limitations	Handling of uncertainties	Data requirement and availability	Human resource requirements	Compatibility with other types of information		
See part 3.3.5.2 about the weaknesses of the tool	Pre-diagnostics: not a problem, since it is just a rough evaluation of energy potentials	All the needed data are or have been measured	*Consultant*: 1 or several experts. *On the site*:1 energy manager and 1 master of works able to practically realize the recommendations.	*Economic*: the tool also includes the needed investments, the expected returns on investment and the expected financial gains.	*Technological:* includes technological solutions	*Social :* none

Table 8: Summary of the suitability of the RESEDA tool

3.3.4. Other characteristics of the RESEDA's energy diagnostics tool

- ***Formal status***: the tool is only recognized by the ADEME
- ***Different variants***: the ADEME has signed the same kind of protocol, to reduce greenhouse gases emissions, with other industry sectors, such as the French Federation of Building Trade. Consequently, other tools similar to RESEDA, for they are submitted to the same specifications, are implemented in other industry sectors.
- ***Future developments***: presently, no development has been planned for the tool.

	Other characteristics		
	Formal status	Different variants	Future developments
Energy (pre-)diagnostics	Recognized by ADEME	Almost the same tool, supported by ADEME, is used in other industry sectors	Presently none

Table 9 : Summary of the other characteristics of the RESEDA tool

3.3.5. Strengths and weaknesses of the RESEDA tool

After having described the RESEDA tool, it is now possible to determine its theoretical strengths and weaknesses.

Obviously, that determination can only be made in relation to the specific target of the tool. As it has been seen before, this target can be summarized in the following way: “To help companies to do economically viable energy saving”.

3.3.5.1. Strengths

Let’s start with the strengths of the RESEDA tool. Here are the main ones:

- ⇨ ***Advantages for the user companies***:
  - o First, that tool is well adapted to the sector since it is dedicated to the FIEV’s adherents
  - o It is quite easy to perform for companies: the FIEV manages the project and the audit is performed by expert contactors
  - o That tool is subsidized and thus quite cheap for the companies
- ⇨ ***Technical intrinsic strengths***:
  - o The tool provides simple indicators about economics and energy saving. Consequently, it links in a simple manner economic and ecological impacts
  - o The tool also provides site specific indicators which are useful for a long term use
  - o It is also a quite flexible tool, since it is able to give either a global overview of the energy situation or focus on a special process or utility.
- ⇨ ***Other strengths***:
  - o The tool is the opportunity for companies to have a better knowledge of their processes and check their installations
  - o Finally, the tool gives the opportunity to make the companies’ employees aware of the energy issue

3.3.5.2. Weaknesses

Despite the strengths listed before, the RESEDA tool has also some weaknesses:

- ⇨ ***Technical intrinsic weaknesses***:
  - o First of all, the tool only gives indicators but does not practically realize energy saving. It means that companies have to act thereafter to eventually decrease their energy consumption. The recommended works can then necessitate various and numerous resources.

- The results are expressed in energy terms and not directly linked to environmental problems. In other words, the tool does not include any impact assessment step.
- Some solutions, even if they are economically viable, may have too long returns on investments. Consequently, those solutions would be considered as inefficient by the companies and not put into practice.

⇨ ***Other weaknesses***:

- The tool has a quite inexistent formal recognition
- No future development has been planned

4. Case study - Evaluation of the application of the RESEDA project

After having conducted a theoretical study of the RESEDA tool, it is now possible to assess in that part its real performances and its influence on the automotive equipment industry sector. It is also possible to determine the main drivers for its implementation.

4.1. Methodology of the evaluation

Before giving the results of the RESEDA project, it is necessary to precise the methodology used to assess those results.

4.1.1. Survey administration

First of all, the scope of that survey has only been the first step of the RESEDA operation, since the launching of the second step was in progress at the time of this study. During the first step of the RESEDA operation, 51 pre-diagnostics and 10 diagnostics have been realized between 2001 and 2004. It corresponds to 60 different industrial sites because one site had ordered both a pre-diagnostic and a diagnostic.

The first step of the survey has been the study of the reports written at the end of each diagnostic and pre-diagnostic. That step was really useful to have a global overview of the scope of the project: size of the audited sites, amount and nature of their energy consumption, main energy problems, etc. That step was also the opportunity to determine how the (pre-)diagnostics have been realized: what kinds of measures have been made, which were the main recommendations, what were the expected gains in terms of energy and economy, etc.

The second step of the survey has been the sending of a questionnaire to the audited sites. That questionnaire has been sent both by e-mail and by mail to increase the number of answers. It was addressed to the energy coordinators of the industrial sites who had been in charge of the RESEDA project in their companies. Theoretically, those energy coordinators were the correspondents of the experts during the audits and they have monitored the works started after the (pre-)diagnostics.

The questionnaire has been sent a first time in July 2005. Since the last (pre-)diagnostics had been realized in 2004, it has been assumed that the companies have had enough time to put into practice the solutions advised by the experts.

The first answers to the questionnaire arrived in July and August 2005. When the answers were too incomplete, a phone call to the author of the incomplete questionnaire was systematically done in order to try to have more precisions.

In September 2005, the questionnaire was sent a second time to increase the number of answers. There again, it was sent both by mail and e-mail. Phone calls to the respondents were also done when necessary.

Some contatcs by phone and e-mail were established with the company proceeding to the audits, AM'TECH INDUSTRY.

4.1.2. Questionnaire design

By studying the reports written at the end of each audit, it has been possible to determine which kind of recommendations were given and which gains were expected. But it is justified to wonder if the pre-diagnostics and diagnostics done in the industrial sites have had any impacts. To answer that question, a questionnaire was needed. That questionnaire had to be as complete and ergonomic as possible. It had several objectives:

- ⇨ To evaluate the impacts of the RESEDA operation
- ⇨ To identify the best practices
- ⇨ To identify the blocking factors (technical, economic, etc)
- ⇨ To quantify the energy and economics gains

An example of the questionnaire can be found in the appendix n° 1.

Concretely, the questionnaire was constituted of four different parts:

- ⇨ ***Motivations part***: this part aimed at determining the motivations which had leaded the companies to realize an energy (pre-)diagnostic. This kind of information is important for two main reasons:

- To evaluate if the results of the (pre-)diagnostics have corresponded to the companies' expectations
- To insist on the right points to convince new companies to be audited

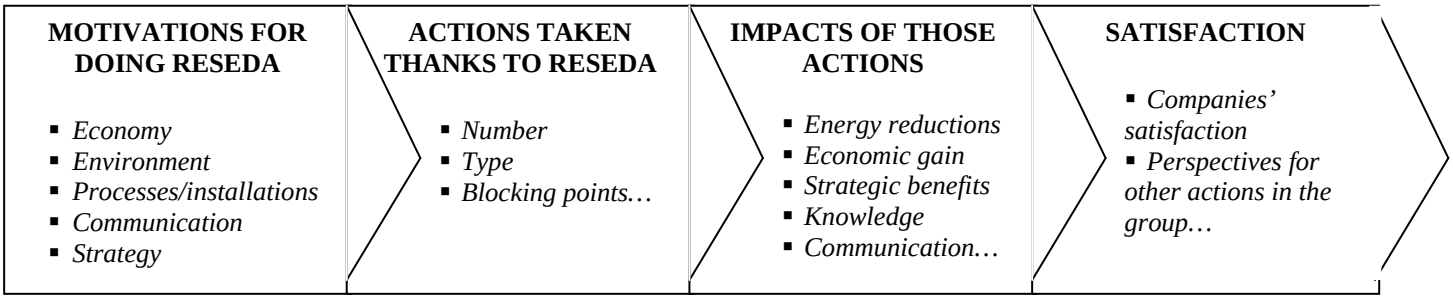
To describe their motivations, the companies had to grade six different categories of motivations, each grade corresponding to the intensity of motivation for each category (the grades being between 1 and 5).

⇨ ***Actions put into practice consequently to the (pre-)diagnostic part***: the objective to this part was to assess if the recommendations given by the energy experts had been put into practice, and if the recommended works had been done. This part also aimed at determining the nature of the actions which have been actually realized and the main blocking points to the implementation of the advised solutions.

⇨ ***Impacts part***: this part aimed at assessing the impacts of the actions taken after a (pre-)diagnostic. The objective was to try to quantify those impacts in terms of energy and economics and to determine how the companies have tried to make the most of the opportunities given by the (pre-)diagnostics' results.

⇨ ***Satisfaction part***: this part aimed at assessing the global satisfaction after the (pre-)diagnostics and at checking if the expectations have been reached.

The following diagram summarizes the framework of the questionnaire and shows the link between the four different parts.



Graph 9 : Questionnaire's framework for the RESEDA project evaluation

4.2. Results of the first phase of the RESEDA project

4.2.1. Results' representativeness

Before realizing a deep study of the survey's results, it is important to make sure that the answers collected are representative of all the audited sites.

The following table summarizes the number and percentage of obtained answers.

	Number of audited sites	Number of answers	Percentage
Pre-diagnostics	51	21	**41**
Diagnostics	10	5	**50**
Total	60	25	**42**

Table 10 : Representativeness of the questionnaire's answers

It can be noticed that 41% of the sites which had done a pre-diagnostic have answered to the questionnaire. That figure is even more for the sites having done a diagnostic, since half of the sites have answered.

Those representativeness rates are really good for such a survey, especially when considering that some (pre-)diagnostics were realized four years ago!

However, all the returned questionnaires were not exploitable. The following table gives the number of exploitable answers.

	Number of audited sites	Number of exploitable answers	Percentage
Pre-diagnostics	51	19	**37**
Diagnostics	10	5	**50**
Total	60	23	**38**

Table 11 : Percentage of exploitable answers

There again, the representativeness of the exploitable answers is very good: 37% for the pre-diagnostics and still 50% for the diagnostics.

4.2.2. Motivations of the RESEDA project's participants

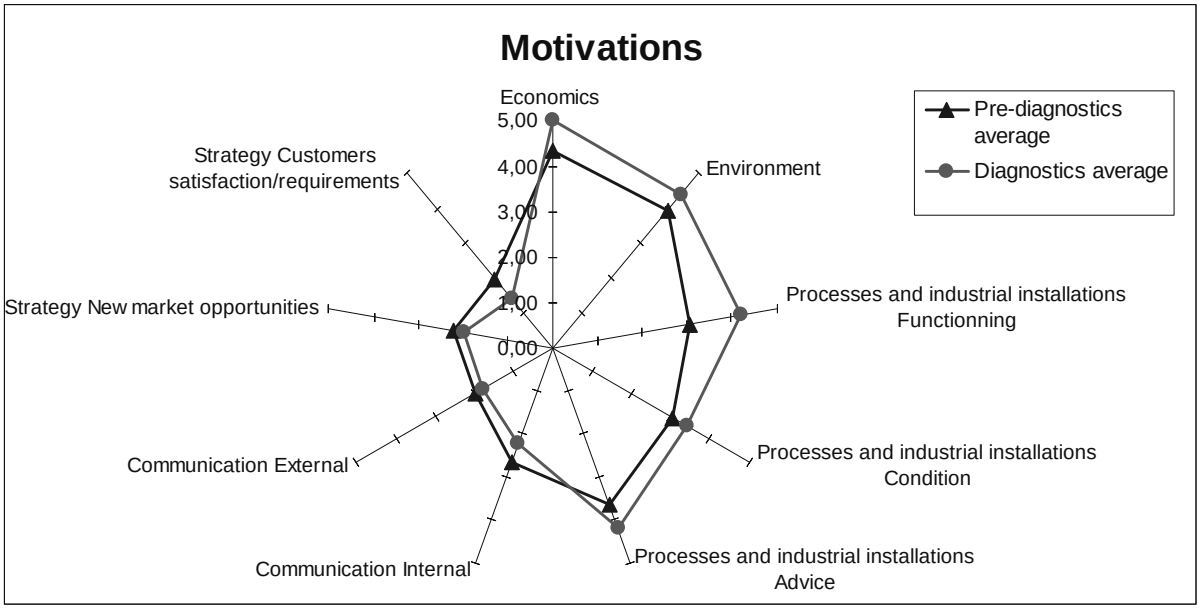
As it has been described in the previous chapter, that part aims at determining which were the driving forces for doing the RESEDA project. Six different categories of motivations have

been graded by the companies. A mark of 1 signified a very low intensity for the motivation. On the contrary, a mark of 5 meant that the motivation was really high.

The categories whom the companies had to grade were the following ones:

- ⇨ ***Environment***: some companies can be committed to follow environmental ethics
- ⇨ ***Economy***: a better efficiency can lead to financial savings
- ⇨ ***Processes and industrial installations***: a diagnostic can be an opportunity for a company to check its installations' condition, to learn about the functioning of the installations and processes or to benefit of advice coming from energy experts to optimize them.
- ⇨ ***Communication***: communicating can be a driving force for doing an environmental work. The communication can target the companies' staff (internal communication) or the companies' customers (external communication).
- ⇨ ***Strategy***: some companies can increase their market shares by proceeding to an environmental work. That work can fulfil the customers' requirements or open new market opportunities.
- ⇨ ***Others***: some companies can have other motivations than the ones listed above.

The following graph and table show the results of the companies' feedbacks concerning the motivations.



Graph 10 : Companies' motivations for doing a (pre-)diagnostic

		Pre-diagnostics' average	Diagnostics' average
Economics		4,3	5,0
Environment		3,9	4,4
Processes and installations	***Functioning***	3,1	4,2
	Condition	3,1	3,4
	Advice	3,7	4,2
Communication	***Internal***	2,7	2,2
	External	1,9	1,8
Strategy	***New market opportunities***	2,2	2,0
	Customers' requirements/satisfaction	2,0	1,4
Others		0,0	0,0

Table 12 : Companies' motivations for doing a (pre-)diagnostic

Interpretations:

- Not surprisingly, it can be easily noticed that for both pre-diagnostics and diagnostics the main motivation is economics. The average grade is 4.3 for the pre-diagnostics and 5.0 for the diagnostics. Besides, economics is the main motivation for more than 85 % of the RESEDA's participants. Being economically viable is a necessary condition to implement such a project and relying on economic gains is a crucial condition.
- Acting in favour of the environment is the second most important driving force, for both pre-diagnostics and diagnostics. The average grades for that motivation are also quite high: 3.9 for the pre-diagnostics and 4.4 for the diagnostics. One explanation for those high grades is that the RESEDA project is considered as an environmental project. Thus, environmental benefits are expected.
- The motivation for the actions related to the processes and industrial installations are medium, even if checking the condition of the installations is slightly lower motivation's factor. It seems that improving the processes and installations is not a decisive factor, but that the companies are quite motivated to grasp that opportunity.
- Communication and strategy are no driving forces for implementing the RESEDA project. Companies do not implement the project in order to communicate or find new

customers. They are only motivated in having direct results, such as environmental or financial benefits or site's optimization.

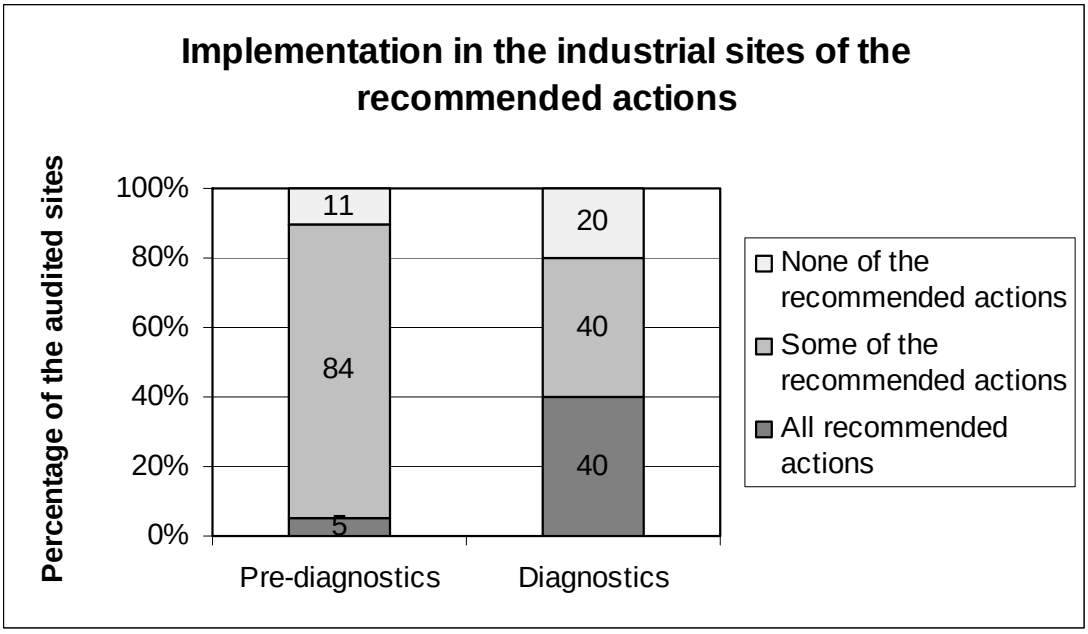
- Among the 25 answers, no other motivation has been mentioned.
- A comparison between the grades coming from sites having realized a pre-diagnostic and a diagnostic shows that the latter give on average higher grades (around half a point) for the economic, environmental and processes and installations categories. Since those categories are the most important, it seems that the companies having done a pre-diagnostic were more motivated than the ones having done a diagnostic.

4.2.3. Effective implementation of actions thanks to the RESEDA project

The pre-diagnostics and diagnostics have leaded to several recommendations given by the energy experts. In that part, it will be assessed if those recommendations have been put into practise. It will be also the opportunity to determine which kind of actions have been implemented thanks to the RESEDA project.

⇨ ***Number of implemented actions***: a necessary condition for a pre-diagnostic or a diagnostic to be useful is the implementation of the recommended actions. Otherwise, no energy saving is possible.

The following graph gives an overview of the number of sites having implemented some of the recommended actions.



Graph 11 : Implementation in the industrial sites of the recommended actions

A large majority of the industrial sites have followed the recommendations issued from the pre-diagnostics and diagnostics. However, 11% of the sites having done a pre-diagnostic and 20% of the ones having done a diagnostic have not implemented any recommended actions. Those figures are quite a lot: it could have been expected that all the sites, which have invested in pre-diagnostics or diagnostics in terms of financing and resources, would have tried to exploit them.

Besides, only a few sites having done a pre-diagnostic have implemented all the recommended actions. It may mean that some of those recommended actions were too ambitious for the sites which only wanted to have a rough diagnostic of their energy situation and did not want to invest too many resources to solve their energy problems.

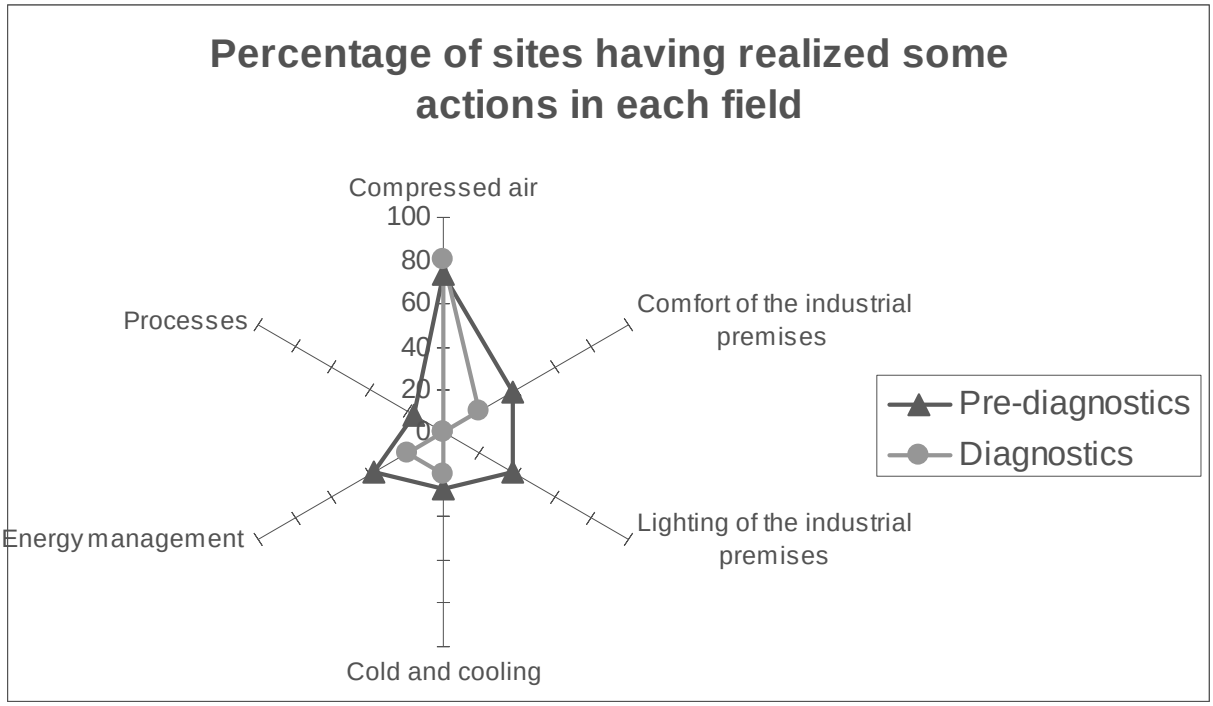
⇨ ***Types of implemented actions***: different kinds of actions have been put into practice. However, some types of actions have been preferred to others.

- **Fields of actions**: the following table shows which were the fields of the implemented actions and gives some examples of actions for each field.

Fields of actions	**Examples of actions**
Compressed air	- *leakages reduction* - *pressure reduction* - *shifting to a variable speed compressor* - *implementation of a procedure enabling to stop the compressors during the weekends, etc*
Comfort of the industrial premises (heating, ventilation)	- *calories recovery* - *decrease of the temperature of the premises, etc*
Lighting of the industrial premises	- *stopping continuous lighting* - *reduction of the power of the lighting,etc*
Cold and cooling	- *increase of the temperature of the refrigerated fluid* - *free-cooling implementation*
Energy management	- *implementation of indicators to proceed to a counting of the energy,etc*
Processes	- *complete stopping of the machines and the electricity supplying during the non-working days* - *reduction of the drying temperature, etc*

Table 13 :Fields and examples of implemented actions

The graph below shows which fields of actions have been the most targeted. That graph represents the percentage of the sites which have realized one or several actions for each field.



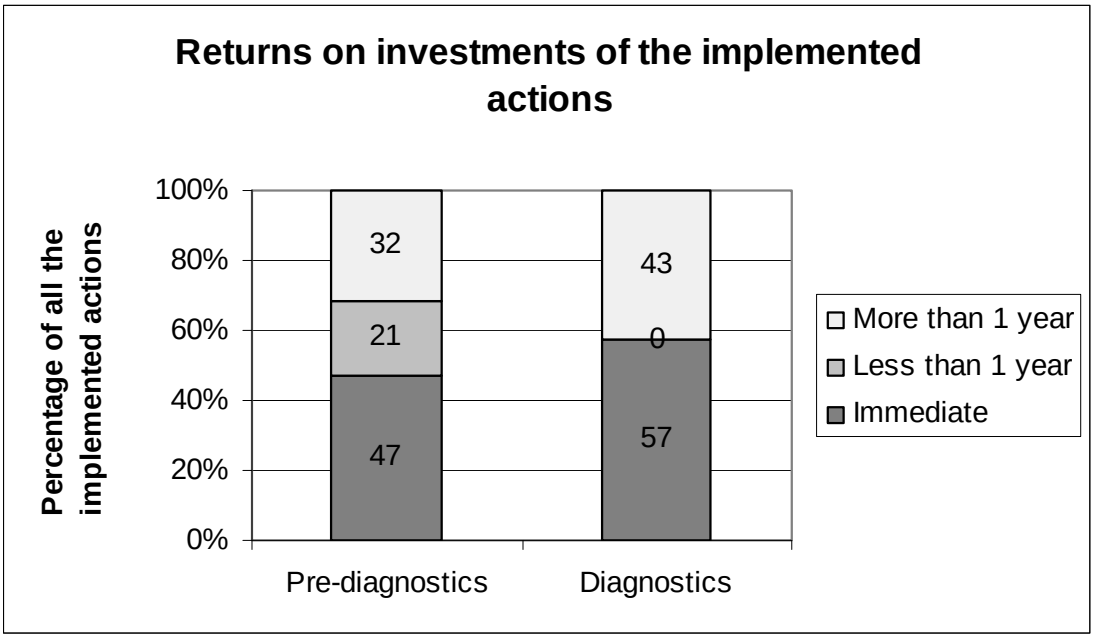
Graph 12 :Comparison of the fields of the implemented actions

For both pre-diagnostics and diagnostics, the sites have globally and essentially worked on compressed air. Around 80 % of the sites have undertaken one or several actions in that field.

Far behind, in second position after compressed air, 37 % of the sites having done a pre-diagnostic have undertaken some actions in the fields of comfort of the industrial premises, lighting of the industrial premises and energy management. Cold and cooling and processes have been slightly more neglected with respectively 26 % and 16 % of sites having worked on.

After the diagnostics, around 20 % of the sites have worked about the comfort of industrial premises, cold and cooling and energy management. No actions about lighting or processes have been undertaken.

- **Returns on investments of the implemented actions**: the graph below shows the returns on investments of the actions undertaken after the energy audits.

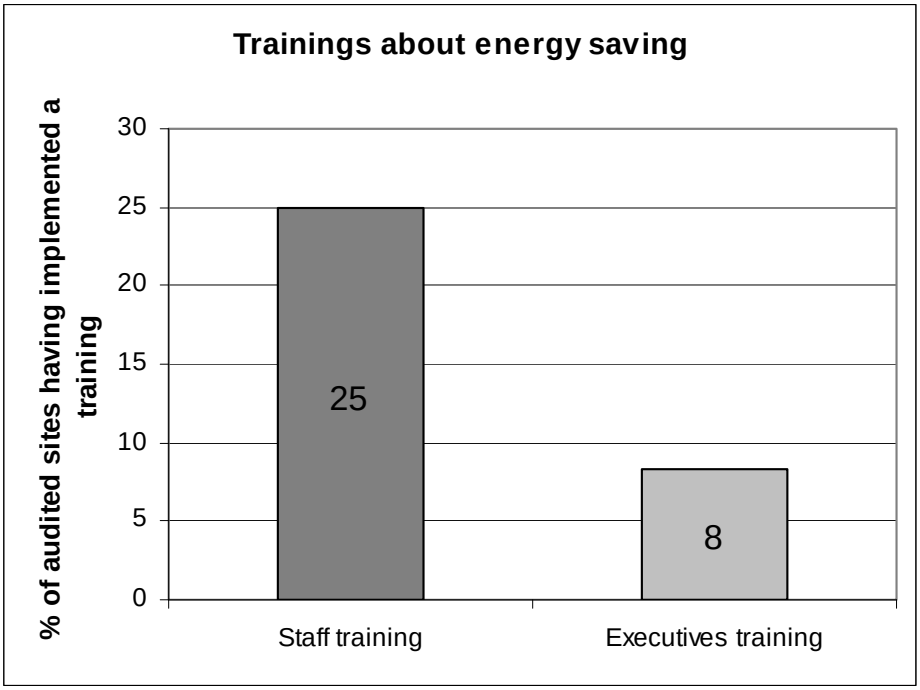


Graph 13 : Returns on investments of the implemented actions

As expected, most of the actions taken had an immediate return on investments, which means that no investments were needed to implement those actions. For both pre-diagnostics and diagnostics, around 50 % of the realized actions have necessitated no investment.

A good point is that companies have also implemented some actions in a medium or long term. 32 % of the actions undertaken after a pre-diagnostic and 43% of the actions undertaken after a diagnostic have a return on investments higher than one year. That figure is higher for the diagnostics than for the pre-diagnostics, which is not surprising because diagnostics are designed to act in a longer term.

- **Trainings**: implementing the RESEDA project can be the opportunity to set trainings about energy savings in the companies. The following diagram shows the percentage of audited sites having implemented trainings for their staff or their executives.



Graph 14 : Trainings about energy saving implemented in parallel to RESEDA

A quarter of the audited sites have set a training to make their staff aware of the energy saving issue. Only 8% of the audited sites have informed their executives on technical existing solutions to save energy.

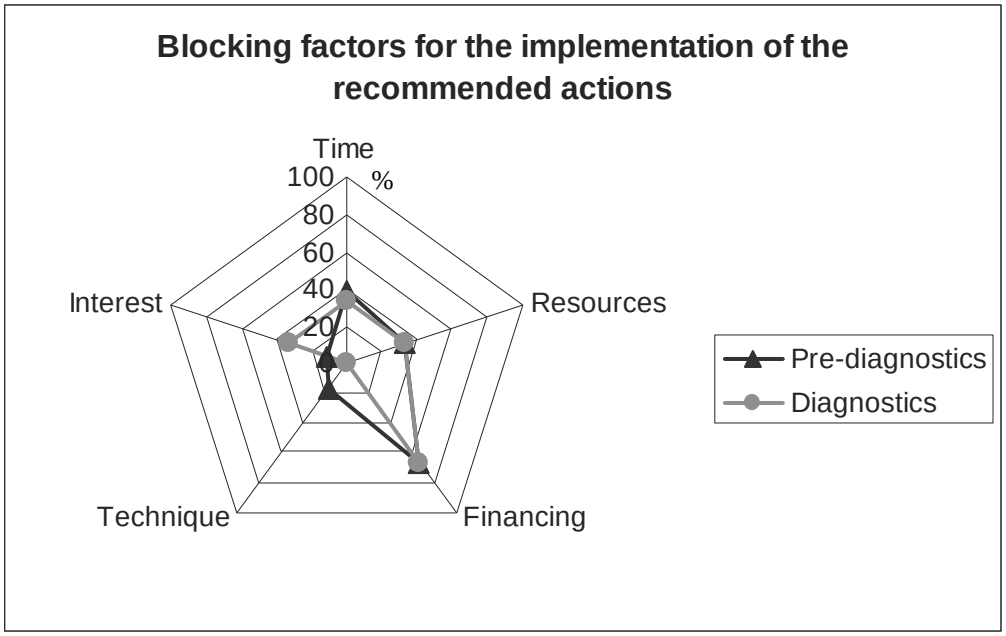
- **Indicators**: parallel to concrete actions, many different indicators have been implemented in all the audited industrial sites. A list of indicator's examples, sorted by fields, is given below.

Fields of actions	**Examples of indicators (units)**
Compressed air	- *Specific ratio (Wh/m^3)* - *Leakage flow (m^3/h)*
Comfort of the industrial premises (heating, ventilation)	- *Heating ratio (Wh/m^3/DJU)*
Lighting of the industrial premises	- *Lighting power ratio (W/m²)* - *Lighting consumption ratio (kWh/m²/yr)*
Cold and cooling	- *Refrigerating efficiency*
Energy management	- *Standard energy indicators*

Table 14 : Examples of indicators implemented in the industrial sites

⇨ ***Blocking factors for the implementation of the recommended actions***: as it has been exposed before, all the recommended actions have not been put into practice. The actions, recommended by the energy experts, were theoretically beneficial for the companies. Consequently, some other reasons have obstructed the implementation of those actions.

The following graph shows the percentage of the sites having not implemented all the recommended actions, which have been blocked by each factor.



Graph 15 : Blocking factors for the implementation of the recommended actions

The main problem obstructing the implementation of the recommended actions is a lack of financing. Its concerns around 65% of the sites having done a pre-diagnostic or a diagnostic and having not followed all the recommendations. Even if the advocated actions are supposed to be economically profitable in a longer or shorter term, investments are often needed.

Lacks of time or resources, sometimes correlated to the financial problem, are the second reasons for not implementing solutions.

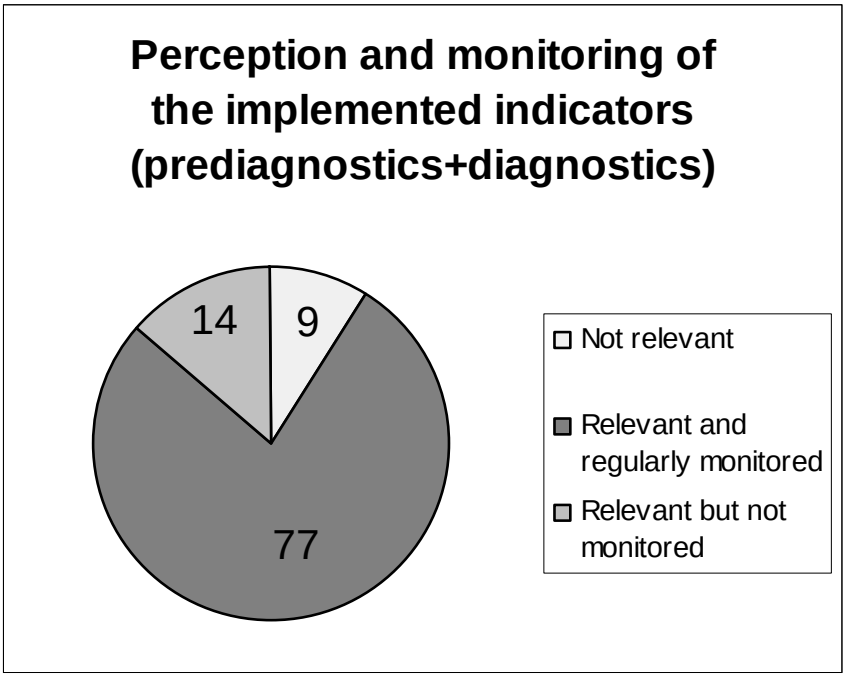
Technical problems or lack of interest are rarely put forward to explain the inaction. No other reason of those five has been mentioned.

4.2.4. Impacts

Having determined the kind and the scope of the actions which have been undertaken thanks to the RESEDA project, the next step is to assess the impacts of those actions by considering qualitative and quantitative aspects.

⇨ ***Qualitative impacts***: before going deeper into details, it is interesting to roughly evaluate some qualitative aspects of the impacts.

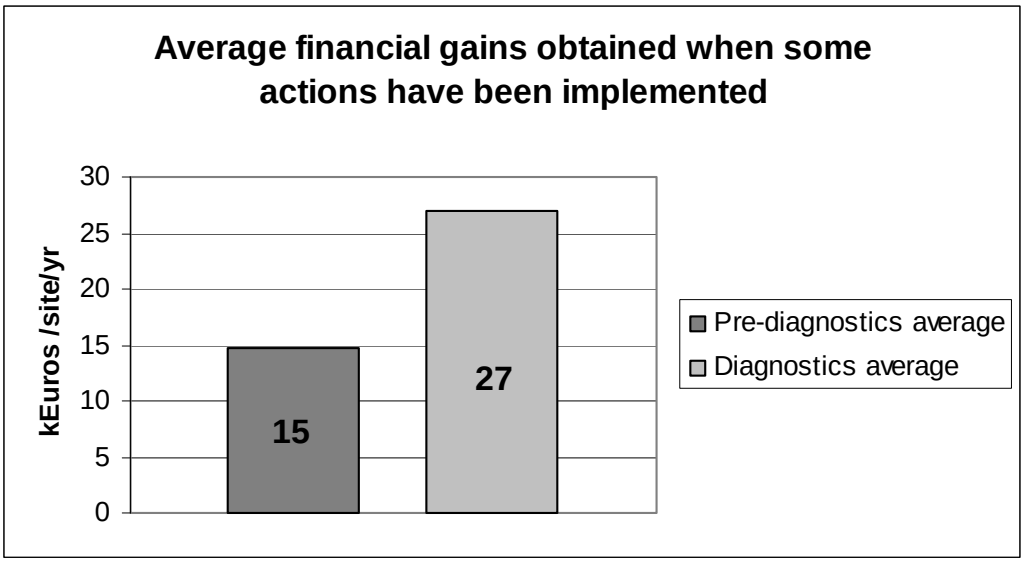
- o First of all, 100 % of the sites which have implemented some actions thanks to RESEDA consider that those actions have been globally efficient. That figure means that the impacts of those actions have been positive.
- o Considering the indicators, as it is showed by the graph below, they are globally considered as relevant. Moreover, 77 % of the audited sites keep on monitoring the indicators which had been set during the audit. There again, the impacts of the RESEDA project are positive.



Graph 16 : Perception and monitoring of the implemented indicators

⇨ ***Quantitative impacts***: qualitatively, the results of the RESEDA project have been positive. In that part, the extent of those positive impacts will be assessed. Different categories of impacts will be studied: economic , environmental, internal impacts and impacts on customers Since the answers to the survey were generally not really precise, especially for the evaluation of the gains, the orders of magnitude will be focused.

- **Economic impacts**: the main motivation of the participants was the financial gains expectations. The following graph shows the average financial saving for the sites which had implemented some actions.



Graph 17 : Average financial gains obtained when some actions have been implemented

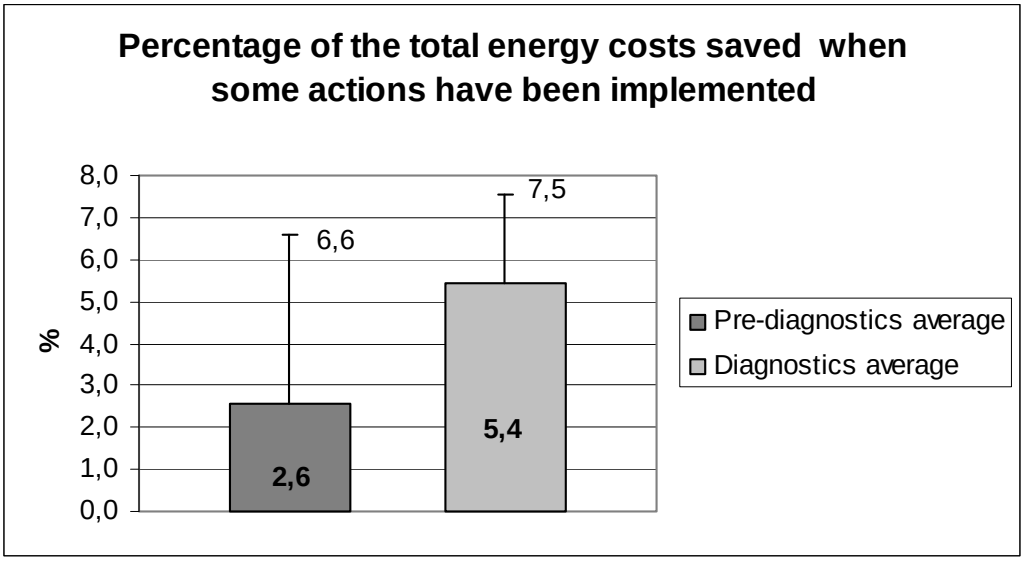
On average, the sites having done a pre-diagnostic and followed some of the recommendations have saved 15 000 euros per year (around 140 000 SEK per year). That figure is 27 000 euros (around 250 000 SEK) for the sites having done a diagnostic.

Those figures are quite high, especially in comparison to the costs of the pre-diagnostics and diagnostics for the companies: 690 euros for a pre-diagnostic and 4000 euros for a diagnostic on average.

If they were not subsidised, a pre-diagnostic would cost 2300 euros for a company and a diagnostic 8000 euros on average. Thus, the benefits are still really higher than the real costs of a pre-diagnostic or a diagnostic. That fact

could motivate the companies to proceed to their own diagnostics outside the scope of the RESEDA project, which is one of the main targets of the project.

Even if the financial benefits are high compared to the costs of the (pre)diagnostics, the actions will be really beneficial for the companies if they enable to realize energy savings which are not negligible in comparison to the total energy costs of the companies. The next graph shows the percentages of the total energy costs of site saved thanks to the RESEDA project. The average and maximum figures are given for the pre-diagnostics and the diagnostics.



Graph 18 : Percentage of the total energy costs saved when some actions have been implemented

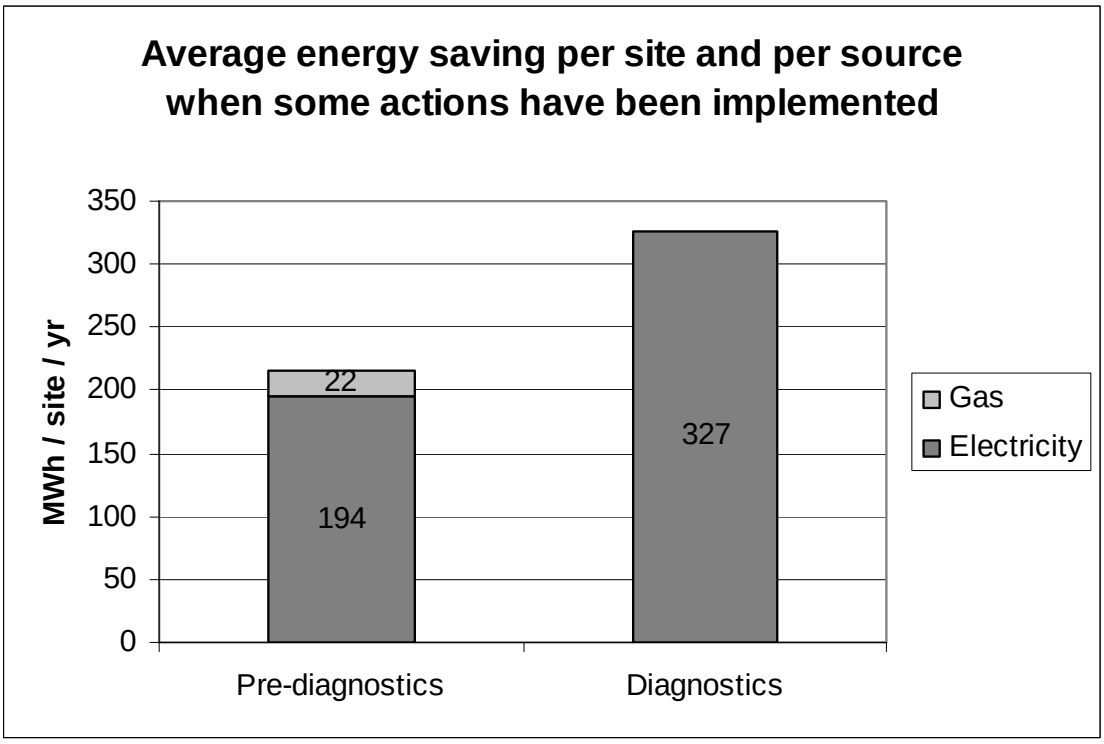
On average, the sites' costs of energy decrease by 2.6 % after a pre-diagnostic and by 5.4 % after a diagnostic, when some actions are implemented.

Those figures are significant enough to meet the expectations expressed in the motivations.

Besides, the financial savings could have been higher if the sites had implemented all the recommended actions and not only a part of them.

- **Environmental impacts**: environmental ethic was the second main motivation of the RESEDA participants. Environmental benefits can be

achieved thanks to energy saving. The graph below shows the energy savings per site and per year which have been obtained when some actions have been undertaken. The graph also distinguishes the different energy sources.

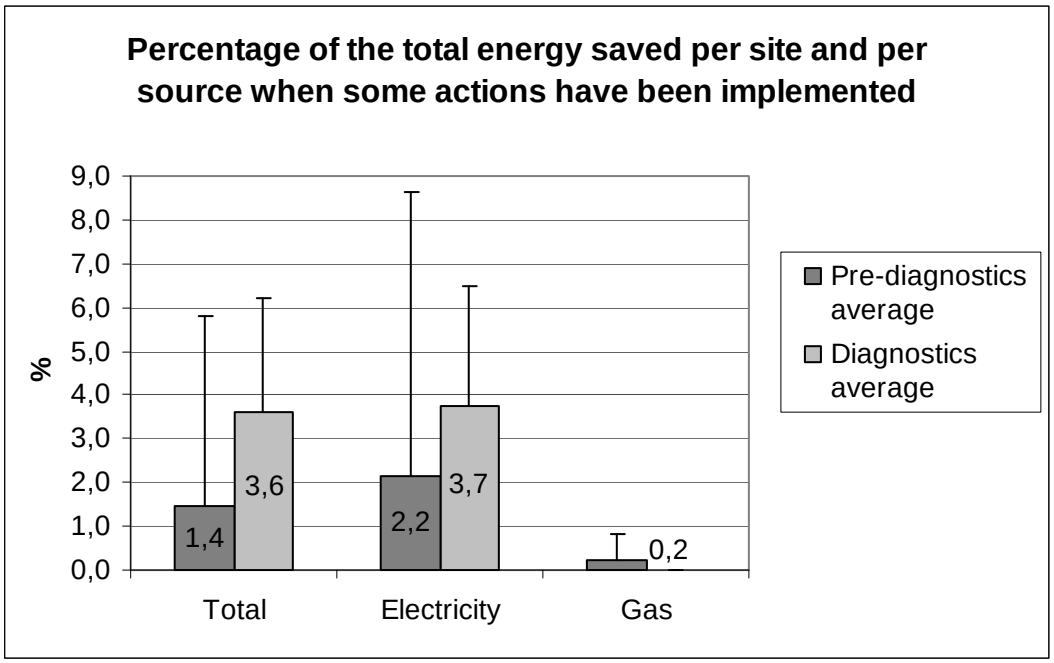


Graph 19 : Average energy saving per site, per year and per source

Almost all the saved energy comes from electricity. It is coherent with the fact that most of the actions implemented deal with compressed air. A slight part of the energy saved because of the pre-diagnostics comes from gas.

Logically, a diagnostic enables to save more energy than a pre-diagnostic (around 50 % more).

There again, it can be interesting to compare the energy savings to the total energy consumption of the sites. The following graph shows the average and the maximal percentage of the total energy saved when some actions have been undertaken in the sites.



Graph 20 : Percentage of the total energy saved per site and per source when some actions have been implemented

On average, a pre-diagnostic enables to save 1.4 % of the total site's energy consumption. Most of the savings are realized on electricity: 2.2 % of the site's total electricity consumption is saved on average, whereas only 0.2 % of the total gas consumption is saved. No energy coming from another source (oil,...) is saved.

On average, a diagnostic enables to save 3.6 % of the total site's energy consumption, all the saving being achieved on electricity.

There again, those figures are quite significant and could have been higher if all the recommendations had been put into practice.

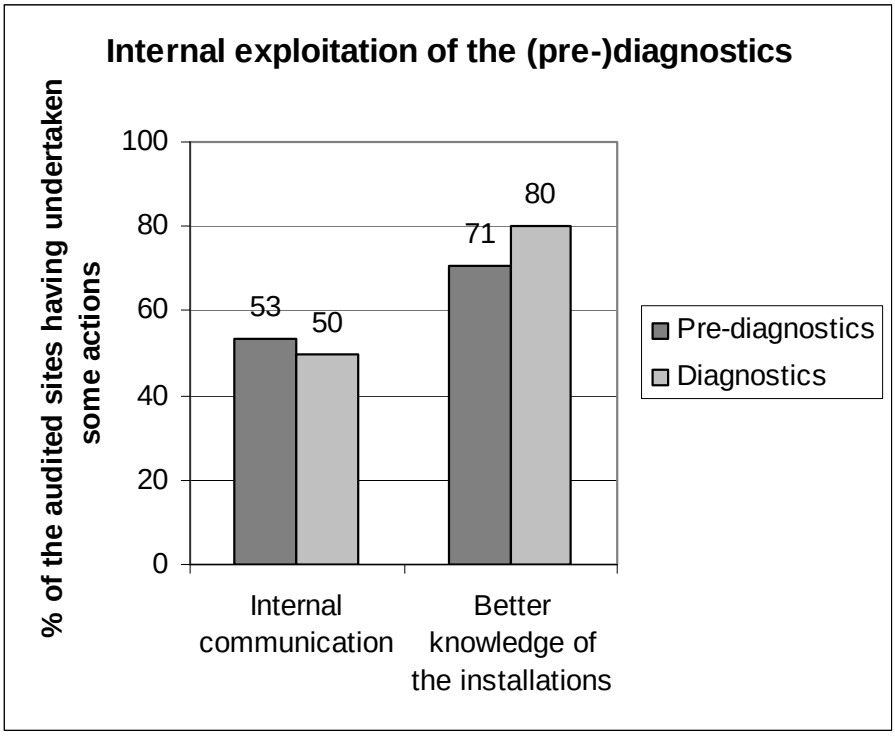
The previous graphs have shown that the RESEDA project has leaded to some energy savings, which may help preserving the environment. To really realize the extent of those environmental benefits, an impact assessment step must be done. The detail of that impact assessment can be found in appendix 2.

The result of that impact assessment is that thanks to RESEDA, the equivalent of 10 000 tons of CO2 are saved each year.

To realize what it represents, although most of the FIEV's adherents are not submitted to CO2 quotas, it can be interesting to calculate the value of that

amount on the quota trade market. Considering that 1 ton of CO2 costs 22.38 € (rate of the Powernext Carbon Market, retrieved the 5th of January 2005), the value of 10 000 tons is roughly 225 000 € (2 000 000 SEK) on the quota trade market.

- **Site's internal impacts**: apart from the financial gains, the RESEDA project has leaded to some other internal benefits for the participants, as it can be seen below.



Graph 21 : Internal benefits of the (pre-)diagnostics

Although internal communication was not an important motivation for undertaking the RESEDA project, around half of the companies having realized a pre-diagnostic or a diagnostic have taken that opportunity. Even if it was not initially planned, half of the companies have been eager to inform their staff about the (pre-)diagnostics.

Moreover, 71 % of the sites having done a pre-diagnostic and 80 % of the ones having done a diagnostic have appraised that the project has enabled them to have a better knowledge of their installation. Those figures are double-edged. In the one hand it is good news that the RESEDA project has

had the knowledge about the industrial installations increase. In the other hand it is a bit alarming to realize that the major part of the sites had only a rough knowledge of their own installations...

- **Impacts on customers**: apart from the environmental benefits, it can be interesting to know if the RESEDA project has leaded or not to external impacts on customers.

  First, no external communication has been done by the participants to the RESEDA project. That was not a motivation for doing the (pre-)diagnostics and it has not been developed.

  Correlatively, there as been no positive answers to the question about potential new benefits related to the customers (new customers, privileged partnership with customers, etc).

  Thus, it seems that the RESEDA project has not leaded to any benefits related to the customers.

5. Discussion – Perspectives and lessons of the RESEDA project

Having evaluated the application and the impacts of the RESEDA project, it is important to analyse the perspectives of the project and to wonder what can be learnt from the obtained results, especially by putting them into the context of self-regulation.

5.1. Evaluation of the efficiency of the RESEDA project

To know if the RESEDA project has really been efficient, its results have to be analysed in comparison to what was expected from the theoretical analysis of the tool.

The main conclusions of the theoretical analysis of the (pre-)diagnostics tool were that it is a simple tool, easy to perform for the companies and well adapted to the sector. It is also a subsidized tool quite cheap for the companies.

Consequently, it seems quite coherent that a great number of sites, representing roughly 25% of the sector, have participated to the project. Since it was not a too complex tool, the sites which are not energy experts have been able to reach non negligible results in terms of

energy saving. On average, the participants to the RESEDA project have decreased by 1.8 % their energy consumption. It also means that the sector has decreased its energy consumption by about 0.5 %.

The tool provides however only indicators and advice and does not practically realize energy saving. Thus, companies have to act thereafter to eventually decrease their energy consumption. That intrinsic weakness has been an obstacle to reach a higher efficiency.

It notably explains why around 20 % of the participating sites, which have not implemented any of the recommended actions, have not realized any energy saving.

Besides, some solutions, even if they are economically viable, may have too long returns on investments. That weakness has hindered the efficiency, because most of the participants have not put into practice all the recommended actions.

As a conclusion, the results of the project are quite coherent when considering the theoretical strengths and weaknesses of the tool.

To reach a higher efficiency, the tool would need to get rid of the two main intrinsic weaknesses presented above. It could be achieved by including a step dealing with the implementation of the recommendations. But that option would necessitate another order of magnitude of the invested means.

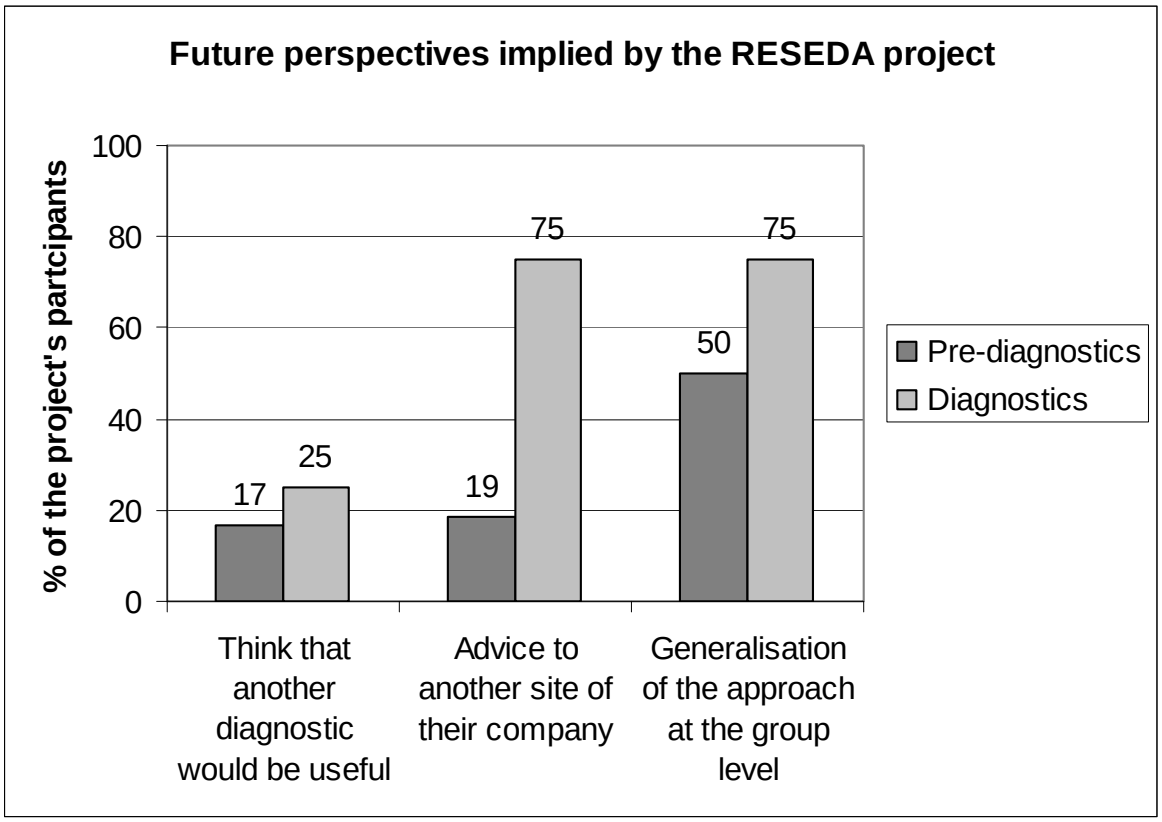
5.2. Future perspectives implied by the RESEDA project

One of the main objectives of the RESEDA project was to initiate a campaign of energy diagnostics in the automotive supply sector. The idea was to subsidize some diagnostics so that the companies could try them, become aware of their potential benefits and eventually decide to generalize that kind of action in all their industrial sites.

In this part, it will be studied if that scenario is probable or not.

- ⇨ To answer that question, it can be first noticed that about 80 % of the participants have considered that the RESEDA project has been beneficial for their industrial site. It is coherent since 80 % of the participants have implemented some actions thanks to the (pre-)diagnostics and have considered them as efficient. Consequently, the project has globally a positive image among the participants

⇨ The following graph shows which horizons have been opened up for the companies thanks to the RESEDA project.



Graph 22 : Future perspectives implied by the RESEDA project

The survey about the RESEDA project's feedback has proved that 17 % of the participating sites, which have realized a pre-diagnostic, think that another diagnostic would be useful to go deeper into the analysis and proceed to more energy savings. That figure is 25 % for the sites having done a diagnostic. Consequently, it can be hoped that some of the sites which had participated to the project will undertake a new complementary energy diagnostic.

Besides, 19 % of the sites having done a pre-diagnostic and 75 % of the ones having done a diagnostic have advised the energy audits to another site of their company. There again, it can be hoped that new energy diagnostics will be realized by new industrial sites.

But the most promising figure is that more than 50 % of the participants try to generalize the energy diagnostics at their group level. If some groups decide to proceed to energy audits in

all their industrial sites, a great amount of energy could be saved and the target of the RESEDA project would be reached.

Considering the previous figures, it seems that a positive dynamic could be launched: the realization of some subsidized energy diagnostics could initiate the realization of other diagnostics in other sites.

To help that dynamic to be launched, a second phase of the RESEDA project is to be implemented. It is planned to realize 20 more subsidized pre-diagnostics and 12 more subsidized diagnostics. The objective of that second phase is to make more companies aware of the potential benefits of energy saving.

The first phase of the RESEDA project, including 51 pre-diagnostics and 10 diagnostics, has leaded to a reduction by around 0.5 % of the sector's energy consumption. With 20 more pre-diagnostics and 12 more diagnostics implemented in the scope of the second phase of the project and with several other energy (pre-)diagnostics expected thanks to the positive dynamic described above, it is reasonable to assess that the total sector's energy saving could be roughly around 1 %.

5.3. Realms of environmental self-regulation's implementation in the automotive industry

In the problem formulation presented at the beginning of that work, the main question was the following: should self-regulation be restricted to the realms where economic gains are possible (even probable), or could it be extended and generalised to every realms?

The study of the RESEDA project has given some clues to answer that question for the automotive supply industry sector.

As it has been seen in the previous part, the implementation of the RESEDA project has been globally successful. A positive dynamic aiming at realising more diagnostics may have been created and the expected total sector's energy saving could roughly reach 1 %.

In France, the sectors submitted to CO2 quotas are supposed to reduce their energy consumption by 2.43 % compared to the 2003 level. As a consequence, the automotive supply industry sector could nearly reach half of that objective although it was not forced to

do anything. Besides, that energy reduction is achieved with a global satisfaction of the participants, which is far to be the case for the sectors submitted to CO2 quotas.

But would the RESEDA project have reached such results if economic gains would not have been expected ?

First of all, it has to be reminded that the main reason for participating to the RESEDA project was undeniably the economic one. It was the most important motivation for more than 85 % of the RESEDA's participants. Consequently, if financial gains could not have been expected, the number of participants must have been lower and the success of the project would have been endangered.

Other arguments show the importance of the financial aspects. Most of the participants have chosen the cheapest solution, pre-diagnostics, to proceed to energy savings even if the expected savings implied by a pre-diagnostic were lower than those implied by a diagnostic.

Moreover, many recommended actions have not been undertaken because of a lack of financing, showing that the financial aspects play a prominent role. If environment ethics was the reason for implementing the RESEDA project, companies could have invested more money to achieve that goal.

Finally, as it is proved in appendix 3, the performances in environment and Sustainable Development of the RESEDA project's participants are just slightly better than the performances of an average automotive supply company. So, the environmental strategies of the RESEDA project's participants are not more developed than an average automotive supply company. Thus, it is not really possible to affirm that the RESEDA project is generally done in the scope of the development of an environmental strategy.

As a conclusion, the example of the RESEDA project shows that implementing a quite efficient environmental self- regulation is possible when economic benefits are expected. It is however not possible to affirm that the implementation would have been also a success if no economic gains could have been expected. On the contrary, several clues seem to show that the project would have experienced some difficulties in that case.

6. Conclusions and recommendations

This work has shown that self-regulation can lead to efficient results in terms of energy saving. Thanks to the first phase of the RESEDA project, around 0.5 % of the automotive supply sector's total energy consumption has been saved.

Considering that the second phase of the project has just been launched, the energy savings are likely to increase in a near future. Besides, some clues indicate that a positive dynamic starts to be initiated: the more energy diagnostics are realized, the more the companies become aware of the importance to have their sites audited.

The RESEDA project has also been economically beneficial for the participants. This fact is closely related to the success of the project since the economic aspects were the main drivers for its implementation.

Even if the study has emphasized that several other drivers existed for the implementation of the RESEDA project, it has not proved that the project would have reached the same results if no economic gains could have been expected. On the contrary, the study has shown that the project would have experienced some difficulties in that case.

Thus, it tends to show that self-regulation within the automotive supply industry can not really be extended to the realms where economic gains are not expected.

As representative of the vehicle equipment industries, the FIEV play a major role for the implementation and the management of self-regulation projects in the sector. Based on the present work, some recommendations can be formulated in order to improve the second phase of the RESEDA project as well as other self-regulation projects.

- ⇨ To have more participants, the FIEV should develop its communication about its self-regulation projects on two levels. First, the FIEV should inform its adherents of the different benefits, beyond the economic aspects, of such projects. Secondly, the FIEV should communicate towards the sector's customers so that the self-regulation projects' participants could expect some market benefits.

- ⇨ The FIEV should more systematically proceed to assessments of the environmental benefits of its self-regulation projects, since environmental ethics is all the same a non negligible motivation and driver for their implementation.
- ⇨ As it has been done for the first phase of the RESEDA project, the FIEV should systematically realize precise feedbacks of its self-regulation projects to be able to keep on assisting and advising the companies after the ends of the projects.

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8. Appendixes

8.1. Appendix 1 – Feedback about the RESEDA project

Feedback about the RESEDA project

I. Motivations

What were the main motivations which have leaded your company to realize an energy pre-diagnostic or an energy diagnostic? (1=really weak motivation, 5=really strong motivation)

	1	2	3	4	5
➢ ***Economics***	☐	☐	☐	☐	☐
➢ ***Environment***	☐	☐	☐	☐	☐
➢ ***Processes and industrial installations***					
- to have a better knowledge of their functioning	☐	☐	☐	☐	☐
- to check the installations' condition	☐	☐	☐	☐	☐
- to have expert advice to optimize their functioning	☐	☐	☐	☐	☐
➢ ***Communication***					
- internal	☐	☐	☐	☐	☐
-external	☐	☐	☐	☐	☐
➢ ***Strategy***					
- new market opportunities	☐	☐	☐	☐	☐
- customers' satisfaction/requirements	☐	☐	☐	☐	☐
➢ ***Others***	☐	☐	☐	☐	☐

Please precise (nature and intensity) :_____

II. Actions put into practice consequently to the pre-diagnostics and diagnostics

II.1) Have you put into practice the actions which had been initially envisaged by your companies' master of works, following the advice of the (pre-)diagnostic?
a) yes, all ☐
b) yes, some ☐
c) none ☐

In case b) and c), what were the factors blocking the implementation of those actions?
- lack of time ☐
- lack of resources ☐
- lack of financing ☐
- technical problem ☐
- lack of interest ☐
- Other :_____

II.2) Among the implemented actions, how many had a return on investments :
- immediate (no investments) :

_____

- less than 1 year :

_____

- more than 1 year (in that case, precise which actions) :

_____

_____

II.3) The implemented actions' types were (several possible answers) :
- Compressed air ☐
- Comfort of the industrial premises (heating, ventilation) ☐
- Lighting of the industrial premises ☐
- Cold and cooling ☐
- Energy management (counting of the energy,…) ☐
- Processes ☐

II.4) Consequently to the audit, have you implemented formations:
- aiming at making the staff aware of the energy saving issue? ☐
- having a technical content, in order to inform the executives on the existing solutions? ☐

If positive, what were the duration and frequency of those formations?

_____

II.5) Did you find relevant the indicators which have been implemented thanks to the (pre-)diagnostic?
Yes ☐
No ☐

II.6) Do you keep on monitoring those indicators?
Yes ☐
No ☐

If no, why ? (several possible answers)
- lack of time ☐
- lack of resources ☐
- technical problem ☐
- lack of interest ☐
- Other:_____

III. Impacts of the implemented actions

III.1) Do you globally consider that the implemented actions have been efficient?
Yes ☐
No ☐

III.2) Could you roughly quantify the realized energy savings? The FIEV commits to respecting the confidentiality of that information and to not spreading it.
- Global savings (MWh or %):_____
- Electricity savings(MWh):_____
- Gas savings (MWh):_____
- Oil savings (MWh):_____

	0-5%	5-10%	10-20%	20-30%	>30%	No action
- Compressed air	☐	☐	☐	☐	☐	☐
- Industrial premises' comfort	☐	☐	☐	☐	☐	☐
- Lighting of the industrial premises	☐	☐	☐	☐	☐	☐
- Cold and cooling	☐	☐	☐	☐	☐	☐
- Energy management	☐	☐	☐	☐	☐	☐
- Processes	☐	☐	☐	☐	☐	☐

III.3) Could you roughly quantify the realized financial savings? The FIEV commits to respecting the confidentiality of that information and to not spreading it.
globally (Euros) :_____

III.4) Have the investments been identical to the forecasting?
Yes ☐
No ☐

III.5) Have the savings (financial and energy) been identical to the forecasting?
Yes ☐
No ☐

III.6) Have you tried to make an opportunity of the (pre-)diagnostic different than the only financial aspect?
- internal communication ☐
- external communication ☐
- Other ☐ Please precise : _____

III.7) Do you think that you have now a better knowledge of your installations and processes thanks to the (pre-)diagnostic?
Yes ☐
No ☐

III.8) Did the (pre-)diagnostic enable your company to have new benefits related to your customers (new customers, privileged partnership with customers…)
Yes ☐ Please precise:_____
No ☐

IV. Satisfaction

IV.1) Do you consider that the (pre-)diagnostic has been beneficial for your company/site?
Yes ☐
No ☐

IV.2) Do you think that another deeper diagnostic would be useful?
Yes ☐
No ☐

IV.3) In the case of your company having several sites, have you recommended those (pre-)diagnostics to another site?
Yes ☐
No ☐

IV.4)Have you contacted your company's environmental manager in order to generalize that kind of operation?
Yes ☐
No ☐

Please, send back that questionnaire before the 29th of July 2005
to François Avril by e-mail : favril@fiev.fr or by fax : 01 46 97 00 80

8.2. Appendix 2 - Environmental impact assessment of the energy saving realized thanks to the RESEDA project

I. Assumptions:

1. According to the ISO standard for LCIA (ISO 14042, 2000), the mandatory elements for an impact assessment are the following:

⇨ Impact category definition

⇨ Classification

⇨ Characterisation

Impact category definition: the RESEDA project is included in a cooperation protocol concerning the reduction of greenhouse gases emissions from small and medium-sized emitters. Since the main goal of the protocol and of the RESEDA project is to fight against Global Warming, it has been the only impact category taken into account here.

Classification: the only substances taken into account as contributors to global warming have been CO_2, CH_4 and N_2O.

Characterisation: the characterisation indicator chosen is the Global Warming Potential 20 years. The following table summarizes the equivalency indicators according to IPCC 1994 &1996 ; in CML 2002.

Categories	Characterisation indicators	Substances	Values
Global warming	GWP 20 (g CO_{2eq}/g)	CO_2	1
		CH_4	56
		N_2O	280

Table 15 : Characterisation equivalency factors

2. According to JM Bourdaire (World Energy Council, 2004), the energy source on the margin for the French electricity production is gas. Consequently, it will be assumed that the electricity saved would have been otherwise produced from a gas power plant.

II. Calculations :

The first step is to evaluate the total energy saving thanks to the RESEDA project, by multiplying the average site's energy saving by the number of participants.

	Number of audited sites	*Average energy saved (MWh/yr/site)*			*Annual energy saving (MWh/yr)*		
		Total	*Electricity*	*Gas*	*Total*	*Electricity*	*Gas*
Pre-diagnostics	50	182	161	21	9100	8050	1050
Diagnostics	10	250	250	0	2500	2500	0
Pre-diagnostics + diagnostics	60				**11600**	**10550**	**1050**

Table 16 : Energy savings thanks to the RESEDA project

The result is that about 10500 MWh of electricity and 1050 MWh of gas are saved each year.

It can be assumed that all the saved electricity comes from gas.

According to Frischknecht et al (1996), the emissions to produce 1 MWh of electricity from gas are (in g/MWh):

	CO_2	CH_4	N_2O
Emissions (g/MWh)	885600	1346	5

Table 17 : Emissions to produce 1MWh of electricity from gas

According to Tillman et al (1992), burning 1 MWh of gas in a stationary installation emits around 198000 g of CO2.

Consequently, the saved emissions each year are :

	CO_2	CH_4	N_2O
Saved emissions (in kg/yr)	9513000	14175	52,5

Table 18 : Annual saved emissions

The last step is to convert the emissions of CH4 and N2O in CO2 equivalent emissions by using the characterisation factors.

	GWP 20		Annual saved emissions		Annual CO_2 equivalent saved emissions	
CO_2	1	kg CO_{2eq}/ kg CO_2	9513000	kg	9513000	kg CO_{2eq}
CH_4	56	kg CO_{2eq} / kg CH_4	14175	kg	793800	kg CO2eq
N_2O	280	kg CO_{2eq} / kg N_2O	52,5	kg	14700	kg CO2eq
Total					10321500	kg CO2eq
					10000	**tons CO2eq**

Table 19 : Annual CO2 equivalent saved emissions

Consequently, thanks to the RESEDA project, 10 000 tons of CO2 equivalent are saved each years.

8.3. Appendix 3 - Evaluation of the Sustainable Development performances of the RESEDA project participants

Survey about Sustainable Development

Between May and July 2005, I have proceeded to a survey about Sustainable Development in the automotive supply industry. The aim of that survey was to carry out a state of art of the performances about Sustainable Development in the FIEV's adherents companies, in order to determine some development axes of the concept within the sector.

A description of that survey and a summary of its results can be found in appendix 4, which is constituted of the presentation made by the FIEV Director to the FIEV's executive board.

Nineteen companies having participated to the RESEDA project have answered to the survey about Sustainable Development. In the present annex, a simple comparison between the RESEDA's participants and the average automotive supply companies will be done about the performances concerning Sustainable Development. That comparison will be based on some of the indicators developed in the survey presented in annex 4.

1. First indicator: Sustainable Development definitions

The following table summarizes the assessments of the definitions of the Sustainable Development concept given by the RESEDA participants and by all the automotive supply companies.

	No definition	Limited to the environmental aspects	Includes environmental aspects and either social or economic aspects	Complete: includes environmental, social and economic aspects
Percentage of the RESEDA participants	32 %	15 %	37 %	16 %
Percentage of all the automotive supply companies	39 %	18 %	20 %	23 %

Table 20 : Comparison of the definitions of the Sustainable Development concept given by the RESEDA participants and by all the automotive supply companies

That table is the evidence that the participants to the RESEDA operation don't have on average a better definition of the Sustainable Development concept than the other automotive supply companies.

2. Second indicator: existence of a Sustainable Development manager

58% of the RESEDA project participants have a Sustainable Development manager. That number is only 47% for all the automotive supply companies. Consequently, considering that indicator, the RESEDA participants are a bit better.

3. Third indicator: environment priority

One question of the Sustainable Development survey was about the priority given to the environmental, social and economic aspects. Grades between 0 and 3 (0 meaning a very low priority and 3 meaning a very high priority) were given to illustrate those priorities.

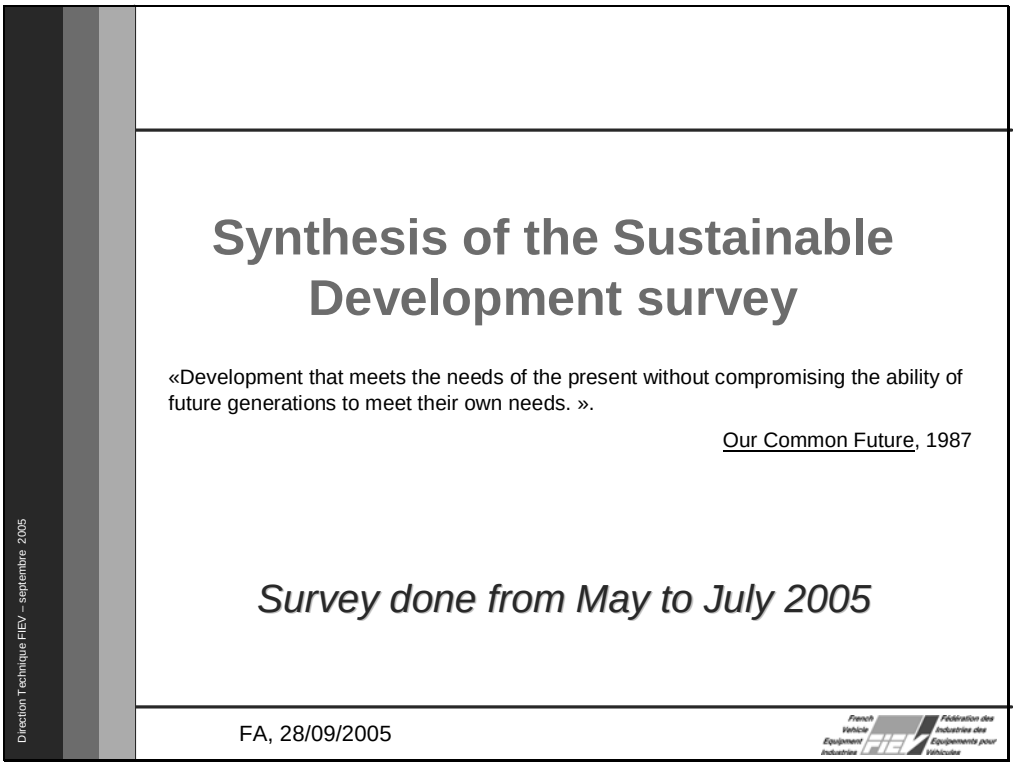
The average grade of the RESEDA project participants for the environment was 2.28. The global automotive supply companies' average grade was 2.15.

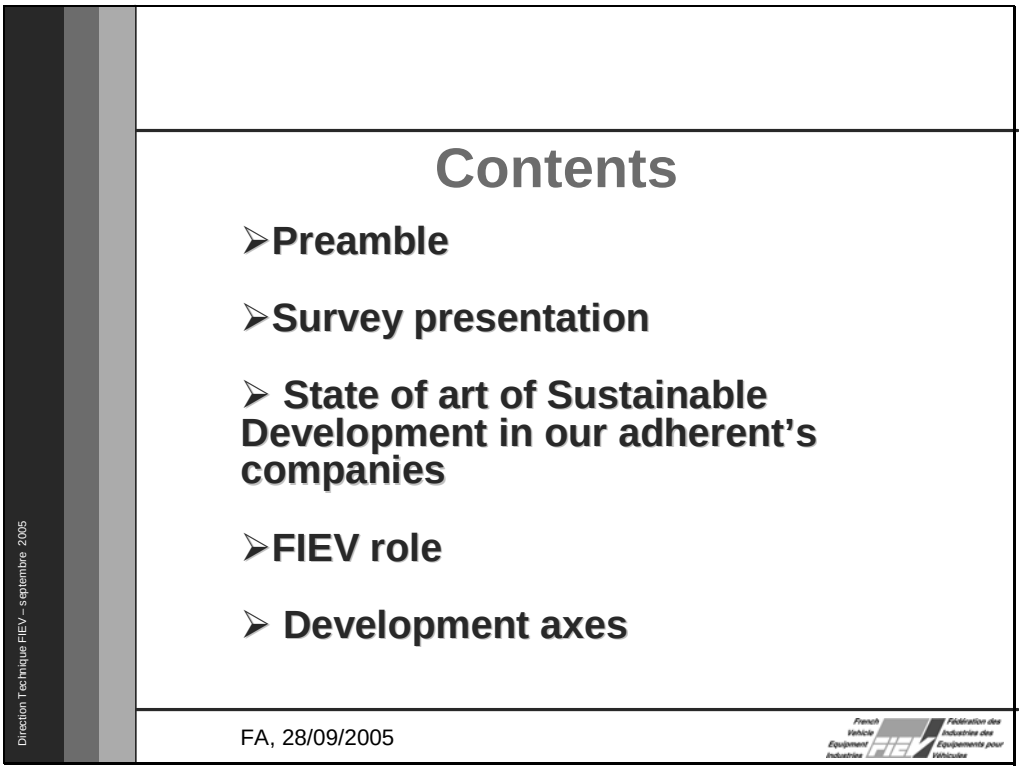
As a consequence, companies having implemented the RESEDA project have given a slightly higher priority for the environmental aspects.

4. Conclusion

As a conclusion, based on those three indicators, it seems that the RESEDA project participants do not really develop the Sustainable Development or environmental aspects more than an average automotive supply company.

8.4. Appendix 4 – Synthesis of the Sustainable Development survey





Sustainable Development definitions for the automotive sector *according to FIEV*.

To use the dynamism and the competitiveness of the automotive sector for the development and for the living standard level increase, in respect of the limits imposed by the environment.

The **3 pillars** of Sustainable Development, applied to the automotive sector:

Environment :

- To preserve the diversity and the conditions of production
- To limit the substances accumulation in the ecosphere

Social:

- To meet the needs in terms of transportation
- To take its social responsibility on by contributing to the increase of the living standards of the actors directly or indirectly linked to the sector

Economics :

- Driving force of a sustainable automotive sector
- To create the resources needed for development

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Survey presentation : (1/2) scope

- Survey addressed at the beginning of May 2005, with a follow up in June, to the:
  - General Directors
  - Purchasing Directors
  - Commercial Directors
  - Environment Directors
  - R&D Directors
  - Human resources Directors
  - Sites Directors

More than 800 surveys sent to our adherents

- Survey supported by several commissions :
  - Commission about Environment & Recycling, 6th June 05
  - Commission about Hazardous Substances, 16th June 05
  - Commission about World Constructors/Suppliers Relations, 2nd June 05
  - Commission about Social development, 11th July 05

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Survey presentation: (2/2) representativeness

- The study represents :
  - 1/3 of the adherent companies, corresponding to around 50% of the total FIEV adherents' sales.
  - International groups, including 7 of the 10 biggest adherents…
  - …and also small and medium size companies, representing 1/5 of the answers

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State of art of SD in the adherent companies (1/8)

- **1st observation :**

  The Sustainable Development (SD) concept is not well-known by our adherents

  - 41% have no SD definition
  - 42% have a definition which is not limited to the environmental aspects

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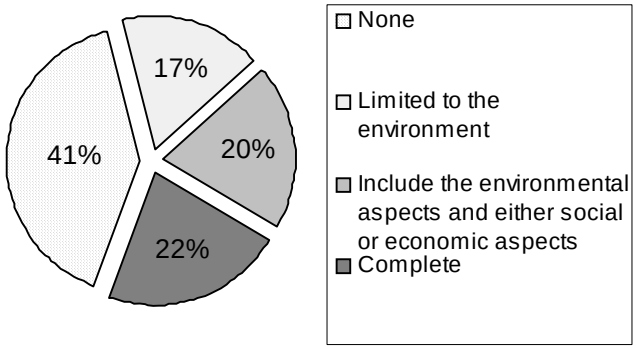
State of art of SD in the adherent companies (2/8)

Sustainable Development definitions in our adherent companies



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State of art of SD in the adherent companies (3/8)

- **2nd observation:**

  Imbalance of the 3 pillars : the environment is predominant

  - At the priorities level
  - At the undertaken actions level

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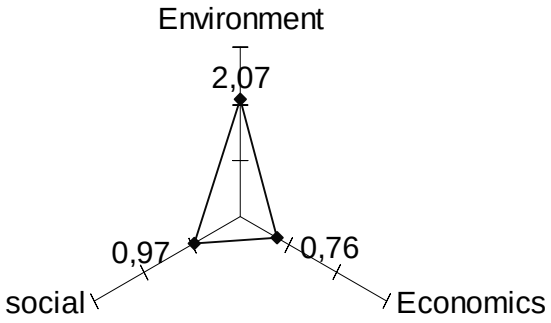
State of art of SD in the adherent companies (4/8)

In words…

Average grades of the priorities
(0: low priority, 3: high priority)



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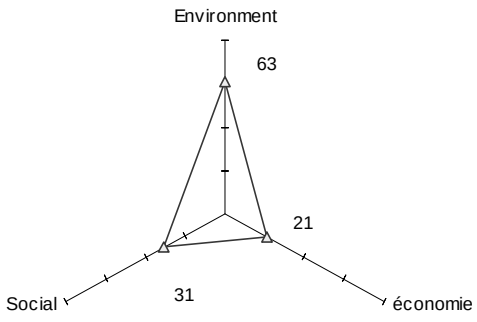
State of art of SD in the adherent companies (5/8)

… in facts

Percentage of companies having realised concrete actions in each field



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State of art of SD in the adherent companies (6/8)

- **3rd observation:**
  - Our adherents don't convert all their priorities into concrete actions
  - 40% admit to consider at least one of the SD pillar as a priority even if they have not undertaken any related concrete action

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Etat de l'Art du DD chez les Adhérents (8/8)

- **However…**

  Implementing a SD approach enables to have a positive outlook on the regulations and customer's requirements

  - Actually, 83% of the adherents having an approach of SD perceive regulations and customers' requirements as opportunities. That figure is only 30% for the adherents without any SD approach.

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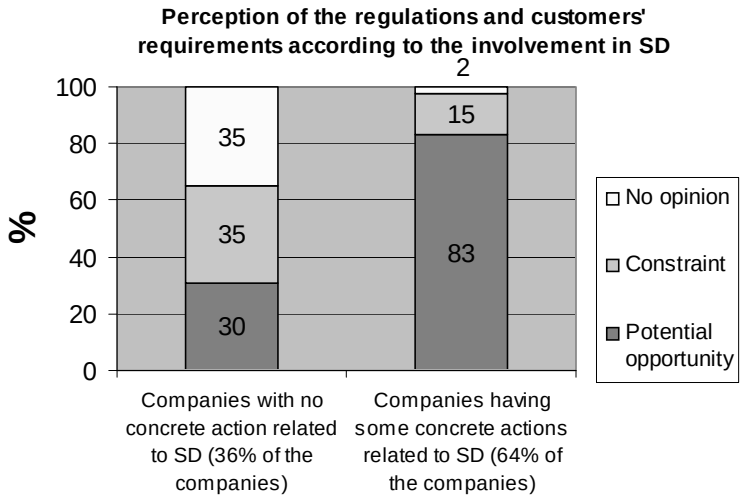
State of art of SD in the adherent companies (8/8)



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FIEV role

Running and coordinating exchanges about SD between the adherents

- ¾ of the adherents want the FIEV to develop that kind of actions

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Development Axes of SD towards the Adherents (1/5)

3 main axes for potential actions

➢ **1st axis:**

SD can only be developed in a long term, via frequent and regular actions.

To promote the function of SD coordinator within the companies

- **The existence and the recognition** by the direction of SD managers is determining for the implementation and the monitoring of concrete actions

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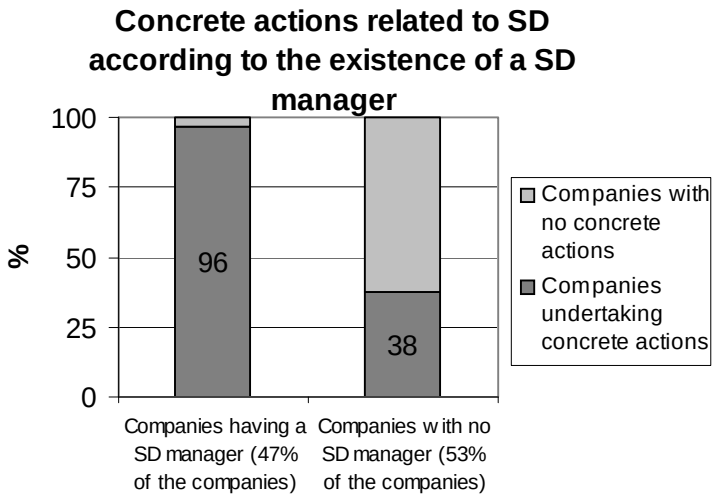
Development Axes of SD towards the Adherents (2/5)

1st axis, continued:



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Development Axes of SD towards the Adherents (3/5)

1st axis, continued:

To use the competences and experiences of the existing SD coordinators

- More than half of the adherents have a SD coordinator
- The coordinators have various profiles (environment, security, human resources, quality, purchasing managers…)

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Development Axes of SD towards the Adherents (4/5)

- **2nd axis:**

  Analogy SD / Quality

  Performance requires a balance:
  - *Quality: Quality – Costs – Delay*
  - *SD: Environment – Social – Economics*

Concrete balancing of the 3 SD pillars

An efficient SD development is based on the 3 following FIEV commissions:

- *Economics :* Commission about World Constructors/Suppliers Relations
- *Environment :* Commission about Environment & Recycling
- *Social :* Commission about Social Development

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Development Axes of SD towards the Adherents (5/5)

➢ **3rd axis:**

Extending of the SD integration in the whole supply chain

- Better diffusion of the concept
  - ➢Pro-active behaviour towards the customers
  - ➢Involvement of all the supply chain

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Action Plan: FIEV Propositions

To implement those 3 axes in a long term, the FIEV proposes:

➢To launch the 1st of December 2005 a **SD commission**, gathering all the competences and experiences of the FIEV and the adherents

➢To organize in a medium term the communication about the works realised about SD

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