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# Green business: a brief financial profile of the Romanian eco-industry

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**Abstract:** The objective of the paper is to outline an overview of the financial position and performance of the national eco-industry, based on a financial statements analysis performed on a significant sample of companies. The research focused on the most representative Romanian eco-industrial sectors, i.e. the pollution control technology sector, the waste management sector and the green energy sector. The time span included in the analysis was 2006-2012, while the selected financial ratios concerned the companies' performance and funding sources, as main factors defining their ability to remain on the market and in the same time promote sustainability in difficult times. As a main result, the research delivers a global picture over the business volume, profitability and efficiency, as well as over the solvability and the structure of the funding sources in the selected sectors, in a period within which the activity of the companies considered in the study was marked by two major events: the global financial crisis and the adhesion of Romania to the European Union.

**Keywords:** financial analysis, performance analysis, eco-industry, sustainability

**JEL codes:** M41

## 1. Introduction

According to OECD, eco-industries are defined as "those identifiable sectors within which the main – or a substantial part of – activities are undertaken with the primary purpose of the production of goods and services to measure, prevent, limit,

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minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems". The specific eco-industrial sectors are generally classified in two main categories: pollution management (air pollution control, waste water treatment, solid waste treatment, soil and groundwater remediation, noise and vibration control) and resource management (recycled materials, renewable energy production, water supply, nature protection). Due to the extensive preoccupations towards the environmental protection in all productive activities, the specific sectors have been lately completed by connected industries, like the automotive, or other energy intensive industries and the eco-constructions (considered eco-oriented through the development of environmentally friendly technology, or the development of energy efficiency solutions)

According to an earlier research report of Ernst and Young, commissioned by the EU and released in 2006, major segments of the environment industry, such as wastewater treatment and air pollution control are imperfectly competitive, due to significant entry barriers, based on learning-by-doing and dedicated know-how, economies of scale and scope, high capital requirements, research and development and regulatory uncertainty.

More recently, the competitiveness of the European eco-industrial sectors was described in a study released at the end of 2009. The research was commissioned by the European Commission Directorate General for Enterprise and Industry and it has so far remained the most extensive research published in this field. The period of time covered by the analysis was 2004-2008, meaning that the development of the eco-industrial sectors had not yet been strongly affected by the financial crisis.

According to the report (Bilsen, 2009), the global market – expressed in annual turnover for eco-industries - was estimated to stand at roughly 600 billion euro a year, with over one third of this stemming from the EU, while US and Japan accounted for a large part of the remaining global turnover. The EU's niche markets consisted in renewable power generation technologies (over 40% of the global market shares) and waste management and recycling technologies (50% of the global market shares). The study revealed high variations with regard to the total eco-industry turnover in relation to the GDP for each of the Member States. In the most states, the eco-industrial turnover reached between 2-5% of the total GDP, with relatively high levels in the new Member States, indicating the importance of the eco-industrial sectors for their new market economies. Exceptionally high were the percentages in Slovenia and Bulgaria (over 10%), while Romania kept close to the EU average, with 2.44%.

Looking at the size of the companies active in eco-industrial sectors, the report highlighted the fact that new regulation driven markets were usually made up of

SMEs (<500 employees), while in older and established eco-industry markets (e.g. waste management, water supply) firms tended to be larger and international. At the smaller companies, the eco-oriented innovation was restrained by the poor access to finance. The venture capitalists active in the eco-industry market focused mainly on the larger companies and projects, leaving the SMEs reliant on traditional local banks, with a rather risk adverse profile. The sectors considered mostly affected by the poor access to finance were the water supply and waste water treatment facilities, the air pollution control equipment, the waste treatment facilities and the renewable energy sectors.

The microeconomic performance of the eco-industries was illustrated by a series of sample performance indicators, computed for the period 2004-2006. As an example, the highest recorded average profit margin in the study area belonged to the renewable energy (14%, with an average growth rate of 2%), while the highest operating revenue per employee was recorded in the air pollution control (780.000 euro, average growth rate 6%) and the eco-construction (530.000 euro, average growth rate 8%).

Relying on Romania's profile in the European sustainability context, as a quite recent member with major shortages in the field of environmental protection, we consider that the observation and monitoring of the national eco-industry is a highly useful research task. In this direction, the objective of the present paper is to complete the European eco-industrial picture with an overview of the financial position and performance of the most significant national eco-industries, by means of a financial statements analysis performed on a significant sample of companies, active in the targeted sectors. For this purpose, our tasks were to properly identify companies whose activity adhered to the eco-industry definition, select relevant indicators for a chosen period and conclude upon the financial performance and position of the identified eco-industrial entities, based on the computed ratios.

Considering both the EU experience and the quite recent environmental obligations of Romanian companies, brought about by the EU adhesion, our intention was to check if the market demand for the products delivered and services rendered by eco-industrial entities was sufficiently high to support their financial performance, in a period surrounding and including the global financial crisis.

We initiated the research in 2012, by selecting the relevant sectors and performing a brief analysis of the business performance and investment efficiency for the period 2007-2010 (Circa & Stefea, 2012). In the current study, we extended the analysis time span to 2006-2012, in order to capture financial indicators prior to the EU adhesion, as well as the entire period marked by the financial crisis, as far as data were available.

The second section of the paper summarizes the current research trends in the eco-industrial field, presented in the specific literature. The third section describes the research methodology, with regard to the database used in the study and the financial statements analysis ratios which support the analysis. The fourth section presents the results we reached and is followed by the concluding remarks.

## 2. Literature review

The literature regarding eco-industrial development approaches a wide spectrum of related topics: from general features of ecologically sustainable corporations, to the implementation of eco-principles in specific industries or regions.

On the general line, Guo *et al.* (2010) summarize the main conditions of the sustainable economical development, i.e. small input, low consumption and light pollution (unlike high investment, high consumption and high emissions, characterizing traditional industries) and compare the traditional industry with the eco-industry in ten areas: guiding ideology, targets, resource utilizing, industry structure, industry function, corporate relations, environment protection, waste disposing, management efficiency and consumption ideas.

In the same context, Kabiraj et al. (2010) indicate the differences between genuine "green businesses" and green labels as marketing tools, highlighting the fact that "the basic concept of a green business lies in business sustainability". The researchers classify entities based on different degrees of greenness as (1) firms whose activity is to produce environmental goods and services; (2) firms which have taken active and identifiable steps to change their products and/or process to take substantiality agenda into account; and (3) all other firms which have taken some steps to improve their process efficiency or change their brand image. As drivers of eco-oriented performance, the authors specify global environmental pressures and the public awareness, the capital markets acceptance, the assurance of market demand for clean tech products or services, the creation of an environmentally-friendly market, through the cap-and-trade system, as well as the provision of extra financial backing to clean tech companies.

The most specific research contributions in the field of the eco-industrial development refer to the insertion of the ecological sustainability principles in certain regions (Dong, 2012) or industry sectors, like textiles (Dudhedia & Bhor, 2012), tourism (Budi Anto *et al.*, 2011), electronics (Kumar *et al.*, 2012) etc.

Coming to the Romanian research in the field of eco-industry, the contributions are rather spare. The authors focus mostly on the specific eco-orientation of certain sectors, like tourism (Tomescu, 2011) or mining (Sima *et al.*, 2012). Iovitu summarizes briefly the perspectives of the eco-industrial sectors in Romania,

though focusing rather on the encouragement of the eco-orientation by the public authorities.

Conceptually, the co-existence of financial and environmental performance has been translated in literature as eco-efficiency, defined as "a management philosophy that encourages business to search for environmental improvements that yield parallel economic benefits", "which focuses on business opportunities and allows companies to become more environmentally responsible and more profitable"(Madden *et al.*, 2005, in Koskela, 2014).

Analyzing the link between the corporate financial and environmental performance, or the possibility of their co-existence, the literature delivers contrasting opinions. Given the additional costs associated to environmental care, one of the first research reactions was to segregate the two performance fields, meaning that an increase of the environmental performance leads to the decrease of the financial performance (Friedman, 1970). The reverse thesis, meaning that environmental care could be profitable, gained its supporters later (Orlitzky *et al.* 2003), based mainly on the acknowledgement that the financial performance of green firms increases due to the resource consumption decrease, respectively to the sale increase. Earlier, Dowell *et al.* (2000) had highlighted a possible higher market performance for environmentally friendly companies, based on empirical studies.

Within a research focused on the link between eco-innovations and the development of the eco-industry, Sarkar (2013) concludes that "performance measurement on eco-efficiency of both eco-industrial projects and eco-products will be the key drivers for ascertaining the success and failures of eco-industrial projects". At a more general level, it is also argued that not just the level of environmental performance, but mainly the kind of environmental management with which a certain level is achieved, influences the economic outcome (Clarkson *et al.* 2011; Schaltegger & Synnestvedt 2002).

More analytically, Lu (2013) focuses on the engineering and construction sector and compares a sample of green and conventional firms, in terms of short-term financial performance, long-term economic value, and market value. The study concludes that going green is paid off at the corporate level, but not at the market level, meaning that, though in the short term green companies can earn a higher return on equity and investment than conventional ones, while in the long term the going green strategy could generate high economic profit and strong revenue growth, the environmental sustainability is not incorporated in the stock price, as shown by the P/E ratio. However, two factors are identified, which probably contribute to the better financial performance of the green firms: the strong asset turnover due to the rapid growth of the green market during the recent period and the favorable debt terms generally obtained by firms which have proven their sustainability, which reduces their interest expenses and supports their high financial leverage.

However, the corporate eco-efficiency analysis is generally performed in literature with reference to a sector with strong environmental mark (e.g. forest industry (Hoffren, 2010; Koskela, 2014), or pulp and paper industry (Thant & Charmondusit, 2010; Wang *et al.*, 2011)). Conclusions are drawn based on two (or two sets) of indicators: one associated to the economic performance and the other one associated to the environmental performance. A key condition for the validity of the eco-efficiency assessment consists in the appropriateness of the selected indicators. In this context, the environmental performance indicators are selected based on the companies' activity profile and may consist in ratios defining materials consumption, energy consumption, water consumption, waste production, $CO_2$ emissions etc. As for the financial performance indicators, the most frequently used ones prove to be the value added (Adams *et al.*, 2000 in Koskela, 2014; Azapagic, 2004; Hoffren, 2010; Jollands *et al.*, 2004; Thant & Charmondusit, 2010; Wang *et al.*, 2011), the sales amount (Adams *et al.*, 2000; Chappin *et al.*, 2007; Kharel & Charmondusit, 2008; Ounsaneha *et al.*, 2012; Rattanapan *et al.*, 2012; Thant & Charmondusit, 2010), the turnover (Hanssen *et al.*, 2003; Hoffren & Apajalahti, 2009; Van Caneghem *et al.*, 2010), the amount of production (Meul *et al.*, 2007; Salmi, 2007; Van Caneghem *et al.*, 2010) and the net income (Adams *et al.*, 2000).

In the same context, aiming at the best possible selection of the financial ratios, Koskela (2014) relied on a Delphi analysis, which rated the suitability of certain listed environmental and economic performance indicators as eco-efficiency indicators. In the case of economic performance, the experts voted value-added as the preferred indicator, with 64%, followed by the amount of production (14%), number of employees, profit and ROE (each with 7%). However, as admitted by the author, using value-added as the indicator of the economic performance in eco-efficiency limits the use of public data, as the only source of value-added data is the corporate annual report

## 3. Research methodology

Our research relies on financial statements analysis specific methods, i.e.:

- Quantitative methods: the ratio method, consisting in the selection and computation of ratios, considered relevant in the assessment of the financial performance of eco-oriented entities;
- Qualitative methods: comparisons across time periods and between similar firms, assessment and interpretation of the results.

The main coordinates regarding the companies included in the research and the ratios used are the following:

*The database*

The companies included in our research are part of the database built by the Romanian Ministry of Environment, within a project meant to create an integrated framework for the development of the Romanian ecological markets. The project was implemented between 2009-2011, in cooperation with the Norwegian Ministry of Environment, the Bucharest Chamber of Industry and Commerce, the Romanian Management Agency for Scientific Research, Innovation and Technological Transfer, the Norwegian Agency for Climate and Pollution Control and the Norwegian Agency for Public Management and e-Governing.

One of the main results of the project was the creation of an on-line database of Romanian eco-industrial entities, which included the identification data and the profile of entities (companies and research institutes) belonging to seven selected sectors: *green energy, waste management, pollution control, clean technology, environmental monitoring, eco-constructions and noise and vibrations control*. Each sector was split in *two distinct components*, according to the activity profile: production and import and distribution, so that in the final database the entities were assigned to the proper activity type, within the corresponding eco-industrial sector.

Although the goal of the project was to merely take an inventory of the eco-industrial entities active in Romania, without any description or appraisal of their position or performance, the task of the project team was a difficult one. The current classification system of economical activities in Romania doesn't include any specific codes for eco-industrial sectors, meaning that eco-oriented entities are classified within different conventional economic activities. As a consequence, the environmental orientation of the entities included in the database had to be confirmed by applying several methods, including website and company catalogues research, or direct questioning.

The database was built in four stages:

- The selection, out of the database of the Bucharest Chamber of Industry and Commerce, of a sample of companies potentially involved in the production/distribution of environmental technology. As there are only few activities associated with the environmental technology, which are specifically identified by the national classification system of economical activities (e.g. water and wastewater treatment, and waste management), no producers/distributers of green energy production technology, environmental monitoring equipment, or "cleaner" process technology could be clearly identified in this stage.

- The survey of the websites of all previously identified companies, aiming at a more specific description of the products delivered / services rendered by each of them.
- The submission of questionnaires (per e-mail or fax) to the producers or distributors of industrial or agricultural equipment, building enterprises, as well as companies specialized in waste management, water and wastewater treatment, and energy production. In this stage however, the "cleanness" of the produced/distributed technology couldn't be definitely stated.
- The conduction of phone interviews with companies whose products could be assigned to environmental technologies (based on the additional data collected so far, by means of specific literature, company catalogues and company website review), in order to check the accuracy of the gathered information and to obtain additional information regarding the manufactured/imported/distributed products. 331 entities (including research institutes) were contacted by the project team in this stage. The response rate to the phone interview was of 96.37%, meaning that only 12 entities were reluctant to the survey. Out of the 319 interviewed entities, 242 proved to be environmental technology suppliers. The remaining 77 firms were either no longer active in the targeted fields, or they switched to fields connected to the targeted ones (e.g. consultancy associated to environment protection).

Among the 242 entities, the best represented eco-industrial sector was the green energy, with 25% of the active entities, followed by the waste management (24.7%), the pollution control (23.17%), the clean technology (14.3%), the environmental monitoring (7.62%), the eco-constructions (3.66%) and the control of noise and vibrations (1.53%).

Our research included the most significant three sectors of the database, i.e. *the green energy, the waste management* and *the pollution control*. The selection criteria were on the one hand the size of the three sectors, from the standpoint of the number of active entities, and on the other hand the structure of the sectors, from the standpoint of the type of the active entities, i.e. the entities included in the selected fields are mainly companies and not research institutions (unlike the environmental monitoring or the noise and vibrations control, performed mainly by governmental agencies or research institutions). As our analysis focuses on the financial position and performance of the eco-industrial entities, it was important that these are active on a free market. A step further, following the design of the database, all the three sectors were approached on two components: *production* on the one hand, *import and distribution* on the other hand.

In its initial formation, i.e. as designed by the project team, the three sectors consisted in 174 entities, including research institutes. After eliminating the latter, the database considered in our study included 118 companies, out of which 46.6% belong to the green energy sector, 17.8% to the waste management sector and 35.59% to the pollution control sector.

The structure of the selected fields is the following:

(1) *green energy*: producers and distributors of equipment used in the production of solar energy, wind energy, bio fuel, as well as photovoltaic panels, heat pumps, HVAC systems;
(2) *waste management*: producers and distributors of equipment used in waste administration (waste collection, depositing, valuation, recycling, incineration), as well as equipment used in the recovery of useful substances;
(3) *pollution control technology*: producers and distributors of equipment, as well as companies otherwise acting in the field of water and wastewater treatment, air purification and, to a smaller extent, soil decontamination.

Considering that the database was a primary one, with no classification criterion other than the adhesion of the entities to a certain eco-industrial sector, we classified the companies within each sector on six size classes, depending on their number of employees:

- class A companies: under 10 employees;
- class B companies: 10-50 employees;
- class C companies: 50-100 employees;
- class D companies: 100-500 employees;
- class E companies: 500-1000 employees;
- class F companies: over 1000 employees.

Most entities included in the analysis could be assigned to classes A (49.15%) and B (40.68%) (less than 50 employees), meaning that the eco-orientation was mainly specific to small and middle-sized entities. This observation confirms the fact the Romania follows the previously mentioned European trend. It was however an expected picture given the fact that, according to data delivered by the National Institute for Statistics, 99% of the companies active in Romania in the period considered in the study had less than 250 employees.

*The ratios*

In designing the most significant set of ratios able to describe the financial position and performance of the companies included in the selected eco-industrial sectors, we considered two issues:

- the companies included in the research belong mostly to young industrial sectors (from the standpoint of their eco-orientation);
- about one half of the period under analysis was strongly hit by the global financial crisis.

Under these circumstances, we decided that the most relevant information to be described by the selected financial ratios concerns the companies' performance and funding sources, as main factors defining their ability to remain on the market and in the same time promote sustainability in difficult times.

Hence, the financial analysis relied on following ratios:

- ✓ the **turnover** – as an indicator of the companies' business volume;
- ✓ the **pre-tax profit** and the **pre-tax profit margin** – as indicators of the companies' performance;
- ✓ the **pre-tax ROE** and the **labour productivity**, i.e. total operating revenue to number of employees – as indicators of the companies' efficiency;
- ✓ the **financial autonomy**, i.e. shareholders' equity to total financing sources – as an indicator of the financial sources' structure;
- ✓ the **solvability**, i.e. total assets to total liabilities – as an indicator of the company's ability to pay its debt and implicitly of its going concern.

Among these, the turnover, the profitability and the efficiency indicators follow the analysis trend set in literature for the appraisal of the financial performance, as a component of the corporate eco-efficiency, while the financial autonomy and solvency ratios are meant to highlight the selected companies' funding profile during the global financial crisis.

The primary financial statements numbers were collected from the on-line available *doingbusiness* database. All indicators were computed as averages for the size determined classes of companies. The analysis period was 2006-2012. The turnover, the pre-tax profit and the labour productivity are summarized in the tables below in thou. RON.

# 4. Results and discussions

## 4.1. Pollution control technology

### The production component

Based on the size classification, we noticed that most companies included in the sample, i.e. 43%, belonged to the B class (10-50 employees), followed by the A class (under 10 employees) with 36%, the D class (100-500 employees) with 14% and the F class (over 1000 employees) with 7%.

The *business volume* of the sector reached its peak in the period 2008-2009, except for the biggest class of companies (over 1000 employees), whose turnover increased in the last two years of analysis. The activity of the other three company classes (A, B and D) has kept a linear trend starting with 2010, lying around 1.5 million RON at the smallest companies, 5.6 million RON at the class B companies and 14 million RON at the class D companies.

Following the picture of the turnover, the sector *profitability* keeps the same trend at the first two size classes, i.e. the highest pre-tax profit margin is reached by the A and B companies in 2009. The class D companies run a profitable business in the first half of the analysis period, though they record losses starting with 2010. The profitability of the biggest companies included in the sample is significantly lower at the end of the period than in the first years; however the year result remains positive.

As for the *business efficiency*, the highest return on equity is reached by all company classes in 2009, whereas the best percent belongs to the smallest companies, with less than 10 employees. After a quite sudden fall of the indicator in 2010, the last two years of the period keep a positive linear trend for the A, B and F companies, while companies with 100-500 employees start recording losses. The labour productivity is fluctuating over the period at the A, B and D classes, though it remains relatively constant at companies with over 1000 employees. Worth mentioning is the fact the best productivity is recorded by the B companies (peak value of about 400,000 RON in 2009), followed closely by the smallest companies (peak value of about 350,000 in 2011), while the lowest labour productivity is recorded by the companies with the highest number of employees (peak value of about 150,000 in 2011). The average number of employees remained relatively constant throughout the period at all company classes in the sector.

Despite business volume and profitability fluctuations, the sector shows a high *financial autonomy* throughout the period, generally lying between 40-60%. An immediate conclusion to be drawn based on these values is that the profits recorded were mostly reinvested, a decision that could lead to the growth of the young sector. Similarly, the solvability lies between 1,8–5% throughout the period and at all company classes, with assuring values even in the years most strongly affected by the financial crisis. Best values are reached by the smallest companies included in the sample (class A), while the lowest solvability is recorded by the least flexible class F companies (under 2% until 2012).

**Table 1. Pollution control – production component**

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 11.66 | 33.29 | 20.49 | 28.63 | 11.34 | 14.38 | 18.27 |
| Net profit margin | 8.78 | 30.48 | 18.45 | 24.41 | 2.36 | 12.16 | 15.46 |
| Pre-tax ROE | 82.21 | 75.11 | 52.07 | 118.8 | 41.67 | 12.90 | 15.02 |
| Net ROE | 80.67 | 66.56 | 45.14 | 108.8 | 31.35 | 7.35 | 11.49 |
| Financial autonomy | 25.01 | 66.17 | 54.01 | 47.65 | 45.46 | 50.73 | 56.31 |
| Solvability | 33.16 | 7.11 | 5.84 | 4.62 | 3.91 | 4.73 | 5.46 |
| Labour productivity | 133 | 199 | 332 | 161 | 272 | 354 | 248 |
| Turnover | 281 | 641 | 3,409 | 837 | 1,398 | 1,624 | 1,550 |
| Pre-tax profit | 26 | 173 | 232 | 195 | 96 | 530 | 260 |
| Number of employees | 2 | 2 | 3 | 3 | 3 | 3 | 4 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 23.60 | 18.37 | 15.41 | 16.04 | 10.16 | 13.24 | 15.46 |
| Net profit margin | 19.57 | 15.33 | 12.91 | 13.37 | 8.11 | 10.96 | 12.62 |
| Pre-tax ROE | 67.22 | 58.16 | 50.25 | 34.59 | 16.73 | 25.93 | 30.83 |
| Net ROE | 55.40 | 48.26 | 41.87 | 28.64 | 12.21 | 21.50 | 25.20 |
| Financial autonomy | 48.46 | 47.18 | 49.17 | 47.58 | 41.64 | 50.44 | 60.72 |
| Solvability | 2.10 | 2.37 | 2.50 | 2.40 | 2.01 | 3.03 | 4.47 |
| Labour productivity | 158 | 255 | 374 | 401 | 332 | 366 | 340 |
| Turnover | 2,598 | 3,671 | 5,129 | 6,173 | 5,655 | 5,847 | 5,341 |
| Pre-tax profit | 554 | 1,008 | 868 | 773 | 539 | 1,026 | 1,301 |
| Number of employees | 19 | 17 | 19 | 17 | 19 | 18 | 18 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 19.29 | 18.34 | 16.02 | 7.72 | -23.58 | -38.76 | -25.79 |
| Net profit margin | 16.22 | 15.27 | 13.33 | 6.50 | -24.42 | -39.37 | -26.99 |
| Pre-tax ROE | 49.94 | 57.10 | 36.08 | 13.59 | -27.06 | -49.91 | 6.67 |
| Net ROE | 41.98 | 47.65 | 30.02 | 11.39 | -28.79 | -51.56 | 891.2 |
| Financial autonomy | 72.49 | 45.63 | 58.09 | 63.24 | 60.34 | 42.74 | 34.67 |
| Solvability | 3.65 | 1.84 | 2.41 | 2.74 | 2.54 | 1.88 | 2.14 |
| Labour productivity | 142 | 154 | 196 | 181 | 117 | 105 | 115 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Turnover | 19,167 | 19,764 | 25,051 | 23,075 | 14,955 | 14,372 | 12,847 |
| Pre-tax profit | 2,914 | 3,303 | 4,547 | 2,183 | -3,228 | -2,045 | -1,587 |
| Number of employees | 146 | 155 | 148 | 146 | 142 | 140 | 138 |
| **SIZE CLASS F: 100-500 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 4.23 | 5.45 | 1.88 | 0.61 | 0.80 | 1.34 | 2.62 |
| Net profit margin | 3.58 | 4.67 | 1.66 | 0.47 | 0.47 | 0.65 | 0.00 |
| Pre-tax ROE | 15.04 | 18.89 | 7.66 | 1.42 | 2.84 | 6.02 | 5.95 |
| Net ROE | 12.74 | 16.17 | 6.76 | 1.09 | 1.69 | 2.91 | 0.00 |
| Financial autonomy | 40.50 | 45.03 | 44.47 | 44.06 | 36.93 | 38.68 | 55.22 |
| Solvability | 1.69 | 1.84 | 1.83 | 1.82 | 1.61 | 1.66 | 2.23 |
| Labour productivity | 97 | 107 | 119 | 86 | 127 | 147 | 150 |
| Turnover | 100,421 | 108,922 | 125,959 | 71,057 | 109,792 | 142,154 | 169,588 |
| Pre-tax profit | 4,246 | 5,938 | 2,366 | 433 | 873 | 1,907 | 4,449 |
| Number of employees | 1102 | 1113 | 1096 | 902 | 932 | 1020 | 1064 |

## The import and distribution component

The import and distribution component of the pollution control sector is operated mainly by small and middle-sized companies, to the highest degree with less than 10 employees (class A – 65%), followed by businesses with 10-50 employees (class B – 23%). The remaining companies in the sector employ between 100-500 people (class D – 12%).

The *turnover* of the small and middle-sized companies keeps a linear trend throughout the period. There is one fact worth to be noted here, namely that the level of the sales was not affected by the global financial crisis, at least at the A and B company size classes. The business volume of the D class companies fluctuated between 30 million and 50 million RON, with the peak value recorded in 2008.
As for the *profitability* of the sector, the weakest performance is generally recorded in the middle years, as well as at the end of the analysis period, when the indicators show for the best a modest profit, at all sized determined company classes.

The business *efficiency*, as described by the pre-tax ROE, shows a generally decreasing trend throughout the period, except for the class A companies, who reach a peak value in 2011. For the remaining two company classes, the return on equity ratios at the end of the period are significantly lower than the ratios recorded

in the first year of analysis. Nevertheless, the productivity ratios show a relatively high efficiency of the labour employed by the B and D class companies in the period 2008-2009, as well as in 2011.

The weakest *financial autonomy* is recorded by the biggest companies included in the analysis, i.e. companies with 100-500 employees. The peak value of the indicator, close to 40%, is observed in 2009, however in the second half of the period the trend of the financial autonomy is continuously descending.

The best *solvability* is once again recorded by the smallest enterprises included in the research, lying between 3 and 5 all over the period, with a peak value of 5.88 in 2008. For the B class companies, the indicator follows a linear trend in the first half of the period and increases constantly in the next years. The biggest companies included in the research show a weak capacity to cover their debt out of the total assets, as the solvability ratio shows unsatisfactory values, completed with a descending trend in the last years.

**Table 2. Pollution control – import and distribution component**

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 17.51 | 14.58 | 10.25 | -20.68 | -7.22 | -4.96 | -16.13 |
| Net profit margin | 14.43 | 11.89 | 8.30 | -23.27 | -9.59 | -6.61 | -17.28 |
| Pre-tax ROE | 84.12 | 73.45 | 45.05 | 22.00 | 1.38 | 152.84 | 7.17 |
| Net ROE | 69.59 | 61.52 | 34.76 | 13.33 | 19.81 | 117.65 | -1.15 |
| Financial autonomy | 38.26 | 37.66 | 42.51 | 40.55 | 44.27 | 43.78 | 43.20 |
| Solvability | 3.31 | 3.36 | 5.88 | 5.31 | 4.12 | 3.41 | 3.02 |
| Labour productivity | 313 | 338 | 351 | 340 | 390 | 341 | 357 |
| Turnover | 1,134 | 2,075 | 1,862 | 1,637 | 1,975 | 1,963 | 1,699 |
| Pre-tax profit | 155 | 163 | 87 | 120 | 164 | 134 | 70 |
| Number of employees | 4 | 5 | 6 | 5 | 5 | 6 | 7 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 18.77 | 16.60 | 10.94 | 9.62 | 10.52 | 9.79 | 7.18 |
| Net profit margin | 15.79 | 13.96 | 9.13 | 7.86 | 8.57 | 8.05 | 5.37 |
| Pre-tax ROE | 55.75 | 41.52 | 31.76 | 27.07 | 24.64 | 22.86 | 16.57 |
| Net ROE | 46.90 | 35.01 | 26.44 | 21.95 | 19.73 | 18.91 | 12.51 |
| Financial autonomy | 44.10 | 41.27 | 43.39 | 44.99 | 47.82 | 45.35 | 46.99 |
| Solvability | 1.99 | 2.17 | 2.11 | 2.05 | 2.37 | 2.76 | 3.64 |
| Labour productivity | 150 | 183 | 176 | 181 | 196 | 247 | 244 |
| Turnover | 2,507 | 3,729 | 4,958 | 6,186 | 5,375 | 5,571 | 5,670 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Pre-tax profit | 492 | 787 | 652 | 567 | 488 | 756 | 1,048 |
| Number of employees | 16 | 18 | 22 | 22 | 22 | 18 | 19 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 7.55 | 5.93 | 4.37 | 5.36 | 4.04 | 3.49 | -10.44 |
| Net profit margin | 6.85 | 4.89 | 3.61 | 4.38 | 3.24 | 2.73 | -11.06 |
| Pre-tax ROE | 27.18 | 16.06 | 12.74 | 10.81 | 7.65 | 7.19 | 91.64 |
| Net ROE | 24.06 | 13.27 | 10.60 | 8.86 | 6.15 | 5.41 | 90.64 |
| Financial autonomy | 31.30 | 33.49 | 36.07 | 39.80 | 37.05 | 31.29 | 18.75 |
| Solvability | 1.49 | 1.53 | 1.59 | 1.69 | 1.42 | 1.48 | 1.34 |
| Labour productivity | 345 | 353 | 464 | 463 | 365 | 463 | 393 |
| Turnover | 32,922 | 36,175 | 51,753 | 48,984 | 36,624 | 46,144 | 39,659 |
| Pre-tax profit | 2,124 | 1,591 | 2,085 | 2,172 | 1,496 | 1,563 | -2,120 |
| Number of employees | 106 | 114 | 125 | 116 | 126 | 119 | 123 |

In a selected data summary, the main coordinates of the sector are the following:

**Table 3. Pollution control – 2006-2012 selected data summary**

| Measure | Mean | Median | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| **PRODUCTION COMPONENT** | | | | | | |
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 19.72 | 18.27 | 11.34 | 33.29 | 0.74 | -0.84 |
| Financial autonomy | 49.34 | 50.73 | 25.01 | 66.17 | -1.06 | 2.41 |
| Solvability | 9.26 | 5.46 | 3.91 | 33.16 | 2.59 | 6.79 |
| Turnover | 1,391.4 | 1,397.7 | 280.67 | 3,409 | 1.37 | 2.55 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 16.04 | 15.46 | 10.16 | 23.60 | 0.69 | 1.44 |
| Financial autonomy | 49.31 | 48.46 | 41.64 | 60.72 | 1.25 | 3.31 |
| Solvability | 2.70 | 2.40 | 2.01 | 4.47 | 1.91 | 3.86 |
| Turnover | 4,916.34 | 5,341.35 | 2,598.08 | 6,173.50 | -1.18 | 0.29 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | -3.82 | 7.72 | -38.76 | 19.29 | -0.44 | -2.15 |
| Financial autonomy | 53.89 | 58.09 | 34.67 | 72.49 | -0.14 | -1.08 |
| Solvability | 2.46 | 2.41 | 1.84 | 3.65 | 1.23 | 1.76 |

| Measure | Mean | Median | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| Turnover | 18,461.8 | 19,167 | 12,847.2 | 25,051.4 | 0.23 | -1.50 |
| **SIZE CLASS F: > 1000 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 2.42 | 1.88 | 0.61 | 5.45 | 0.86 | -0.53 |
| Financial autonomy | 43.56 | 44.06 | 36.93 | 55.22 | 1.25 | 2.17 |
| Solvability | 1.81 | 1.82 | 1.61 | 2.23 | 1.59 | 3.13 |
| Turnover | 118,270 | 109,792 | 71,056 | 169,587 | 0.27 | 0.42 |
| **IMPORT AND DISTRIBUTION COMPONENT** | | | | | | |
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | -0.95 | -4.96 | -20.68 | 17.51 | 0.00 | -1.92 |
| Financial autonomy | 41.46 | 42.51 | 37.66 | 44.27 | -0.58 | -1.60 |
| Solvability | 4.06 | 3.41 | 3.02 | 5.88 | 0.99 | -0.74 |
| Turnover | 1,763 | 1,862 | 1,133 | 2,074 | -1.48 | 2.37 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 11.92 | 10.52 | 7.18 | 18.77 | 0.95 | -0.37 |
| Financial autonomy | 44.84 | 44.99 | 41.27 | 47.82 | -0.28 | -0.12 |
| Solvability | 2.44 | 2.17 | 1.99 | 3.64 | 1.77 | 2.96 |
| Turnover | 4,856 | 5,375 | 2,507 | 6,185 | -1.19 | 0.63 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 2.90 | 4.37 | -10.44 | 7.55 | -2.36 | 5.94 |
| Financial autonomy | 32.53 | 33.49 | 18.75 | 39.80 | -1.54 | 3.08 |
| Solvability | 1.51 | 1.49 | 1.34 | 1.69 | 0.29 | 0.22 |
| Turnover | 41,751 | 39,658 | 32,922 | 51,752 | 0.29 | -1.78 |

### 4.2. Waste management

#### The production component

The production component of the waste management sector is operated mainly by companies with 10-50 employees (class B - 66%), followed by classes D and F, each with 17%.

The *business volume* of the sector is quite heterogeneous. The largest companies in the sector record a fluctuating turnover throughout the period, with highest sales in 2007 and lowest sales in 2011. However, the last year of the period shows a revival

of the business volume, indicated by a 23% increase of the turnover. Starting with 2009, the smallest entities in the analysis show a descending trend of the sales, while the class D companies disclose relatively constant sales until 2011, followed by growth in the last two years of the analysis.

Regarding the *profitability*, the sector seems to be dominated by the larger companies. In this context, class B companies record losses for the entire second half of the analysis period, while the performance of the class D and F companies describes an ascending trend, starting with 2009.

The business *efficiency*, as described by the return on equity, follows the trend of the profitability, with a good performance of the larger companies and a poor one at companies with less than 10 employees. Surprisingly though, the best labour productivity of the sector belongs to class B entities, while class D companies show a weak performance in this direction. However, the average number of employees follows the profitability trend, i.e. it increases in the second half of the period at the two larger company classes, and it decreases at class B entities.

Despite the poor financial performance, class B companies manage to keep a quite constant *financial autonomy*, with an average of 35.40%, higher than the autonomy of the largest companies, though way under the level of the class D entities (average of 60%). Accordingly, the only company where the value of the total assets is at least twice as large as the one of the total debt is the D class.

**Table 4. Waste management – production component**

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS B: 10 - 50 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 5.60 | 6.04 | -6.85 | -2.92 | -27.74 | -12.39 | 2.10 |
| Net profit margin | 4.64 | 5.07 | -7.38 | -3.59 | -28.26 | -12.46 | 0.93 |
| Pre-tax ROE | 20.50 | 36.22 | 23.78 | 11.37 | -5.64 | -5.93 | -3.40 |
| Net ROE | 16.95 | 29.87 | 18.97 | 8.95 | -6.35 | -6.32 | -3.94 |
| Financial autonomy | 32.24 | 37.15 | 37.37 | 34.30 | 31.23 | 30.64 | 44.84 |
| Solvability | 1.68 | 1.86 | 1.82 | 1.65 | 1.56 | 1.52 | 1.95 |
| Labour productivity | 429 | 446 | 615 | 661 | 605 | 529 | 619 |
| Turnover | 14,228 | 11,203 | 9,885 | 9,965 | 7,635 | 6,991 | 5,390 |
| Pre-tax profit | 1,200 | 595 | -380 | -22 | -731 | -671 | -227 |
| Number of employees | 41 | 35 | 36 | 21 | 20 | 21 | 16 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 37.03 | 27.60 | 10.32 | 2.56 | 8.49 | 8.66 | 12.47 |
| Net profit margin | 31.10 | 23.21 | 8.44 | 2.03 | 6.92 | 7.43 | 10.62 |
| Pre-tax ROE | 94.85 | 90.80 | 23.22 | 5.87 | 17.88 | 23.22 | 13.34 |
| Net ROE | 79.65 | 76.35 | 18.98 | 4.64 | 14.57 | 19.92 | 11.36 |
| Financial autonomy | 71.47 | 42.95 | 59.77 | 62.90 | 58.36 | 54.16 | 70.44 |
| Solvability | 3.54 | 1.75 | 2.53 | 2.73 | 2.41 | 2.18 | 3.29 |
| Labour productivity | 89 | 91 | 91 | 89 | 89 | 105 | 82 |
| Turnover | 14,751 | 16,298 | 15,687 | 15,263 | 15,887 | 21,807 | 17,358 |
| Pre-tax profit | 5,462 | 4,498 | 1,619 | 391 | 1,348 | 1,889 | 2,165 |
| Number of employees | 167 | 181 | 178 | 177 | 182 | 210 | 217 |
| **SIZE CLASS F: > 1000 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | -4.83 | 3.51 | 1.91 | 0.46 | 0.90 | 2.47 | 1.91 |
| Net profit margin | -4.83 | 3.23 | 1.35 | 0.11 | 0.16 | 1.36 | 0.41 |
| Pre-tax ROE | -79.17 | 53.28 | 20.40 | 3.69 | 4.10 | 6.85 | 4.15 |
| Net ROE | -79.17 | 48.99 | 14.36 | 0.92 | 0.73 | 3.77 | 0.90 |
| Financial autonomy | 12.73 | 16.47 | 31.40 | 21.37 | 22.68 | 22.11 | 26.54 |
| Solvability | 1.12 | 1.20 | 1.22 | 1.22 | 1.25 | 1.24 | 1.36 |
| Labour productivity | 196 | 367 | 302 | 242 | 123 | 91 | 104 |
| Turnover | 202,675 | 371,356 | 305,307 | 216,700 | 127,012 | 80,358 | 99,264 |
| Pre-tax profit | -9,797 | 13,026 | 5,836 | 990 | 1,147 | 1,987 | 1,900 |
| Number of employees | 1,047 | 1,042 | 1,087 | 1,044 | 1,051 | 1,021 | 1,042 |

## The import and distribution component

Compared to the initial analysis, the structure of the sector has remained unchanged: class A (less than 10 employees) and class C (50-100 employees) dominate the import and distribution of waste management technology, each of them with 36% of the total number of entities. The picture is completed by class B companies (10-50 employees) with 18%, followed by class D (100-500 employees) with 9%.

A highly interesting observation regarding the import and distribution component of the waste management is that neither one of the size determined company classes seems to have been affected by the global financial crisis, as the *turnover* is in all cases significantly higher starting with 2008 than in the first years of the period. It's an evolution which might be connected to the EU adhesion in 2007, respectively with the new regulations in the field of waste management.

However, based on the evolution of the *pre-tax profit* and the *pre-tax profit margin*, the profitability of the sector declines in the last years of analysis, except for the C class companies, whose trend is rather linear all over the period.

The same trend is followed by the investment *efficiency*, as described by the return on equity. After reaching peak levels in 2008, ROE is constantly declining at all company classes. However, the decrease of the indicator is justified by the relatively constant increase of the average shareholders' equity, most probably following the reinvestment of the profit earned in the middle years of the period. The best labour productivity is recorded by companies with up to 50 employees (classes A and B).

The *financial autonomy* of the companies in the sector fluctuates throughout the period between 20% and 60%, while the solvability shows a relatively constant level of 2.

**Table 5. Waste management – import and distribution component**

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 11.68 | 7.21 | 12.93 | -1.14 | 9.78 | 10.73 | 6.16 |
| Net profit margin | 7.44 | 5.04 | 11.12 | -3.32 | 6.82 | 9.08 | 4.86 |
| Pre-tax ROE | 96.12 | 88.42 | 180.46 | 175.15 | 104.95 | 38.39 | 34.57 |
| Net ROE | 104.19 | 82.56 | 163.77 | 158.07 | 91.11 | 31.03 | 25.70 |
| Financial autonomy | 32.11 | 41.15 | 37.98 | 19.14 | 34.28 | -70.73 | -39.36 |
| Solvability | 1.87 | 15.83 | 2.35 | 1.66 | 1.63 | 2.43 | 2.08 |
| Labour productivity | 293 | 442 | 318 | 475 | 948 | 984 | 754 |
| Turnover | 337 | 596 | 379 | 745 | 1,971 | 1,866 | 1,491 |
| Pre-tax profit | 62 | 64 | 50 | 81 | 273 | 220 | 165 |
| Number of employees | 2 | 2 | 2 | 2 | 2 | 2 | 2 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 2.24 | 3.74 | 33.66 | 12.52 | 27.59 | 1.90 | 0.97 |
| Net profit margin | 1.81 | 3.10 | 28.25 | 10.39 | 22.92 | 1.22 | 0.51 |
| Pre-tax ROE | 18.34 | 77.51 | 106.10 | 51.70 | 35.46 | 4.00 | 0.81 |
| Net ROE | 14.78 | 64.20 | 88.46 | 43.00 | 29.15 | 2.82 | 0.44 |
| Financial autonomy | 20.74 | 9.75 | 35.13 | 31.37 | 39.09 | 39.55 | 61.87 |
| Solvability | 1.26 | 1.11 | 1.92 | 1.61 | 2.00 | 1.97 | 2.64 |
| Labour productivity | 228 | 423 | 920 | 1,107 | 757 | 499 | 515 |
| Turnover | 1,109 | 2,066 | 5,783 | 12,861 | 9,610 | 6,399 | 6,111 |
| Pre-tax profit | 25 | 72 | 1,259 | 1,317 | 2,149 | 106 | 47 |
| Number of employees | 5 | 6 | 7 | 13 | 17 | 19 | 16 |
| **SIZE CLASS C: 50-100 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 11.10 | 5.35 | 8.30 | 4.56 | 4.93 | 6.10 | 5.09 |
| Net profit margin | 9.32 | 4.45 | 6.95 | 2.34 | 4.01 | 4.80 | 4.12 |
| Pre-tax ROE | 84.24 | 63.06 | 65.07 | 39.57 | 16.40 | 22.24 | 17.24 |
| Net ROE | 70.71 | 51.44 | 54.62 | 30.10 | 13.08 | 15.25 | 13.09 |
| Financial autonomy | 39.67 | 28.09 | 31.07 | 40.62 | 38.90 | 42.99 | 39.16 |
| Solvability | 1.74 | 1.48 | 1.56 | 1.76 | 1.75 | 2.04 | 1.81 |
| Labour productivity | 392 | 345 | 343 | 263 | 240 | 241 | 261 |
| Turnover | 21,921 | 23,739 | 31,482 | 25,685 | 26,436 | 29,238 | 39,580 |
| Pre-tax profit | 1,989 | 1,076 | 1,725 | 2,039 | 1,232 | 1,524 | 1,706 |
| Number of employees | 51 | 58 | 65 | 66 | 75 | 77 | 80 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 28.36 | 8.55 | 11.45 | 11.73 | 7.22 | 3.46 | 4.95 |
| Net profit margin | 23.76 | 7.16 | 9.74 | 9.87 | 6.09 | 2.96 | 4.14 |
| Pre-tax ROE | 74.43 | 28.36 | 36.07 | 42.63 | 19.50 | 10.27 | 10.36 |
| Net ROE | 62.37 | 23.74 | 30.69 | 35.86 | 16.45 | 8.81 | 8.66 |
| Financial autonomy | 67.12 | 51.05 | 51.80 | 48.27 | 42.37 | 30.87 | 39.84 |
| Solvability | 3.04 | 2.04 | 2.09 | 1.93 | 1.74 | 1.45 | 1.63 |
| Labour | 168 | 131 | 187 | 264 | 308 | 449 | 364 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| productivity | | | | | | | |
| Turnover | 45,625 | 47,313 | 64,814 | 98,703 | 63,598 | 70,143 | 52,992 |
| Pre-tax profit | 12,938 | 4,046 | 7,423 | 11,580 | 4,589 | 2,425 | 2,622 |
| Number of employees | 275 | 363 | 357 | 381 | 210 | 158 | 151 |

In a selected data summary, the main coordinates of the sector are the following:

**Table 6. Waste management – 2006-2012 selected data summary**

| Indicator | Mean | Median | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| **PRODUCTION COMPONENT** | | | | | | |
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | -5.17 | -2.92 | -27.74 | 6.04 | -1.19 | 1.23 |
| Financial autonomy | 35.40 | 34.30 | 30.64 | 44.84 | 1.23 | 1.49 |
| Solvability | 1.72 | 1.68 | 1.52 | 1.95 | 0.18 | -1.53 |
| Turnover | 9,327.94 | 9,884.53 | 5,389.50 | 14,227 | 0.42 | -0.03 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 15.31 | 10.32 | 2.56 | 37.03 | 1.16 | 0.23 |
| Financial autonomy | 60.01 | 59.77 | 42.95 | 71.47 | -0.62 | 0.41 |
| Solvability | 2.63 | 2.53 | 1.75 | 3.54 | 0.23 | -0.64 |
| Turnover | 16,721 | 15,886 | 14,750 | 21,806 | 2.04 | 4.50 |
| **SIZE CLASS F: > 1000 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 0.90 | 1.91 | -4.83 | 3.51 | -1.92 | 4.30 |
| Financial autonomy | 21.90 | 22.11 | 12.73 | 31.40 | 0.03 | 0.03 |
| Solvability | 1.23 | 1.22 | 1.12 | 1.36 | 0.63 | 2.26 |
| Turnover | 200,381 | 202,675 | 80,357 | 371,356 | 0.55 | -0.95 |
| **IMPORT AND DISTRIBUTION COMPONENT** | | | | | | |
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 8.19 | 9.78 | -1.14 | 12.93 | -1.42 | 2.17 |
| Financial autonomy | 7.80 | 32.11 | -70.73 | 41.15 | -1.31 | 0.10 |
| Solvability | 3.98 | 2.08 | 1.63 | 15.83 | 2.63 | 6.92 |
| Turnover | 1,054.97 | 745.35 | 337.11 | 1,971.21 | 0.39 | -2.15 |

| Indicator | Mean | Median | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 11.80 | 3.74 | 0.97 | 33.66 | 1.01 | -0.86 |
| Financial autonomy | 33.93 | 35.13 | 9.75 | 61.87 | 0.30 | 1.01 |
| Solvability | 1.79 | 1.92 | 1.11 | 2.64 | 0.30 | 0.04 |
| Turnover | 6,276.94 | 6,110.89 | 1,108.88 | 12,861 | 0.38 | -0.22 |
| **SIZE CLASS C: 50-100 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 6.49 | 5.35 | 4.56 | 11.10 | 1.52 | 1.64 |
| Financial autonomy | 37.21 | 39.16 | 28.09 | 42.99 | -1.05 | -0.31 |
| Solvability | 1.73 | 1.75 | 1.48 | 2.04 | 0.30 | 0.74 |
| Turnover | 28,297 | 26,435 | 21,920 | 39,580 | 1.23 | 1.63 |
| **SIZE CLASS D: 100-500 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 10.82 | 8.55 | 3.46 | 28.36 | 1.92 | 4.23 |
| Financial autonomy | 47.33 | 48.27 | 30.87 | 67.12 | 0.46 | 1.01 |
| Solvability | 1.99 | 1.93 | 1.45 | 3.04 | 1.58 | 3.24 |
| Turnover | 63,312 | 63,598 | 45,625 | 98,703 | 1.32 | 2.10 |

### 4.3 Green energy

**The production component**

The sector is operated by companies with up to 50 employees, i.e. classes A (with 55%) and B (with 45%).

For the smallest entities in the sample, the business volume starts at 363 thou. RON in 2006 and increases constantly to 1.7 million RON in 2011, with a strong decline in the last year of the period. The class B companies keep a relatively constant *turnover*, however 2012 is a similarly weak year, with a turnover decrease of over 36%.

Nevertheless, the *profitability* of the sector does not follow the turnover trend. Hence, despite the increasing business volume, companies with less than 10 employees earn a quite fluctuating pre-tax profit, while the profit of the class B entities starts declining in 2008, although the level of the sales is constant. The antagonistic evolution of the earnings could be explained only based on a cost analysis in the same period.

The *return on equity* remains quite constant for both company classes, while the last year of the period shows a slightly increased business efficiency of the companies with less than 10 employees. In the same time, although the average number of employees is stable throughout the period for both classes, the smallest entities enjoy an increasing labour productivity.

The best *financial autonomy* is reached by both company classes in 2008, whereas the indicator is maintained within satisfactory limits over the entire time span. The *solvability* indicator lies between the levels 2 and 4 for entities with 10-50 employees (except for a peak value in 2008), respectively between 1.3 and 2.5 for entities with less than 10 employees.

**Table 7. Green energy – production component**

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | -15.35 | 0.00 | 10.63 | 11.91 | 5.37 | 8.09 | 15.38 |
| Net profit margin | -17.76 | 0.00 | 8.96 | 9.51 | 2.83 | 6.59 | 13.00 |
| Pre-tax ROE | 233.76 | 18.28 | 46.36 | 37.31 | 12.24 | 25.49 | 95.51 |
| Net ROE | 181.61 | 9.76 | 38.98 | 29.39 | 5.79 | 20.94 | 83.54 |
| Financial autonomy | 50.92 | 38.62 | 41.56 | 29.64 | 26.12 | 35.22 | 31.17 |
| Solvability | 2.49 | 1.71 | 1.70 | 1.35 | 1.32 | 1.60 | 1.59 |
| Labour productivity | 101 | 138 | 228 | 314 | 243 | 344 | 317 |
| Turnover | 363 | 452 | 801 | 580 | 1,092 | 1,697 | 908 |
| Pre-tax profit | 2 | 37 | 154 | 69 | 27 | 213 | 206 |
| Number of employees | 4 | 4 | 4 | 3 | 5 | 7 | 6 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 33.79 | 18.95 | 23.22 | 13.39 | 10.90 | 10.51 | -91.92 |
| Net profit margin | 28.15 | 15.79 | 19.51 | 11.14 | 8.13 | 7.31 | -95.46 |
| Pre-tax ROE | 72.93 | 39.55 | 50.18 | 25.29 | 15.10 | 18.88 | 26.75 |
| Net ROE | 60.52 | 32.70 | 41.97 | 20.95 | 10.68 | 14.64 | 20.76 |
| Financial autonomy | 47.57 | 61.96 | 69.06 | 57.20 | 41.36 | 36.42 | 43.65 |
| Solvability | 4.22 | 2.92 | 10.31 | 2.75 | 1.90 | 1.92 | 2.18 |
| Labour productivity | 153 | 173 | 159 | 242 | 260 | 190 | 182 |
| Turnover | 4,573 | 4,877 | 4,434 | 4,948 | 4,378 | 4,463 | 2,863 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Pre-tax profit | 1,113 | 734 | 956 | 446 | 283 | 113 | 16 |
| Number of employees | 24 | 24 | 26 | 22 | 25 | 29 | 24 |

**The import and distribution component**

Similar to the production component, the sector is operated by small companies, with less than 50 employees, out of which 70% belong to class A and 30% to class B. The *total sales* of the sector fluctuate for both company size classes.

The best *profitability* of the sector was experienced by both company types in the first half of the period, however starting with 2009 the performance of the sector has been declining. The same trend is followed by the business efficiency, as described by the return on equity.

However, following a slight decrease of the average number of employees, decided by both types of companies starting with 2009, the *labour productivity* remains relatively constant at the class B entities, while it describes an increasing trend at the class A entities.

The best *financial autonomy* is reached in the middle years of the period, though 2011 comes with a decrease of the ratio. The decreasing evolution of the companies' own financing sources is the result of the poor performance recorded in the sector, starting with 2009.

The *solvability* is poor, i.e. under 2 for the entire period of the analysis, except for 2006.

**Table 8. Green energy – import and distribution component**

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | -12.11 | 25.92 | 3.04 | -2.49 | -5.04 | -18.45 | -13.40 |
| Net profit margin | -15.07 | 23.53 | 1.26 | -5.54 | -7.82 | -19.49 | -14.00 |
| Pre-tax ROE | -41.15 | -200.88 | -268.41 | -534.51 | -815.03 | 239.76 | 12.79 |
| Net ROE | -86.44 | -225.58 | -281.66 | -676.25 | -838.91 | 242.40 | 10.03 |
| Financial autonomy | -24.21 | 29.04 | 23.82 | 24.75 | 24.41 | 11.64 | 4.76 |
| Solvability | 2.88 | 1.63 | 1.39 | 1.66 | 1.56 | 1.87 | 1.63 |

| Measure (average/ class) | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Labour productivity | 122 | 173 | 210 | 161 | 182 | 253 | 276 |
| Turnover | 345 | 614 | 741 | 612 | 596 | 716 | 601 |
| Pre-tax profit | 56 | 108 | 59 | 70 | -7 | 21 | 0 |
| Number of employees | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | | |
| Pre-tax profit margin | 4.71 | 4.63 | 4.69 | 0.79 | -1.88 | -3.27 | -20.56 |
| Net profit margin | 3.94 | 3.90 | 3.94 | 0.02 | -2.59 | -3.49 | -21.05 |
| Pre-tax ROE | 56.27 | 86.61 | 68.35 | -194.99 | -176.05 | 23.66 | 28.01 |
| Net ROE | 46.70 | 72.54 | 54.34 | -208.43 | -187.77 | 21.72 | 24.54 |
| Financial autonomy | 21.78 | 27.31 | 29.45 | 35.43 | 34.04 | 17.48 | -12.95 |
| Solvability | 1.35 | 1.51 | 1.63 | 1.67 | 1.59 | 1.54 | 1.67 |
| Labour productivity | 173 | 181 | 214 | 168 | 159 | 181 | 166 |
| Turnover | 2,676 | 3,196 | 3,653 | 2,403 | 2,284 | 2,661 | 2,084 |
| Pre-tax profit | 127 | 147 | 194 | 26 | 1 | 13 | 21 |
| Number of employees | 16 | 18 | 18 | 15 | 14 | 14 | 13 |

In a selected data summary, the main coordinates of the sector are the following:

**Table 9. Green energy – 2006-2012 selected data summary**

| Measure | Mean | Median | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| **PRODUCTION COMPONENT** | | | | | | |
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | 5.15 | 8.09 | -15.35 | 15.38 | -1.53 | 2.55 |
| Financial autonomy | 36.18 | 35.22 | 26.12 | 50.92 | 0.77 | 0.33 |
| Solvability | 1.68 | 1.60 | 1.32 | 2.49 | 1.76 | 3.88 |
| Turnover | 841.79 | 800.77 | 362.69 | 1,696.69 | 1.11 | 1.26 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | -1.56 | 13.39 | -91.92 | 33.79 | -2.43 | 6.21 |
| Financial autonomy | 21.79 | 47.57 | 36.42 | 69.06 | 0.40 | -1.30 |
| Solvability | 1.57 | 2.75 | 1.90 | 10.31 | 2.28 | 5.41 |
| Turnover | 2,708.05 | 4,462.72 | 2,863.09 | 4,947.98 | -2.08 | 4.96 |

| Measure | Mean | Median | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| **IMPORT AND DISTRIBUTION COMPONENT** | | | | | | |
| **SIZE CLASS A: < 10 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | -3.22 | -5.04 | -18.45 | 25.92 | 1.43 | 2.40 |
| Financial autonomy | 13.46 | 23.82 | -24.21 | 29.04 | -1.66 | 2.71 |
| Solvability | 1.80 | 1.63 | 1.39 | 2.88 | 2.21 | 5.29 |
| Turnover | 603.58 | 612.35 | 345.13 | 741.03 | -1.47 | 3.22 |
| **SIZE CLASS B: 10-50 EMPLOYEES** | | | | | | |
| Pre-tax profit margin | -1.56 | 0.79 | -20.56 | 4.71 | -1.96 | 4.19 |
| Financial autonomy | 21.79 | 27.31 | -12.95 | 35.43 | -1.89 | 3.96 |
| Solvability | 1.57 | 1.59 | 1.35 | 1.67 | -1.22 | 1.45 |
| Turnover | 2,708.05 | 2,660.59 | 2,083.66 | 3,652.71 | 0.87 | 0.04 |

### 4.4. Global picture

Summarizing the research results, the ratio analysis we performed delivered following coordinates of the main Romanian eco-industrial sectors:

The *pollution control* sector is operated mostly by small companies, with less than 50 employees, both on the production and on the import and distribution component. However, the small companies are the most significant size class of the sector not only with regard to the number of active entities, but also in terms of the financial performance reached: within the production component, the best profit margins, as well as the highest return on equity and the best labour productivity are recorded by companies with up to 50 employees. The best period for the production of pollution control technology proved to be 2008-2009. Starting with 2010, the financial crisis has lead both to the contraction of the business volume, and to the decrease of the profitability and return on equity. However, the financial autonomy and solvability ratios have shown assuring levels up to the end of the period, indicating that the profits earned in the peak years were most probably reinvested in the business. Going to the import and distribution component of the sector, we notice a striking linear trend of the sales throughout the period, at class A and B companies, indicating the fact that their business volume was not strongly affected by the crisis. Though the profitability is generally lower here than in the production component, the financial autonomy and solvability ratios remain at assuring levels.

In the production component of the waste management sector, business is run more efficiently by larger companies, with 100-500 employees. However, companies with up to 50 employees manage to keep their financial autonomy and solvability ratios at reasonable levels and present astonishingly high values of the labour

productivity. Similar to the pollution control technology, business in the import and distribution component doesn't seem to have been affected by the crisis, on the contrary, the average turnover of all company classes has increased since 2008. Our assumption is that this evolution relies on the 2007 adhesion to the EU, which introduced new regulations and obligations in the field of waste management.

The *green energy* sector is entirely operated by SMEs with less than 50 employees. Though the business volume, as indicated by the average turnover, generally follows an ascending trend at the class A companies, respectively a linear trend at the class B companies, both size classes show a declining profitability, on both components of the sector. An immediate conclusion is that the falling performance is linked to an adverse evolution of the costs, which should be investigated more deeply.

Within a comparative analysis of the main ratios computed and summarized based on descriptive statistics indicators, we observe that the best *profitability*, expressed both in terms of profit margin and of ROE, was recorded by A and B class entities (less than 50 employees), active in the production component of the pollution control sector (mean profit margin over the period between 16% and 19%, minimum profit margin 10%, maximum profit margin 33%). Within the import and distribution component, profitability remains high at the B class entities (mean profit margin of 12%, with a minimum of 7% and a maximum of over 18%). Entities belonging to the other size classes of the sector reach rather poor profit margins. However, ROE remains satisfactory within the pollution control sector, probably relying on the low value of the necessary assets. Within the waste management sector, the best profitability ratios are found at a larger size class, the D class (100-500 employees); whereas the results remain consistent for both components of the sector. As for the green energy sector, the profitability indicators show overall poor levels, unlike the Bilsen report data, which had recorded the best profitability within the renewable energy sector, between 2004 and 2006.

The *solvability* ratios generally reach satisfactory levels (mean>2) within the pollution control sector, except for the largest entities acting in the two sectors (with over 500 employees). Within the waste management sector, solvability is generally poorer (mean<2), with two exceptions: D class (100-500 employees) production entities and A class (less than 10 employees) import and distribution entities. Within the green energy sector, solvability ratios generally remain between 1.5 and 2.

The *financial autonomy* ratios keep a rather constant level of about 40-50% within the pollution control sector, except for the class D import and distribution entities (100-500 employees) with about 30%. In a complete different picture, the indicator fluctuates strongly within the waste management sector. The reluctance to credits or, on the contrary, the difficulties in obtaining borrowed funds, may be inferred

also in association with the companies' profitability ratios. However, the highest autonomy in the sector (60%) is recorded by D class production entities, which also show the best profitability figures. The poorest financial autonomy is observed within the green energy sector.

## 5. Conclusions

On the whole, we may conclude that the global picture of the Romanian green business is definitely an encouraging one. Given the fact that the time span under analysis included the peak years of the global financial crisis, the analysis revealed three remarkable features of the local eco-industry:

(a) just like in the other EU Member States, going green is an important business opportunity for SMEs;
(b) the business volume was in most cases not significantly affected by the general economic contraction; and
(c) despite an often fluctuating profitability, the financial autonomy and the solvability of the companies included in the research were generally maintained at assuring levels.

As limits of our research, we have to consider two facts:

- the analysis focused only on three eco-industrial sectors, hence the results should not be extrapolated to the entire national eco-industry; and
- the database we relied on was built in 2009 and has not been updated ever since. As the green profile of a company is not indicated by the current classification system of economical activities, its adhesion to an eco-industry should be confirmed based on the initial criteria defined by the Ministry of Environment. Hence, a complete analysis of the sectors requires a regular update of the database.

However, we consider that the research may be seen as a first step in a wider project, targeting the permanent surveillance of the economical performance in the Romanian green business. Coming back to the contributions indicated in the relevant literature, the performance measurement of the eco-industry is a valuable future research direction, a key driver for ascertaining the success and failures of eco-industrial projects (Sakar, 2013).

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