

# A Preliminary Analysis of Carbon Disclosure among the Electricity Generation Companies in Asia

B. Alrazi, N. A. Shaiful Bahari, and N. Mat Husin

**Abstract**—This research examines the carbon disclosure of 75 electricity generation companies in Asia. Using a self-developed carbon disclosure index to assess the disclosure made in the annual reports for the year 2013, we find low level of disclosure among the sample companies (i.e., average score = 12%). The highest level of disclosure is 60%, while 27 reports made no reference to climate change or carbon emissions. The level and extent of disclosure can be attributed to the companies' country of origin with Japan and Hong Kong reported the highest. Most of the disclosure were related to risks and opportunities and plans and strategies to reduce emissions. However, there still lack of quantitative data and, when disclosed, the data were not externally verified. This scenario indicates the need to revisit the reporting requirements pertaining to carbon information.

**Index Terms**—Asia, carbon disclosure, electricity companies.

## I. INTRODUCTION

The electricity sector accounts for a significant share of global carbon dioxide (CO<sub>2</sub>) emissions. In year 2013, the industry accounted for 42-percent of CO<sub>2</sub> emissions which has seen an increase of 70 percent since year 1990 [1]. It is also documented that two-thirds of global emissions for 2013 originated from just ten countries in which six of them are Asian, namely China (ranked 1<sup>st</sup>), India (3<sup>rd</sup>), Japan (5<sup>th</sup>), Korea (7<sup>th</sup>), Islamic Republic of Iran (9<sup>th</sup>), and Saudi Arabia (10<sup>th</sup>) [1]. Since greenhouse gas (GHG) emissions is the factor contributing to climate change (of which 77% is CO<sub>2</sub> emissions) [2], it is rational to pay special attention to the electricity sector and Asian countries.

Carbon disclosure is the provision of information by corporations emphasising on concerns, initiatives, or performance related to carbon emissions/climate change [3]. This can be done using various media including annual reports, stand-alone sustainability reports, and corporate websites. Furthermore, legitimacy theory posits that companies would be more likely to provide disclosures when their operations are perceived as inconsistent with societal expectations [4]. Due to reputation as 'dirty' companies, it is expected that electricity companies in Asia would be more forthcoming in disclosing carbon disclosure. However, most

of prior literature on carbon disclosure did not focus on electricity companies. Additionally, for few studies examining the carbon disclosure among electricity companies, they did not focus on Asia [5]-[9].

Therefore, the objective of this research is to examine the carbon disclosure of electricity generation companies in Asia. In this regard, we developed a carbon disclosure index consisting of 25 items and applied it on the annual reports of 75 electricity generation companies in Asia for the year 2013.

The research is pertinent for several reasons. It contributes to the dearth of literature in carbon disclosure of electricity companies in Asia. The assessment of disclosure would also help in determining the strength and weaknesses in the current level of disclosure for future improvements. Since the disclosure is low, it is important for policy makers in Asia to revisit the necessary to have mandatory requirements for disclosure to ensure greater accountability from the companies which ultimately could help in reducing the problems related to climate change.

The remainder of the paper are structured as follows. Section II provides the review of related literature. Section III presents the research methods undertaken. Section IV discusses the findings and Section V concludes the paper.

## II. LITERATURE REVIEW

Climate change is perhaps the most significant environmental issue facing the world today. This can be seen from the number of countries signing the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the Kyoto Protocol in 1997. At the Paris climate conference (COP21) in December 2015, a total of 195 countries have negotiated and adopted the Paris agreement which sets out a global action plan to keep global temperature rise to well below 2<sup>o</sup>C [10]. There are also various initiatives being implemented at the regional, national and institutional levels including the establishment of EU Emissions Trading Scheme (2005); the enactment of Alberta's Climate Change and Emissions Management Act (2007), California's Global Warming Solutions Act (2006), and the UK's Climate Change Act (2008); and the formation of investor groups such as Carbon Disclosure Project (CDP), the Institutional Investors Group on Climate Change in Europe, the Investor Network on Climate Risk in the US, and the Investor Group on Climate Change in Australia and New Zealand [7].

As the public becomes increasingly aware of the negative impacts brought about by climate change, companies are facing pressure to demonstrate that they are taking necessary steps to minimize the impacts of their operations on the environment. In line with the increased expectation for

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companies to report on carbon information, various reporting guidelines have been introduced. These include the Global Reporting Initiative (GRI)'s Sustainability Reporting Guidelines, Greenhouse Gas Protocol's 'A Corporate Accounting and Reporting Standard', and CDP. Likewise, there has been an increasing number of companies reporting on carbon information voluntarily [11], [12] and the quality had increased over the years [13].

The extant literature on environmental reporting has seen an increasing number of studies investigating the extent of corporate carbon reporting [14]-[18]. However, most of the carbon disclosure studies did not focus on electricity industry which is the main contributor to CO<sub>2</sub> emissions and climate change problem. Several studies attempted to analyze the carbon disclosure among electricity companies; however, these studies are based on US [5] and European countries [6]. Even though [7], [8], and [9] conducted international comparative studies, Asian companies make up small proportion of the sample (i.e. the highest being 50 companies) and the data are outdated (i.e. between 2006-2009). Therefore, it is important to revisit this issue using a larger sample and more recent data.

### III. METHODS

#### A. Population and Sample

Thompson Reuters database was used to determine the sample for this research. All Asian companies from the following codes 59101010, 59101020, and 59104010 make up the population of the research. Initially, there were 135 companies in the list. However, 60 companies had to be removed due to not having annual reports either in English or for the year 2013 and not operating in the electricity generation business. The criteria left the final sample to be 75 companies. In terms of country distribution, the sample comprises companies from India (22 companies), China (12), Japan (11), Thailand (8), the Philippines (8), Malaysia (7), Hong Kong (4), Singapore (2) and South Korea (1).

#### B. Data Collection Methods

The data for this research were collected from the annual reports and sustainability reports for the year 2013, which was the most recent data available at the commencement of the research. The reports were downloaded from the companies' websites and any online databases available.

The disclosure index developed by [15] was used as the basis to define and measure carbon information. The index is guided by the factors identified in the Carbon Disclosure Project (CDP) Annual Information Request sheets. CDP is a London-based not-for-profit organization established to help investors and cities globally to achieve sustainability. Each year, CDP has been inviting the largest companies in the world (by size of market capitalization) to participate in its annual surveys on the issues of climate change, water, and forest protection. The number of participating companies has increased over time, from 253 in 2003 to 5003 in 2014. These credentials make CDP and [15] as good bases for the development of a disclosure index. Reference [15] developed an 18-item disclosure index and used a dichotomous scoring

system (1=if disclosed, 0=not disclosed).

We refined the disclosure index to include two (2) items from [19] (*RC5* and *RC6*); comparative figure for energy consumed (*EC4*, see also [20]); policy/mission/vision (*ACC4*), stakeholder engagement program (*ACC3*), supporting organizations promoting climate change (*ACC4*), and awards received (*ACC5*) (see also [21]). Consistent with [15], we adopted a dichotomous scoring system in which each item was assigned either 0-1 (1=if disclosed, 0=not disclosed). Such a decision is to avoid subjectivity inherent in content analysis method [22]. Furthermore, previous studies have documented evidence that both dichotomous and polychotomous scoring system have produced similar results (see, for example, [22]). Overall, our disclosure index contains 25 items. The scores were then converted into percentage (see Table II).

### IV. FINDINGS AND ANALYSIS

This section presents the findings of the research. Table I depicts the level and extent of carbon disclosure by country. The level of reporting is based on whether companies provided any report on carbon information, while the extent of reporting is based on the average score obtained by the companies. The 'report' column states the number of companies that actually reported on carbon (*n*) and the percentage (%) out of the total companies for that country. For example, India has 11 companies reported on carbon information and they represent 50% of the total sample companies in India (i.e. 11 divided by 22). The 'average scores (%)' column presents the scores obtained by each company in each country divided by the total number of sample companies in each country.

TABLE I: CARBON DISCLOSURE DISTRIBUTION BY COUNTRY

No	Countries	Report		Average scores (%)
		<i>n</i>	%	
1	India	11	50	8.18
2	China	8	67	11.33
3	Japan	10	91	21.10
4	Thailand	2	25	5.50
5	The Philippines	5	63	11.50
6	Malaysia	6	86	8.00
7	Hong Kong	4	100	35.00
8	Singapore	1	50	14.00
9	South Korea	1	100	8.00
<b>All sample</b>		<b>48</b>	<b>64</b>	<b>12.21</b>

Based on Table I above, the total number of reporting companies is 48 (64%). However, the extent of reporting is low considering the average score of 12.21%. In terms of country analysis, apart from South Korea which only represented by one company, Hong Kong, Japan, and Malaysia are countries with the highest number of reporting with 100%, 91%, and 86%, respectively. Both Japan and Malaysia have been consistently ranked high in the biannual Environmental Performance Index (EPI) published by Yale University and Columbia University. The index ranks how well countries perform on high-priority environmental issues in two broad policy areas: protection of human health from

environmental harm and protection of ecosystems [23]. In the 2014 edition, Japan was ranked 26<sup>th</sup> (in 2012 ranked 23<sup>rd</sup>), while Malaysia was ranked 51<sup>st</sup> (in 2012 ranked 25<sup>th</sup>) out of 178 countries (in 2012, out of 132 countries) [23], [24].

TABLE II: THE DISCLOSURE INDEX

No	Disclosure Items	Reporting
<b>A</b>	<b>Climate change: risks and opportunities</b>	
1	CC1 – assessment/description of the risks relating to climate change	42
2	CC2 – assessment/description of current (and future) financial implications, business implications, and opportunities of climate change	17
<b>B</b>	<b>GHG emissions accounting</b>	
3	GHG1 – description of the methodology used to calculate and report on GHG emissions	5
4	GHG2 – existence external verification of quantity of GHG emission	1
5	GHG3 – total GHG emissions – metric tons CO <sub>2</sub> -e emitted	18
6	GHG4 – disclosure of Scopes 1 and 2, or Scope 3	2
7	GHG5 – disclosure of GHG emissions by sources	2
8	GHG6 – disclosure of GHG emissions by facility or segment level	1
9	GHG7 – comparison of GHG emissions with previous years, competitors or industry average	9
<b>C</b>	<b>Energy consumption accounting</b>	
10	EC1 – total energy consumed	12
11	EC2 – quantification of energy used from renewable sources	6
12	EC3 – disclosure by type, facility or segment	1
13	EC4 – comparison of energy consumed with previous years, competitors or industry average	2
<b>D</b>	<b>GHG reduction and cost</b>	
14	RC1 – detail of plans or strategies to reduce GHG emissions	33
15	RC2 – specification of GHG emissions reduction target level and target year	14
16	RC3 – emissions reductions and associated costs or savings achieved to date as a result of the reduction plan	14
17	RC4 – cost of future emissions factored into capital expenditure planning	5
18	RC5 – the contribution of renewable electricity to the company's EBITDA in the current reporting year	2
19	RC6 – the projected contribution of renewable electricity to the company's EBITDA at a given point in the future	0
<b>E</b>	<b>Carbon emission accountability</b>	
20	ACC1 – indication of which board committee/other executive body has overall responsibility for actions related to climate change	17
21	ACC2 – description of the mechanism by which the board/other executive body reviews the company's progress regarding climate change	6
22	ACC4 – Carbon policy/mission/vision statement	0
23	ACC5 – Description of stakeholder engagement programs	1
24	ACC6 – Support for organizations promoting climate change	3
25	ACC7 – Awards received	11

Hong Kong was not included under the EPI assessments. However, the country is very active in outlining agenda for climate change. In year 2015, Hong Kong Environment Bureau had published Hong Kong Climate Change Report 2015. According to the report, the country had successfully reduced its carbon intensity in year 2012 by 19% using 2005 as the base [25]. In this research, all sample countries from Hong Kong reported some form of carbon information.

In terms of the extent of reporting, Hong Kong (35%), Japan (21%), and Singapore (14%) recorded the highest

average scores. The high score for Hong Kong is attributable to one particular company which obtained the highest score among the sample companies i.e. 60% (not tabulated here). It is also the case for Japan in which it has the second highest reporting company with 44%. The high average score for Singapore is due to low sample size (i.e. 2 companies).

Table II below presents the disclosure index for the research and the number of reporting companies for each item. Items with the highest number of reporting are description of the risks related to climate change (CC1 = 42 companies) and plans or strategies to reduce GHG emissions (RC1 = 33 companies). The extent of reporting quantitative data can be assessed based on the disclosure categories of GHG emissions accounting, energy consumption accounting, and GHG reduction and cost. The disclosure of these items is relatively low. Only 18 companies (24%) reported actual emissions data (GHG3), while only one of them claimed to have the data verified by an external party. The lack of independent verification might affect the reliability of data provided. None of the sample companies disclosed projected contribution of renewable energy to the company's earnings (RC6). Such information is very important for shareholders and investors to make decision about the prospects of the company in the future. Finally, carbon policy/mission/vision statement (ACC4) was also not reported. The inclusion of climate change issue in the company's mission or vision statement indicates the importance of the issue in the company's strategic direction.

## V. CONCLUSION, LIMITATIONS, AND RECOMMENDATIONS

This research investigates the level and extent of carbon disclosure by 75 electricity generation companies in Asia. Annual reports and stand-alone sustainability reports for the year 2013 were analyzed for this purpose. Despite significant contribution of CO<sub>2</sub> emissions contributed by companies in the electricity companies and in Asian region, only 64% of the sample companies made some form of carbon disclosure. A high level of disclosure can be discerned among companies in Hong Kong, Japan, Malaysia, and Singapore and in the areas of climate change risks and opportunities and plans or strategies to reduce GHG emissions. This scenario suggests that disclosures are a function of country of origin and nature of information.

The findings of this study offer several implications. Firstly, the reporting of information is low. This is evidenced from the average score of 12%. This indicates that if the companies were left alone, they will not disclose information beyond than what is required. Since the industry is highly polluting and climate change is the most important concern globally, mandating disclosures could help improve the quality of information reported. Secondly, since the disclosure is minimal, it has made decision making process by stakeholders more difficult. They will not be able to understand the climate change impacts of company operations and any initiatives that have been undertaken by companies to mitigate the climate change issue. For regulators, this situation could also make the tracking of carbon emissions at the national level problematic.

There are few limitations inherent in this research. In essence, it only focuses on the level and extent of reporting, hence quality of such disclosure is unknown. The use of a range of scores for each disclosure item (e.g., 0-4) will distinguish disclosures that are comprehensive from disclosures that are minimal. We also ignored any repetitive disclosure items (i.e., information being disclosed in several parts of the reports) in which disclosure is only counted once. This certainly has ignored the volume of information which, according to [26], signifies the importance of information hence the stakeholders to companies. This research also did not empirically test whether disclosures could be linked to any country or company characteristics. Examining such a relationship enables us to understand the reasons for reporting or not reporting.

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