



# 3<sup>rd</sup> INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

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“CLEANER PRODUCTION INITIATIVES AND CHALLENGES FOR A SUSTAINABLE WORLD”

## Level of Disclosure of Environmental Information in the Electricity Sector: an Empirical Study of Brazil and Iberian Peninsula

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### Abstract

The world is faced with a challenge in the world market for electricity: energy security, protected environment and competitiveness in the search for the sustainable energy. The balance of these three elements enables the production of cleaner and compatible energy with sustainable development. One way to assess the environmental performance and level of disclosure of a company is the use of indicators. The Global Reporting Initiative (GRI) indicators are highlighted. In the first decade of this century there was an increase in social and environmental disclosure in the electricity sector in Brazil. The demand of stakeholders for environmental reporting and accountability by promoting the dissemination of the environmental report, especially in an industry sensitive to the environment. With the privatization of the sector in Brazil, some of the Iberian Peninsula enterprises made investments in companies that integrate various links of the industry value chain. This paper aims to identify the Environmental Information Disclosure Level (EIDL) of Brazilian and the Iberian Peninsula companies, which have made environmental disclosure using the GRI indicators, G3, posted on the GRI, in the period 2006 to 2008. The conclusions show that Brazilian companies are in the process of improving the level of disclosure and the Iberian ones are divided between those that grew in the dissemination and those that experienced a reduction. The analysis between the level of disclosure and the location of the firms suggests that the Iberian companies are better positioned than the Brazilian. The definition of stakeholders for companies is similar in all three countries. Regarding the company's communication process with stakeholders there are also similarities.

**Keywords:** *disclosure, GRI, environment, Brazil, the Iberian Peninsula.*

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### 1 Introduction

The world statistics and trends indicate that the generation of electricity will remain the main source of growth in CO<sub>2</sub> emissions in the XXI century. Thus, the world is faced with a challenge in the global market for electricity: energy security, the protected environment and competitiveness in the search for sustainable energy.

The goal is to align the security of electricity supply, with low emission of greenhouse gases and a fair price. Besides ensuring the economic and financial returning to the sector companies. The balance of these three elements allows a cleaner and more compatible energy production with sustainable development.

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São Paulo – Brazil – May 18<sup>th</sup>-20<sup>nd</sup> - 2011

For monitoring and evaluation of this goal, specifically on environmental grounds, it is essential the analysis of disclosure of environmental information of the entities, and use of important tools, which are indicators of the Global Reporting Initiative (GRI). These indicators are used worldwide in all economic sectors, and disseminated in the form of report, which allows the monitoring of company performance in the economic, social and environmental spheres.

After the privatization process of the electricity sector in Brazil, which attracted domestic and foreign investors and the creation of the regulator company the National Agency (ANEEL), the companies began to disclose more financial, economic, social and environmental information. Even publishing reports with GRI indicators.

Some Iberian Peninsula companies have made investments in companies that integrate various links of the value chain of the sector in Brazil. These companies already had an experience with environmental regulation in its headquarters located in Portugal and Spain.

This paper aims to identify the Environmental Information Disclosure Level (EIDL) of 23 Brazilian companies and 8 of the Iberian Peninsula published on the website of the GRI, which have made environmental disclosure in the period from 2006 to 2008 using the GRI indicators, G3.

The study is structured in four sections. The following section describes the methodology; the third section presents the analysis of results and the fourth brings the conclusion.

## **2. Methodology**

This section focuses on the literature review that includes the report and environmental disclosure, the contents of the publication, GRI indicators, previous studies on the level of disclosure, the methodology and the sample definition.

### *2.1. The report and environmental disclosure*

The disclosure of environmental information in the annual report is defined as a subset of the Corporate Social Responsibility (CSR), which includes information on waste management, recycling programs and environmental control, Ahmad et al (2003). This publication usually includes mandatory and voluntary environmental information due to the broad group of stakeholders that has relationship with the company.

Despite the lack of mandatory environmental publication in Brazil, there are several recommendations for the dissemination of environmental information, such as the Securities and Exchange Commission, the Institute of Independent Auditors of Brazil and the Federal Accounting Council. In addition to an extensive environmental legislation at all levels of government.

In Spain, the disclosure of environmental information in annual reports has become mandatory since 1998, with the sectoral adaptation of the General Accounting Plan of the electrical companies. And, in Portugal, the Accounting Guideline No. 29 - Environmental matters (DC No. 29/2002) and took effect from 2006, Eugénio (2010).

Despite the importance of environmental information provided in the reports, there is still a lack of structural order in the disclosure when it is made voluntarily, Bolivar (2009). Internationally we use the guidelines of the Global Reporting Initiative

(GRI). In this investigation we examined the publications using the GRI indicators, G3.

Another important aspect of disclosure is the definition of material support and dissemination. According to Jose and Lee (2007), the Internet has emerged as a tool of low cost, quick and easy access. In addition to the disclosures on site, companies use complete print and/or a summary of the report and CD-ROM.

### 2.2 The content of environmental disclosure and the GRI Indicators

Concerning the level of disclosure practices of sustainable development in companies in Brazil, Gallon and Ensslin (2007) argue that the publication on the environmental impact of activities shows that firms use more declarative disclosure, then the quantitative monetary type, and finally a quantitative non-monetary.

The contents of the report can be defined by guidelines and/or informational interests of stakeholders, prominently by those who have critical relationships with the entity, Berns et al. (2009). GRI indicators used in environmental reports allow a dialogue between internal and external stakeholders.

Since 2006 there has been an evolution in the publications of the Brazilian electric power companies in the GRI model, and the Iberian Peninsula remained unchanged, as shown in Table 1.

Table 1: Disclosure of GRI guidelines, Electric Sector, Brazil and the Iberian Peninsula, 2006-2008.

Country	2006		2007		2008	
	GRI	Electric Sector	GRI	Electric Sector	GRI	Electric Sector
Brazil	18	8	32	21	71	20
Portugal	6	2	18	2	25	2
Spain	120	6	128	6	138	6
<b>Total</b>	<b>144</b>	<b>16</b>	<b>178</b>	<b>29</b>	<b>234</b>	<b>28</b>

Source: prepared by the authors.

The increase in the number of publications by the electric companies generate the expectation of changing the level and quality of environmental disclosure.

### 2.3 Level of disclosure of environmental information- Literature review

The disclosure of environmental information by companies may have several goals as fundamentals that determine the public exposure of information, Ahmad et al. (2003).

Skouloudis et al. (2010) conducted a research in the sustainability reports of 16 Greek companies. The results show that the research report in Greece is still inefficient, compared with the international standard in terms of materiality and completeness. Pressure from stakeholders on the Greek CSR disclosure is minimal. The publication confirms that CSR is weak in Greece.

Liu and Anbumozhi (2009) investigated the factors that affect the level of corporate disclosure of environmental information, based on the theory of stakeholders. They found that the variables determining the level of environmental disclosure in China are: size of company and industry sensitive.

Rover et al. (2009) conducted a study on the determinants factors of voluntary environmental disclosure by Brazilian firms potentially polluting. The research found that company size, sustainability, corporate audit and publication of sustainability report are factors relevant to the voluntary disclosure of environmental information.

Jose and Lee (2007) presented a content analysis of environmental disclosure on websites of 200 multinational companies globally, Fortune, 2002. The research concluded that the environment is a strategic issue for companies, there is a paradigm shift for the legal dissemination of strategic, there is no uniformity in environmental practices and disclosure in all units of multinationals, there is little engagement with stakeholders, and companies are developing specific environmental report.

The studies cited were conducted covering companies from various sectors of the global or national economy. While this study uses only the electric power industry located in Brazil, Portugal and Spain.

#### 2.4 Methodology

The Brazilian and Iberian sample have different characteristics, as in Table 2. However, using the same methodological approach for the analysis of sustainability in business: Global Reporting Initiative (GRI).

Table 2: Profile of the country of origin of companies

<i>Aspect</i>	<i>Brazil</i>	<i>Iberian Peninsula</i>
geographic area from the country of origin	huge territorial extension. Brazil 8.511.965 Km	small extension territorial. Portugal: 92.389 Km <sup>2</sup> e Spain 04.782 Km <sup>2</sup> .
Number of customers(*)in the country	63.892.929	Portugal: 6.316.180 and Spain:23.759.685.
Amount of enterprises listed in the Global Reporting Initiative – GRI – 2006 a 2008	23	8
Market concentration	Oligopoly	Oligopoly
Company size	Large company	Large company

Source: prepared by the authors. Dada taken from ANEEL (2010), GRI (2010), CNE (2009), ERSE (2009).

The sample, which represents the universe, was obtained by examining the list of disclosure of the GRI, and includes 23 Brazilian companies and 8 of the Iberian Peninsula, all belonging to the electric power sector (generation, transmission, distribution and holding), which published the report using GRI indicators, G3, in the period 2006 to 2008, on the GRI website. Due to the oligopolistic characteristics of the electricity sector, which has investment from large multinational companies, were also included in the sample holding companies.

The research examines 39 environmental indicators (19 core indicators, 12 additional and 08 specific indicators), the indicator 4.14., which focuses on stakeholder engagement, and the aspect of communication between stakeholders and the company.

The conceptual framework includes environmental indicators grouped into 11 categories: materials, energy, water, biodiversity, emissions, effluents and wastes, products and services, compliance, transportation, general, society/ community and industry.

The research methodology uses the system developed by the Center for Environmental Policy and Strategic Management of Environmental University of the

Aegean, Skouloudis et al. (2010), and the philosophical basis of the concept of sustainable development, Mebratu (1998)

The scale used is based on a score from zero to four, with a maximum score of 156 points, Skouloudis et al. (2010). When the item is described in the report in a qualitative, quantitative form (monetary or non monetary) and through time (Ex.2008/2007) is assigned four points. Three points for the item described qualitatively and quantitatively, in the financial year. For an item described only quantitatively it takes two points. One point is assigned to an item only qualitative, and zero point defined for the items identified as *Not Applicable* (NA), *Not Available* (ND) or when the indicator is not published. Here it is important to note that the methodology GRI G3 is medium and long term, allowing the use of items with this rating because it suggests an evolutionary process of social and environmental commitment.

The research aims to identify the Environmental Information Disclosure Level (EIDL) of Brazilian, Portuguese and Spanish companies electric power sector in the period 2006 to 2008.

It also features four scientific questions: 1. How has evolved the environmental disclosure of individual firms in the sample? 2. What is the relationship between the level of disclosure of environmental information and country where the companies are?, 3. What are the main stakeholders of the companies investigated, and 4. What are the communication channels provided by companies in their sustainability reports?

The research is exploratory. It uses the method of content analysis, Silva et al. (2005), Bardin (2008), in conjunction with the documentary research technique, Martins and Théophilo (2007), for analysis of sustainability reports published on websites of companies and the calculating Level Disclosure of Environmental Information (EIDL). To assess the relationship between variables EIDL and the country of location of company we used the technique of interdependence called Correspondence Analysis panel with a sample of 31 companies and 70 information regarding the period from 2006 to 2008 Fávero et al. (2009), Hair et al. (2005), Lima (2007). The panel is unbalanced type, Gujarati (2006), Wooldridge (2007).

### 3 Results and discussion

After identifying the EIDL through the content analysis it seems that companies in the peninsula are divided among those that increase the level of disclosure (38%) and those that reduce (50%), as shown in Table 3.

Table 3: Environmental Information Disclosure Level, the electric power sector, the Iberian Peninsula, 2006-2008

Organization	Score (%)		
	2006	2007	2008
EDP Portugal	64.74%	52.56%	46.79%
REN	33.97%	36.54%	40.38%
Iberdrola	63.46%	54.49%	46.79%
Endesa Espanha	43.59%	46.15%	50.64%
Red Eléctrica	43.59%	51.28%	50.00%
Gás Natural Fenosa	46.79%	55.13%	52.56%
Iberdrola Renovável		25.00%	35.90%
HC Energia			54.49%

Source: prepared by the authors.

Brazilian companies are in the process of improving the level of disclosure. According to Table 4, 52% of the sample companies increased the level of disclosure, 22% reduced, 22% published only in a fiscal year and 4% remained stable.

Table 4: Environmental Information Disclosure Level, the electric energy sector, Brazil, 2006-2008.

Organization	Score (%)		
	2006	2007	2008
AES Tietê S A		14.74%	
Endesa Cachoeira		31.41%	31.41%
Eletronorte		21.79%	24.36%
Furnas Centrais Elétricas		22.44%	38.46%
Itaipu Binacional	32.69%	47.44%	58.33%
Tractebel Energia		39.74%	50.64%
Endesa Fortaleza		31.41%	36.54%
Endesa CIEN		32.69%	28.21%
CTEEP			27.56%
AES Eletropaulo		44.23%	39.74%
COELBA		35.26%	33.33%
COELCE	26.28%	39.10%	42.95%
Ampla	32.05%	32.05%	46.15%
Elektro	26.92%	23.08%	23.08%
COSERN		20.51%	
CEMIG	30.77%	39.10%	44.23%
COPEL	39.74%	44.23%	48.08%
Energias do Brasil	27.56%	52.56%	51.28%
CPFL Energia	44.23%	15.38%	47.44%
Eletrobrás			23.08%
Light S.A.		46.79%	52.56%
Endesa Brasil		39,10%	44.23%
Grupo Rede		30.77%	

Source: prepared by the authors.

To examine whether there is any relationship between the country of company location (country variable) and the Environmental Information Disclosure Level (variable EIDL) was used the division into quartiles. Between the values of 0.2121 to 0.3141, score 1, Bad, up 0.3141 to 0.3974, score 2, Regular, up 0.3974 to 0.4744, score 3, Good and above 0,4744 until the end, score 4, very good. The median is 0.3974. The content analysis reveals that the maximum EIDL sample is 0.6474, and a minimum of 0.1474.

To confirm the application of Correspondence Analysis (CA) panel was held the hypothesis test Chi-square ( $X^2$ ), at a significance level of 5% as a result showed  $\text{sig} = 0.006 < 0.05$ , then reject the null hypothesis ( $H_0$ ) that there is no association between the variables EIDL and country of location of firms, ie, the variables are associated with a non-random and thus use the CA, Favero et al. (2009). The CA panel shows the relationship between the variable EIDL and country of location, according to the contingency table, Table 5.

The sample exhibits a balance between the four categories, but with more companies with poor level of disclosure (19). The smallest number is in the optimal level (16). The largest contribution is from the companies in Brazil and Spain, respectively.

Table 5: Contingency table of the Environmental Information Disclosure Level x country location business panel.

Country	Environmental Information Disclosure Level - EIDL				
	Bad	Regular	Good	Very Good	Active Margin
Brazil	18	15	10	6	49
Portugal	0	2	2	2	6
Spain	1	1	5	8	15
Active Margin	19	18	17	16	71

Source: prepared by the authors.

The CA has two dimensions. The dimension one contributes in 92.7% of the level of explanation for the total inertia, and the dimension two with explanation of 7.3%.

The most important categories in dimension one are Spain and very good. And in dimension two highlights the categories Portugal and regular.

The altogether graphical representation of the variables EIDL and country is presented in the perceptual map, Figure 1.

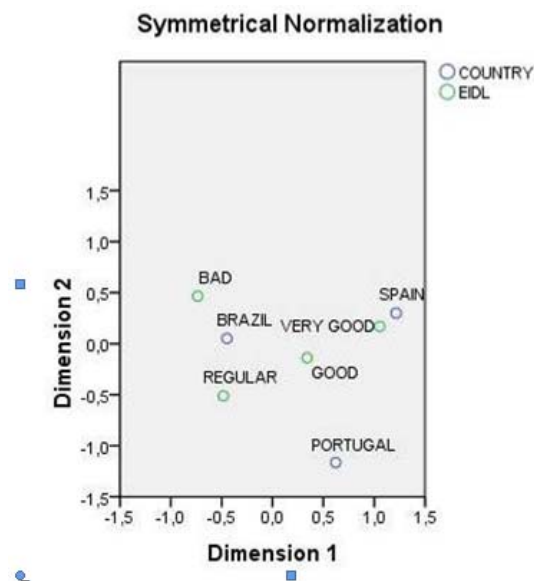


Fig. 1. Perceptual map

Based on the map it is possible to see that the level of disclosure by companies in the electric power sector in Brazil is between poor and fair. While Portugal is between fair and good levels, and Spain, near the optimum.

One factor that may contribute to the distance of Portugal category from EIDL categories is the small number of firms in the country.

The performance of Spanish companies is more balanced by focusing on good and great. Maybe by having a larger number of energy companies on the Peninsula and legislation that favors disclosure.

Brazilian companies have in the period, only 49 publications, but have already shown a trend in the disclosures with great framing. In 2006, two companies, four in 2007 and nine in 2008. The influence of shareholders / investors, the control of a regulator and government regulation in the environmental aspect may be contributing to improve the performance of voluntary environmental disclosure in the sector in Brazil.

The location of the company has a very important factor in the level of disclosure that the culture of the country where the company is installed. Culture can focus on the dissemination of information or organizational actions aimed at the satisfaction of stakeholders. Typically, companies settle in other countries through a new operational arrangements, such as: mergers, acquisitions, etc.. and this affects stakeholders, Simnett et al (2009), Griffin (2000).

It is important to emphasize the cultural aspect of the business location because there are companies in the Iberian Peninsula with investments in Brazil, and the Iberian Peninsula was created Iberian Electricity Market (MIBEL) for the integration of a power market between Portugal and Spain.

Regarding the definition of stakeholders for companies, there is great similarity between what is published in Brazil and in the Iberian Peninsula. The analysis was performed in 2008, considering a sample of 20 Brazilian companies and 8 Iberian ones. Shareholders/investors and consumers/customers seems to be the main stakeholders. Also worth mentioning, the government regulator and the agent, according to the characteristics of the sector.

Analyzing also the aspect of the company's communications with the stakeholder who reads their reporting of sustainability we notice that in Brazil, 19 companies inform contact telephone number, 18 reporting an e-mail, 15 informs the web page and 11 give you the name of a contact person in the company. In this sample, eight firms (40%) report the four elements of communication.

Companies in the Iberian Peninsula do not disclose the name of the enterprise to contact, all disclose e-mail, 7 discloses the web page and 5 the telephone to contact. Of the sample, five companies (62.5%) report the three elements of communication.

Importantly, however, Brazil adopted a model of disclosure that is not mandatory, and Portugal and Spain use a binding model, the shape, orientation, media and dissemination are similar.

#### **4 Conclusion**

This research companies in the electricity sector in Brazil and the Iberian Peninsula shows that the GRI indicators are important for analyzing the level of disclosure of environmental information.

Analyzing the result of individual EIDL in course of time, it was found that Brazilian companies are in the process of improving the level of disclosure. While the Iberian companies are divided between those that grew in the dissemination and experienced a reduction.

The results indicate that the reports of Spanish companies have an optimal level of disclosure, Portuguese companies have a level close to fair and good, and Brazilian companies are somewhere between poor and fair.



The definition of stakeholders for companies is similar in all three countries. Shareholders/investors and consumers/customers have been identified as main stakeholders. It is also highlighted to the government and the regulator.

Regarding the company's communication process with stakeholders there are also similarities. The main channels of communication are telephone, email and/or web page. In Brazil, 40% of test sample disclose all means, and 62.5% in the Peninsula.

These conclusions are limited to the sample, the period and the methodology used. Therefore, further studies may arise from this research.

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