



# Carbon reporting: does it matter?

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## Abstract

**Purpose** – This paper aims to identify the significance of carbon emissions reporting for investment banking.

**Design/methodology/approach** – Functionaries at selected financial institutions in the USA, Europe and Australia are interviewed. Carbon emissions reporting methods used by companies are identified using desk research. A proposal from a non-state actor called the Climate Disclosure Standards Board for general-purpose carbon emissions reporting is assessed using participant observation. The data gathered are interpreted through a semiotic lens, with focus on the placement, content, and style of reporting, and combining with a functional perspective of decision-usefulness.

**Findings** – Environmental investing for well-diversified investors constitutes a discourse of the imaginary. Financialised constructs have been used to represent heavier polluters as superior “carbon performers” (the imaginary), while reported variations in industrial carbon emissions levels have been ignored in asset allocation decisions (the actual). Environmental investing is conditioned by four factors: exclusion of carbon emissions in constructions of firm value; diverse methods used by firms to calculate, measure and report carbon emissions; the appropriate venue for such reporting; and the quantum of data contained therein. Carbon emissions reports have had some use in investors’ assessments of firms’ corporate governance.

**Practical implications** – Risk assessment is likely to be erroneous if using measures that deflate carbon emissions by firms’ revenues. This may not matter much as carbon reporting in the hands of investors appears linked to imaginary signification more so than actual portfolio decisions.

**Originality/value** – The paper contributes to work on the participation of institutional investors in environmental investing and establishes a foundation for future research in general-purpose reporting on greenhouse gas emissions. Supplemented by desk research, the study uses interviews to provide insights into investors’ motivations for environmental investing, and how they use company-issued carbon reports.

**Keywords** Environmental investing, Signification, Carbon emissions reporting, Discourse of the imaginary, Investments, Carbon, Banking

**Paper type** Research paper

## Introduction

There is a growing literature on the mix of mandatory and voluntary carbon reporting emanating from companies worldwide today. Much of that literature notes the significance of reporting itself rather than performing detailed empirical investigation or a careful assessment of different types of carbon emissions, carbon intensities, and carbon reports. We suggest it is details on the variations and nuances of carbon emissions performance metrics that ultimately determines the ability of investors to assess environmental risks affecting the portfolio. Responding to calls for research on the consistency of climate-risk reporting (e.g. Mizuguchi, 2009), the paper assesses the methods that firms have used to identify and measure carbon emissions; identifies the interest of financial institutions with respect to carbon reports; and appraises a recent



proposal from a certain non-state actor for general-purpose carbon accounting reports. We identify and examine the differences between signified reporting and the actual uses of reporting, concentrating our analysis on the signification of investors' analysis of companies' carbon reports.

We rely on Barthes' (1972) approach to signification, while recognising the "information needs" of professional portfolio managers with respect to environmental risks as they might affect the portfolio. Barthes' (1974, p. 91) analysis of the power of the photograph "to convert" is helpful for gaining an understanding of carbon reporting. Politicians seeking (re-)election often "adorn their electoral prospectuses with a portrait". The signification produced by the placement, the content, and the style of content of the photograph, Barthes argues, influences the political chances of electoral candidates. We use this general approach to the signification of the sign to identify how the fact alone that companies produce greenhouse gases emissions reports might affect financial institutions.

The paper contributes to work on the participation of institutional investors in environmental policy (e.g. Clark and Hebb, 2005; Hagerman, 2007; Okereke, 2007) and establishes a foundation for future research in general-purpose reporting on greenhouse gases emissions. Supplemented by desk research, we use a series of interviews to provide insights into investors' motivations for environmental investing, and the ways they use company-issued carbon reports. A judgmental sample of 32 professionals working in financial institutions and service organisations located in North America, Europe, Japan and Australia is obtained for interview. Secondary data are obtained from:

- an exhaustive review of regulatory and industry pronouncements on carbon reporting;
- company data collected and analysed by the Carbon Disclosure Project, a charity registered in the UK and claiming to represent the interests of financial institutions; and
- public responses to an exposure draft on a general-purpose carbon emissions reporting framework, issued in 2009 by the Climate Disclosure Standards Board.

The article divides into four sections. In what immediately follows, a reasonable basis for general-purpose carbon reporting is considered. A restriction is placed to forms of reporting that would suit conventional portfolio selection processes. In this sense, "general-purpose" refers to company reports made available to fund managers, equity analysts, and investment brokerages. Interview data informs the utility of company carbon reports. Following, selected pronouncements on carbon emissions calculations and reporting are reviewed. A subsequent section adopts a case approach to assess the ways in which the Carbon Disclosure Project, an organisation claiming to represent the interests of hundreds of international financial institutions, has analysed firms' reported greenhouse gas emissions. A concluding section is used to consider the received significance of carbon reporting, using a case to highlight issues associated with the quantum, format and venue of carbon reports.

### **Considering a reasonable basis for carbon reporting**

This section begins by discussing investors' information requirements. Interview data are then used to discuss the significance of measurement and reporting issues. The

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governance and technical processes – to use a distinction brought by Lovell and Liverman (2010) – by which an investor might identify and take the characteristics of “carbon-sensitive” assets into account deserve consideration. Barth *et al.* (2004) suggest that government policies encouraging corporate control by the private sector and emphasising accurate disclosure of information may be associated with greater stability and, hence, lower levels of portfolio risk over investment horizons. Although empirical support for these arguments has not surfaced, environmental investing has the potential to challenge the theory of portfolio management.

Our decision to frame carbon reporting in terms of the utility of calculation and measurement methods for the investment portfolio construction process follows Jegadeesh *et al.* (2004), Schaltegger and Burritt (2000), and Lease *et al.* (1976). Criticism might be made that our approach ignores the needs of multiple stakeholders. Governance issues associated with ecological programs such as water and climate management cannot be discounted (e.g. Friel *et al.*, 2008; Füßel and Klein, 2006). Lovell and Liverman (2010) were motivated in their review of carbon trading mechanisms by the absence of widely used international standards or regulations. We are similarly motivated by the absence of widely used international standards or regulations for voluntary carbon reporting. Framing our analysis in terms of signification and information requirements allows us to use two well-understood methods to evaluate how the social world of financial services “asset owners”, their intermediaries, regulators and consultancies have taken companies’ carbon emissions reports into account.

The Tobin-Markowitz portfolio theory on which capital markets are based conceives of investor governance as consisting of the satisfaction of short-term investment yield targets, and requiring little involvement with invested companies provided that certain minimum information requirements are met[1]. Such a conceptualisation implies that financial institutions are interested in the governance of individual companies only to the extent of compliance with applicable laws and codes. Insofar as index-driven investing approaches are concerned, this perspective accurately describes current practice. As such, the following might represent an institutional investor’s minimum information requirements: each company should disclose adequate information so that investors can calculate the risk, return and value of each potential and actual investment asset; the investor needs to have enough information to assess how the company risk and return makes a marginal contribution to the risk and return of the portfolio; and thus to assess if the risk and return of the portfolio matches or exceeds that of average portfolio values, the latter being measured by that attainable in a benchmark portfolio.

It should be stated that the information needs of financial institutions that adopt “active” management styles, which would include taking cognisance of “environmental considerations” in the portfolio construction process, would differ to those assumed by the Tobin-Markowitz portfolio model (Clarkson *et al.*, 2010). Since Lease *et al.* (1974), scholars have noted that active-styled mutual fund investors seeking to identify “mis-priced” valuations of companies employ a range of decision criteria wider than the information requirements of portfolio risk and investment return. Dozens of studies since have challenged the assumption that an investor’s sole objective is to achieve an appropriately balanced investment risk/return profile (e.g. Cochrane, 2000; Ferreira and Matos, 2008). Climate-change researchers providing services to financial institutions may be able to identify new unusual assets with unusual risk and

return behaviours likely to emerge in a carbon emissions-restricted world and which may persist over business cycles and longer horizons. This kind of research can provide hints as to where new diversification and value benefits might arise in carbon emissions-restricted investment portfolios. These would include “passive” diversified portfolios represented in the world’s major stock exchanges, and “active” thematic portfolios concentrated on, for example, sustainable energy stocks. Active-styled investors can be expected to direct attention to attributes of individual stocks, such as qualitative information about companies and their management and business models, including information on company environmental programmes and how companies address identify and address environmental and reputational risks (Holland, 2006).

Taking into account both styles of institutional investing, we use the multi-attribute cognitive model offered in Capon *et al.* (1996) as a conceptual basis for our analytical approach. Capon *et al.* (1996) studied a group of 3,386 retail investors in mutual funds offered in continental USA, seeking to determine the sources of information and the criteria that investors used to select between mutual funds. The model offered in Capon *et al.* (1996) handles multi-dimensional behavioural motivations and diverse inputs to decision-making, making it useful for the present paper. In an initial information-gathering phase, investors (consumers) source various information sources so as to construct a number of product and service attributes that they rank as important when assessing alternative product offerings. These information sources are referred to as selection criteria. This allows us to present a set of selection criteria for environmentally responsive investing. The following combines the information requirements of Sharpe (1992), Capon *et al.* (1996) and the environmental accounting requirements set out in Schaltegger and Burritt (2000, pp. 52, 55, 211, 357, 361).

- The investor needs to have sufficient information to assess how company sustainable development and environmental protection programmes are operationalised in company business models.
- Each company should provide information on sustainable development sufficient to allow investors to integrate economic and environmental performance indicators.
- This information should be sufficient to allow the investor to develop indicators which can be used to determine the exposure of the environmental component of an investor’s overall portfolio to movements in the portfolio return.
- This information, in turn, can be used to determine the investor’s overall effective asset mix.

Satisfaction of all the above criteria is expected to meet the requirements for active-styled, if not also passive-styled, environmental investing[2].

#### *Carbon emissions reporting, and investors*

With respect to greenhouse gas emissions trading systems and environmental management systems, national reporting requirements have been introduced in Japan, the UK, the EU, and some US states, and in addition to binding and non-binding pronouncements issued by the United Nations’ Kyoto Protocol. Further, multiple non-regulated reporting initiatives and frameworks were in issue at the time of writing (June 2010)[3].

It has been suggested recently that not more than one in ten financial institutions has taken steps to measure its portfolio-level exposure to risks posed by climate change and its attendant regulatory environment[4]. This is not unexpected. Reliance in portfolio construction on standardised data such as quoted asset prices and predetermined funds inflows would preclude, in the usual case, the use of probability estimates on contingent events such as those issued by the Intergovernmental Panel on Climate Change. Furthermore, untested, exotic products such as trading in options on greenhouse gas emissions rights with no guarantee of continuance beyond 2012, catastrophe bonds, climate risk futures, and climate-related exchange traded contracts are not in the standard purvey of trustee management[5]. A level of disengagement of the financial markets in climate policy is noticeable. The following quotation is indicative; the extract forms part of a submission by the UK-based Institutional Investors Group on Climate Change to the widely known Stern Review of 2008 (Stern, 2008):

The terms of reference for the Review are very broad and it is therefore difficult for us to understand the specific information or evidence that could usefully inform your work. Perhaps we could arrange to meet together with some of the institutional investors active in this area at some point in the New Year to allow us to better understand your requirements and how we may contribute to this process[6].

To understand how investors – referring to financial institutions only – take account of carbon-related issues and use company-issued carbon reports, 30 interviews were conducted by the first named author in May through August of 2010 with chief executives and heads of investment functions in selected financial institutions. The sample is constructed using professional networks of the first named author, and suggestions from staffers at industry conferences held in Europe, the USA and Australia attended by the first named author. The organisations represented by interviewees are located in the USA, Japan, Australia, the UK, Italy, Germany, France, Norway and Denmark. By design, the sample captures the main investment markets in which investors have been known to express interest in company-supplied carbon data; large investors (over \$US500m funds under management and over 100 employees) and smaller investors; public-sector and private-sector pension funds and insurance companies, as well as private equity firms and mutual funds; the principal functions in investment decision processes, *viz.*, trustees, portfolio managers, and analysts; and both experienced users of environmental data (ten or more years of experience) and novice users.

Multiple approaches are used to ensuring quality of the interview data. One, understanding of the issues of relevance to the participants was gained prior to interview. Understanding is obtained from the first-named author's prior research and personal professional networks. Two, multiple methods of data collection and analysis were used to check the accuracy of interviewee statements. Observational data as found in written material issued by the selected organisations are combined with interview data from workers in those organisations. Finally, ensuring authentic input and access to full participation for all participants in all aspects of research process and representation of findings is achieved with member checking.

### *Imagining the future*

Our approach begins with the sphere of voluntary carbon reporting, in which the concept of signification provides a framework for understanding the complex motivations for investors' interest in carbon emissions reporting. Following Barthes

(1964), the materials of semiotics include written myth and narrative; the spoken in such as press, prospectuses, interviews and conversation; and possibility of the unspoken giving an inner language ruled by the laws of imagination. It is the latter aspect of an imagined signification that interests us.

Imagination has arguably become a main focus of regulatory and professional effort. For instance, the integrity of the voluntary environmental reporting process has received criticism for the ideology brought by an imaginary discourse of sustainable development (Milne *et al.*, 2009). Our examination of actors in managed investment is based on a claim that language, and symbolic systems in general, is an agency that, by positioning human beings as subjects, produces subjectivity.

We identify that certain institutional features have blocked some interviewees' vision of a "carbon emissions-restricted world": namely, absence of fungible (standardised) markets trading at appropriate volumes; lack of standardised reporting of carbon emissions quantities; and isomorphic pressure, by which is meant simply that it was observed that most financial institutions surveyed had not invested according to environmental considerations. Lending weight to the salience of a discourse of the imaginary, interviewees gave an impression they were attempting to convince themselves and the interviewer that environmental investing made sense simply because it was expected to be profitable. All interviewees mentioned that they expected that the presence of "robust", "fungible" carbon emissions market prices would stimulate environmental investing in the future.

That said, most interviewees considered the price of carbon below its worth, complaining that the absence of a fungible carbon trading market related to an untradable carbon price. Possibly as outcome, differences between the causes and management of greenhouse gases emissions between and within sectors are being glossed by investors due to the absence of such matters in financial statements, for example GAAP, (would) preclude treatment of carbon emissions as an asset or liability unless arising directly from a commercial transaction. The interview data justify a further suggestion that investors' muted level of concern for environmental risks might be related to the fact that carbon emissions have not appeared in viable trading markets, which is to say, trading in volumes that meet investors' minimum investment thresholds (in the City of London, customarily of the order of £500m). Until such time as these factors change, most financial institutions are unlikely to include carbon considerations in their decision processes.

We identified in those interviewees who indicated they were prepared or wanted to factor environmental considerations in their business a certain level of frustration co-existing with an overtly utopian vision. Such might be expected from the options available to actors who face restrictions from organisational frameworks and processes (Larrinaga-Gonzalez and Bebbington, 2001). The following interview extract gives of an anticipated world of environmentally responsiveness:

Carbon reports currently don't allow us to make investment decisions, but we anticipate that they will once we have a price. In the absence of a clear carbon price, the impact of carbon emissions is really speculative. We don't want to go there at the moment (Interview, Corporate governance advisor, US education sector pension fund).

The interviewee explained that although their financial institution had collected data on company carbon emissions, the exigencies of the investment process had not permitted that data to be used – for any purpose. Interviewees' visions of future

arrangements of the political economy remained, however, aspirational. Some interviewees cited social justice and inter-generational equity as grounds sufficient to allocate funds towards “carbon-sensitive” asset classes, as the following extract shows:

What really matters is having policies that are put in place in order to support the creation of large-scale renewable energy facilities that reduce carbon emissions around the world. It is about policies that are set up to help countries that need help, especially China and India, about how they can be assisted to choose green technologies. And it is those types of policies that will help us (establish) these technologies. They are only just on a cost curve so with the right sort of policies they will be mature and quality assets in their own right. This is all strictly from a fiduciary basis (Interview, Trustee, European public sector insurance company).

As if to say: “This has got nothing about ‘being nice’ to the environment or being moral in some way: this is about running our business properly”. Turning towards the use of mandated rather than voluntary carbon reporting, the discourse of the imaginary appears again. Some interviewees hoped that legislators would mandate that the scope of their fiduciary duties would include consideration of “long-term” matters such as “the environment”.

We are not going to do anything unless and until sustainable energy is given the go-ahead from governments. (Interview, Research provider operating in the French capital market).

The following extract indicates how one fiduciary manager justified environmental welfare within scope of their professional responsibilities:

I think we should all ask ourselves why we should be doing this? Because it is outside our fiduciary responsibilities to adopt any sort of messaging strategy targeting to save the world or anything like that. We are here to make money for the benefits of our organizations, our pensioners and our membership. That’s what it’s all about (Interview, Fiduciary, European public sector pension fund).

Here a discourse of the imaginary surrounding investing by reference to environmental considerations seems to follow a path process involving relational processes between the state and the financial markets. An interviewee explains:

Regulation has to be tighter on companies if [...] we’re going to see some kind of results. At the moment we don’t have any evidence that we’re doing anything to reduce carbon emissions. Governments [should] provide the right kind of subsidies so that investors – long-term investors – will bring their acts and their money to the table (Interview, Advisor, European public-sector insurance company).

Substantiating a discourse of the imaginary, most interviewees were able to articulate the kinds of policies they hoped for and that they hoped would bring about ecological improvements:

Effective climate regulation from an investor’s perspective would be provision of short and long-term performance targets, market-based practices that set up robust carbon prices, and stimuluses [*sic*] to the renewable energy industry. Comprehensive information disclosure on a standardised disclosure platform is number two, and targeted governmental intervention for market development is probably number three (Telephone interview, Chief investment officer, US public sector pension fund).

An argument either mentioned or discussed at length in all the interviews is that (hoped-for) policy makers should, in the future, treat privately managed capital flows

as a policy tool. The anaphoric emphases of the following extract indicate the fervour of some interviewees regarding their hoped-for relations of the state and privately managed financial markets:

The number doesn't matter. What really matters is that the bulk of the money needed for carbon emissions reductions should come from private sources. Now that doesn't happen if not supported by very, very strong policies and very, very committed targets and very, very ambitious policies set up by national governments housed by international treaties (Interview, Fiduciary, European insurance company).

The extracts presented in this section were selected from a larger database that together support the Capon *et al.* (1996) model of investment behaviour. Investors are able to handle multi-dimensional behavioural motivations and diverse inputs to decision-making. (The interested reader is invited to contact the authors for a summary of the interviews.) The next section turns to methods available to firms that disclose their carbon emissions volumes and environmental management programmes.

### **Calculating, measuring and reporting carbon emissions**

The material for this section was collated from Agnolucci *et al.* (2009), Busch and Hoffmann (2007), and from a review of regulatory and industry pronouncements issued in the USA, the EU, Australia and Japan. The methods selected for review (see the Appendix for references) are those mandated in European Directives and the UNFCCC's Kyoto Protocol reference manual on accounting for greenhouse gases emissions; and four discretionary methods:

- (1) input-output analysis;
- (2) decomposition analysis;
- (3) British Standard PAS 2050; and
- (4) the Greenhouse Gas Protocol Standards.

The latter claim derivation from a series of standards issued by the International Organization for Standardization.

Each method is considered below. To the authors' knowledge, the four discretionary methods listed above exhaust the field as at 2011.

The Kyoto Protocol and the European Directives have mechanisms that define "carbon emissions" and "carbon emissions reductions", and describe calculation, measurement, and reporting methods in virtually the same way and using the same terminology. This can be contrasted with the voluntary reporting approaches that contain various definitions and calculation methods. All four voluntary methods recommend that emissions be reported as a function of intensity; the basis of an intensity calculation is given as the volume of measured carbon-equivalent emissions, relative to either a production or financial base. The idea here is that "carbon emissions intensity" indicates the carbon emissions performance of the emitter. Table I below supplies an overview of the methods reviewed. It can be noticed that the methods contain a diversity of definitions; terminology; calculation methods; inputs included and excluded in calculations; and recommendations/requirements for information disclosures. The rightmost column provides the bases to be used in calculation of emissions: production activity or other.



	Description of intensity calculation	Calculation basis
Kyoto Protocol	Intensity is not mentioned Emissions calculations are given as a function of activity data, involving either direct observation of emissions or application of emissions factors	Production activity
EC Directives 2007/589; 2003/87 Annex IV; 96/61	Intensity is not mentioned Emissions calculations are given as a function of activity data, emission factors, and oxidisation factors	According to standardised or accepted methods
Input-output analysis	Intensity is a function of quantity of resource consumed, cost of resource consumed, activity data and emissions factors. Structural modeling is necessary (see Acquaye and Duffy, 2010)	Production activity and cost data Suited to limited sector analysis
Structural decomposition analysis	Emissions are a function of emissions intensity of energy relative to an activity rate, e.g. GDP, energy use, population, production volumes, and a firm's operational revenues	Various activity rates
British Standard PAS 2050	"Carbon footprint" is a function of activity data and emission factors. Activity data are defined as raw materials and energy use associated with a product's life cycle. Associated uncertainties require calculation of probability densities (see Martin-Tapia <i>et al.</i> , 2008). Need not report calculated emissions	Production activity
GHG Protocol Standards	Volume of emissions directly associated with the firm and relative to production quantities	Production flow rates

**Table I.**  
Carbon emissions intensity calculation methods

We note that while there is a body of data on mandated carbon reporting methodologies, there are few comparable data available in the voluntary carbon reporting market.

Our review notes that the averaging of greenhouse gases emissions intensities across industrial sectors as required in input-output analysis may have appeal to an investment analyst concerned with deviations of portfolios from well-known stock exchange indexes (for "tracking error", see Pope and Yadav, 1994). The utility of input/output analysis for portfolio analysis is limited as the method is most suited to construction and resource extraction; entails complex calculations for emissions, which may not be possible without modification to reporters' information systems; and contains a number of non-trivial limitations, such as ignoring reductions in emissions that should come with economies of scale. The latter might skew investors' analysis of, for example, growth sectors.

PAS 2050 offers more appeal for portfolio analysis given the level of specification called for, its extension to service industries (absent in other guidance), and its flexibility with conventional management accounting systems.

The other methods reviewed cannot be considered suitable for (nor are they focused on) the purposes of investment management. Kyoto and the EC pronouncements permit that “carbon intensity” may be used as a policy tool with a proviso that the components part of the calculation is correlated with the generation of carbon-equivalent emissions. (Six gases are nominated in the Kyoto Protocol, including carbon dioxide. Emissions of the remaining five gases are converted to carbon dioxide emissions on the basis of their estimated greenhouse warming potential, and using published factors. Following this process allows a firm to report the emissions of all six gases as if they all were of their carbon-dioxide equivalents.)

At this point, it becomes appropriate to consider a case of systematic, industrial sector-specific carbon emissions reporting made to satisfy the information needs of institutional investors.

### **Investors’ assessments of carbon emissions reports**

The data and reports analysed in this section are produced by the Carbon Disclosure Project (hereafter, CDP), which since 2003 has followed a practice of sending information requests to companies appearing in the world’s most popular stock indexes. CDP’s annual information request addresses a company’s energy uses. CDP uses the data provided to produce and rank carbon intensity scores. Additionally, the proportions of answered questions on the information request are used to construct a performance measure called the Carbon Disclosure Leaders Index. CDP issues the rankings produced to its “signatories”, numbering around 400 financial institutions spread around the world.

CDP’s carbon emissions intensity calculation involves summing a company’s direct emissions and dividing the result by the company’s annualised operating revenue, expressed per million US dollars. The conceptual basis for the calculation was given by two interviewees, one working at CDP and the other a chartered accountant providing data quality services to CDP, as an intention to monetise emissions and so attract the attention of investment analysts familiar with performance measures based on accounting revenues. An investigation of the intensity construct is useful.

The document selected for analysis is CDP’s 2008 FTSE 350 Report. (The FTSE 350 is a benchmark industry index used, *inter alia*, by financial institutions to help them construct their portfolios.) The FTSE 350 index covers most of the industrial sectors and geographical regions of the UK economy, as well as certain other trans-national companies. The dominance of the FTSE 350 in Europe makes it an important group of companies, highlighted by EU requirement for companies to report and have verified their greenhouse gas emissions.

The 2008 FTSE 350 Report contains analyses of data received from 233 companies that responded to a questionnaire sent by CDP in November 2007 to the Chair of the Board of FTSE 350 companies. It is convenient to summarise CDP’s calculations and presentation of emissions intensities using one of the companies contained in the 2008 FTSE 350 Report: Royal Dutch Shell plc (ticker: RDS.A). The calculation of emission intensity involves three steps:

- (1) Shell disclosed that in 2007 it had generated 92 million metric tonnes of carbon dioxide-equivalent emissions from its production operations. Other emissions relating to consumption of electricity were not used for purposes of the emissions intensity calculation (a treatment not permitted by any of the calculation methods reviewed in this paper).

- (2) CDP divided Shell's reported emissions by the operational revenues made by Shell in 2007, giving an intensity figure of 212.
- (3) That intensity figure was then shown against the FTSE 350's oil and gas sector's average intensity figure of 435. This third and final operation gives a ratio of 0.4873, which was reported as indicating that Shell was approximately half (48.73 per cent) as "carbon-intense" as its peers.

A different picture is produced if using actual volumes. Using actual volumes of carbon emissions reported by Shell in that year, Shell exceeded the average emissions of companies in the oil and gas sector of the Global Financial Times 500 index (33.8 million tonnes) by a factor of 2.7. (The Global Financial Times 500 contains all of the companies in the FTSE 350 index.) The operation described here has obvious implications for portfolio construction. Risk assessment based on such representation may be biased in favour of large polluters – exactly the opposite effect that is intended.

Calculations and rankings of other companies analysed by CDP in 2007 are given in Table II. The companies listed in Table II relate to the Carbon Disclosure Leadership Index (hereafter, CDLI) "leaders" in the nine industrial sectors appearing in CDP's 2008 FTSE 350 Report, the same report referred to immediately above. The CDLI is used to rank companies according to how comprehensively they answer the CDP information request. Along with greenhouse gases emissions volumes and intensities, CDLI scores account for an additional set of survey responses on matters such as a company's use of greenhouse gases emissions reporting standards, and details of their environmental management programmes.

Rather than use the CDP report named above for further analysis, a dataset was procured from the CDP containing all data the CDP had gathered in the period 2002-2009 (thus representing the CDP's entire set of activities).

In Table II, columns 4, 5, and 6 show, respectively, CDLI scores, emissions volumes, and CDP-calculated emissions intensities. Inter-sector rankings of the nine companies nominated by CDP as leading its industrial sector are shown in parentheses.

If using the CDP methodology, we would expect within-sector CDLI rankings (column 4) to correspond with within-sector direct emissions and intensity rankings (respectively, column 5 and column 6), but this occurs in only two instances, i.e. Nissan Motor and Suncor.

These differences are also not consistent. For three other companies, revenue-adjusted emissions intensities show a superior "carbon performance" than that suggested by greenhouse gases emissions alone (i.e. BASF, Nissan Motor, and Tesco). For another three companies, revenue-adjusted emissions intensities are worse (i.e. Suncor, Barclays, and EMC).

An implication following from these observations concerns the Carbon Disclosure Project's claim that its work has contributed to the abilities of active-styled (stock-picking) investment managers to gauge companies' exposures to climate change-related risks. As noted above, investors would be justified, for example, in questioning a revenues-based intensity measure that serves to divert attention from heavier emitters.

The relation between a company's greenhouse gases emissions and its reported emissions performance appears tenuous. Below we identify the variations in emissions rankings and emissions intensity rankings using difference measures of emission

**Table II.**  
Carbon intensity  
rankings of carbon  
disclosure project  
reporters

1	2	3	4	5	6	7	8	9
Company	Sector <sup>a</sup>	No. of companies in sector <sup>b</sup>	CDLI <sup>c</sup> (rank)	Emissions by volume <sup>d</sup>	Revenue <sup>e</sup> (rank)	Gross non-current assets (rank)	Net non-current assets (rank)	Net plant and machinery (rank)
BASF	Chemicals	9/25	82 (1)	23,463	346 (8)	0.0001 (20)	0.0013 (5)	0.0005 (21)
Nissan Motor	Construct	4/9	78 (1)	975	30 (2)	0.00005 (1)	0.00006 (1)	0.0005 (18)
Suncor	Oil and gas	5/16	75 (1)	10,419	588 (1)	0.0005 (6)	0.0005 (4)	0.0008 (3)
BHP Billiton	Mining	7/11	77 (1)	21,394	1,096 (4)	0.0011 (8)	0.0014 (8)	0.0016 (5)
Iberdrola	Transport	9/20	82 (1)	37,769	1,616 (7)	0.0005 (7)	0.0008 (7)	0.0006 (8)
Barclays	Financial	18/31	98 (1)	31	11 (9)	0.0004 (3)	0.0006 (5)	0.0002 (4)
Taiwan Semiconductor	Hospitality	4/6	95 (1)	2,466	439 (3)	0.00009 (17)	0.0001 (10)	0.0004 (18)
Tesco	Retail	7/20	96 (1)	1,705	42 (3)	0.00002 (10)	0.0001 (11)	0.00008 (8)
EMC	Media	5/22	98 (1)	32	20 (2)			

**Notes:** <sup>a</sup>Sectors correspond to industrial sectors in the FTSE Global 500 index. <sup>b</sup>The first number in the pair represents the total number of companies in each sector based on report respondents. The second number represents the total number in each sector based on Orbis data corresponding with FTSE 350. <sup>c</sup>Figures shown are percentages. Rank is shown in parentheses. <sup>d</sup>Direct emissions are based on quoted CO<sub>2</sub>-eq tonnages in the 2007 financial year. <sup>e</sup>1 (in parentheses) corresponds to the best performance (lowest intensity) in that sector. <sup>f</sup>Data not available

**Source:** Data points are taken from the "Carbon Disclosure Leaders Index" 2008 report (see [www.cdproject.net/carbon-disclosure-leadership-index.asp](http://www.cdproject.net/carbon-disclosure-leadership-index.asp); accessed 20 April 2009)

intensity. We devise three measures of emissions intensity. Following Acquaye and Duffy (2010), each measure uses a financial line item that represents a source of greenhouse gases emissions.

The items in balance sheets correlated most strongly with the production of greenhouse-gas direct and indirect emissions are fixed productive assets, for example, property, plant and machinery. The intensity measures we have created take greenhouse gases emissions divided (deflated) by three balance sheet items:

- (1) gross (before depreciation and amortisation charges) property, plant, and equipment;
- (2) depreciated and amortised (net) property, plant, and equipment; and
- (3) net plant and machinery.

The results are ranked, and the rankings are compared with rankings that use CDP's method of relating emissions volumes to accounting revenues, as described above.

Columns 7, 8, and 9 of Table II provide the new intensity scores and rankings for the top CDLI scorers in the Global FT index[7]. Some companies exhibit greater rankings-based gaps between the new intensity measures and the original revenue-deflated intensity measure (column 6) – namely BASF, Tesco and EMC.

A fuller comparison of these rankings will yield substantive results about revenue-deflation and asset-deflation measurement techniques. Our first task is to compare the rankings using CDP-calculated intensity scores with rankings using the assets-based intensity measures created for this article. We use a two-group mean comparison. Table III gives the results.

Table III shows that the three assets-based ranking structures (columns 7-9) are virtually identical with CDP's revenue-deflated intensity measure (column 6).

We then divide the sample into two emissions intensity groups, in two different ways. First, we apply the Carbon Disclosure Project's categorisation of intensity by industrial sectors[8]. Clear differences exist in CDLI scores, emissions scores and emissions intensity scores between emissions-intensive and non-emissions-intensive sectors. For example, in terms of CDLI scores, the means are significantly different ( $t(222) = 8.76, p < 0.001$ ).

All differences are investigated using two-group mean-comparison tests of revenues-based intensity rankings and the new asset-based intensity rankings, along emissions-intensive and non-emissions-intensive strata. The results are shown in Tables IV and V, respectively.

**Table III.**  
Two-group mean comparisons of ranking structures: revenue versus assets

Measure	Gross non-current assets	Net non-current assets	Net plant and machinery
Intensity	$t(161) = -0.17$ equal	$t(158) = -0.25$ equal	$t(146) = 1.71$ equal

**Table IV.**  
Two-group mean comparisons of ranking structures: non-emissions-intensive firms

Measure	Gross non-current assets	Net non-current assets	Net plant and machinery
Intensity	$t(77) = -1.04$ equal	$t(77) = -1.73$ not equal	$t(71) = -0.99$ equal

For the non-emissions-intensive firm group, the mean of {emissions per net non-current assets} is 8.3 rank positions lower than the mean according to the CDP's revenues-based intensity measure. The converse appears for the emissions-intensive firm group in two instances, where intensity measures using net non-current assets, and net plant and machinery, yield means 6.3 and 17.1 rank positions higher, respectively, than when applying a revenues-based intensity measure.

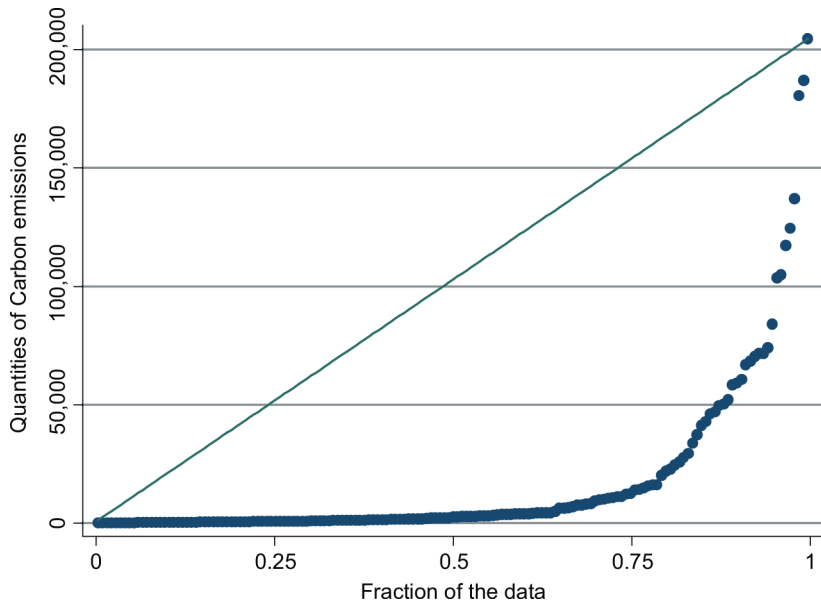
We attribute these results to the relative use of fixed assets in the emissions-intensive and non-emissions-intensive groups.

We amend the Carbon Disclosure Project's blanket classification by industrial sector, claiming that it is entirely too crude a basis for whether a firm is to be classified as emissions-intensive or non-emissions-intensive. We create a new measure of emissions intensity based on the median level of greenhouse gases emissions across all 161 firms in the sample. Firms falling below the median were designated as emissions-non-intensive and above the median were designated as emissions-intensive. Figure 1 presents a graphical result.

Figure 1 shows that nearly three-quarters of the sampled firms are relatively low greenhouse gases emitters, while firms in the fourth quarter of the distribution show an exponential increase in emissions. Using CDP's sector-based approach, the non-emissions-intensive group displays lower assets-based emissions intensities than revenues-based intensities. A converse result is noted for the emissions-intensive group.

**Table V.**  
Two-group mean comparisons of ranking structures: emissions-intensive firms

Measure	Gross non-current assets	Net non-current assets	Net plant and machinery
Intensity	$t(83) = 1.15$ equal	$t(83) = 1.70$ not equal	$t(74) = 4.60$ Not equal



**Figure 1.**  
Distribution of GHG emissions in the sample

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For the new median-based disaggregation measure, an opposite effect is noticed; the non-emissions-intensive group displays higher assets-based emissions intensities than revenues-based intensities[9].

The analysis presented above can be viewed as support for prior studies finding that company reports have declining value relevance to investors (which is not repeated here). The variations noted in calculation and measurement methods used in the field are, perhaps, endemic of wider uncertainties associated with greenhouse gases impact assessment (Martin-Tapia *et al.*, 2008). Scholars might note that monetised carbon emissions intensities can produce inconsistent results if compared to other measures of carbon performance, such as variations in raw volumes of carbon emissions.

### Concluding remarks

The analyses presented above suggest several areas for fruitful research. Lovell and Liverman (2010) identify the tensions that arise between the governance of reports prepared by entities for the purpose of claiming “Certified Emissions Reductions” and “Voluntary Emissions Reductions”. Reports prepared for claiming Certified Emissions Reductions are technocratic in nature, and are given over to method, refinement of techniques and reporting accuracy. Reports prepared for purposes of claiming Voluntary Emissions Reductions, in contrast, focus on explaining the relations between the finance provider and the project initiator and can be distinguished for their tendency to narrative. “Tensions” between the finance provider and project initiator, these authors argue, may account for the limited uptake of Voluntary Emissions Reductions. Analogously, the analyses presented above point to tensions between the exigencies of investment management and the utility of carbon reporting.

The interviews suggest that additional investment decision criteria exist to those identified in Capon *et al.* (1996) with respect to carbon emissions considerations. Additional investment decision criteria include:

- institutional features such as the extent to which investors take account of the behaviour of their peers (isomorphism);
- public policies requiring investors to disclose how they go about making environmental considerations without provision of further guidance; and
- the potential of fungible markets to provide shorter-term and long-term perspectives for various types of investors.

Further, comparability is not furthered necessarily by either the variety of methods used by companies to report carbon emissions or by monetised carbon emissions performance measures that work to smooth out differences between greenhouse gases emissions levels of firms.

Counter-intuitively, emissions intensities based on company revenues can be used to suggest that it is heavy polluters that are better at greenhouse gases emissions management. This is not merely a possibility. CDP’s Carbon Disclosure Leaders’ Index of 2008 correlated its lower-quoted revenues-deflated emissions intensities with companies’ profits relative to assets, yielding, quote, a “win/win”[10]. Such representation is consonant with much of the discourse of climate change, global warming, and corporate sustainability (e.g. Bumpus and Liverman, 2008; Leiserowitz, 2006; Milne *et al.*, 2009).

In light of our application of the multi-attribute model of Capon *et al.* (1996) and the minimum information requirements of Sharpe (1992), we contend that there is no single formula dictating how sector-based carbon emissions information should be utilised. An investor must engage in some form of meta-analysis, as we have done here, to determine its effective asset mix.

With the exception of the intensity measure produced in PAS 2050, the other measures reviewed do not facilitate comparison and aggregations between firms and within and between industrial sectors – a *modus operandi* of asset allocation processes. The diversity of measurement and calculation approaches, the complexities involved in some of them, and the subjective choice necessary to use any of them, all make it likely that fund managers will restrict themselves to the types of data they know best: company financial data supplied by data providers or gathered using direct consultation with companies (Holland, 2009). An exasperated interviewee said:

All I hear is “carbon, carbon, carbon”. What is carbon? Is it an asset class or a risk premium? I mean, what is next? Is carbon just the next fad? (European funds manager).

That governance arrangements concerning verification of greenhouse gases emissions reports had not been determined at the time of writing (in any jurisdiction) leads to consideration of the content and form of general-purpose carbon accounting reports. This is the task that takes up the remainder of the paper.

Barthes (1974) rejects the idea that technologies such as reporting can play a role in providing stability to discourse (Lovell and Liverman, 2010) as an artefact of bourgeois ideology. The signifier is not always the stable partner of the signified. For instance, the accounting literature has had much to say on the role of corporate reporting in establishing organizational legitimacy (e.g. Owen *et al.*, 1997). Taking up the non-fixable aspect of voluntary reporting, consideration is given to the work of the Climate Disclosure Standards Board, an initiative formed in 2009 by several non-state actors (for details, see [www.cdsb-global.org](http://www.cdsb-global.org))[11].

Reporting principles based on the usual hallmarks of financial information quality have not been formulated for carbon reporting. Recognising the legitimacy accorded to financial reporting, the Climate Disclosure Standards Board engaged the services of global accounting consultancies in 2010 to prepare a framework for a “general purpose” company carbon report using the well-known concepts of reporting materiality, decision-usefulness and comparability. A “draft” document was issued in 2009 for public written comment, and the comments received (all available in the public domain) warrant consideration here. The respondents included environmental and financial services consultancies in the USA, Europe and Australia, accounting bodies such as IFAC, ICAEW, ACCA and the Japanese Institute of Certified Public Accountants, and the major global accounting consultancies.

All respondents to the document issued in 2010 by the Climate Disclosure Standards Board approved of the rigour of using principles of decision-usefulness to guide carbon reports; however, some objected to the implications arising. The framework document advocates a group reporting approach to define the scope of reportable emissions. Most respondents objected to this on the basis that disclosures would be made where currently they are not required. It seems that “borrowing” a definition from the principles used to prepare general-purpose financial statements can, for some, destroy



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the imaginary immanent to carbon discourse. Barthes provides a useful analogy. Considering the typical “three-quarter” pose of the politician’s portrait, Barthes writes:

The gaze is lost nobly in the future, it does not confront, it soars, and fertilizes some other domain, which is left chastely undefined (Barthes, 1972, p. 93).

A similar attention to the future, similar in that, like the politician’s gaze, it also manages to bypass present exigencies, is identified here in financial institutions. We identify a gap between commercial exigencies, and an imaginary, future carbon-restricted world represented by collected but unused carbon reports and shadow carbon prices used to suggest the shape of potential asset allocations. Unable to find a ready use for company carbon reports, some interviewees had collected company carbon reports for an imagined future.

“Carbon emissions” is a project. It’s on our agenda. We’ve got all the data. We haven’t done much with it. We might in the future. [Greenhouse gases emissions data from] Bloomberg is in very early stages. It will take some time, but we expect to be using Bloomberg of course (Interview, US fiduciary portfolio manager).

Evidently, the investment possibilities that might present from carbon reports have not been realised. Some interviewees looked forward to the day where carbon reporting would be mandatory for companies and would find a place in investors’ asset allocation decisions. Interviewees thought this would happen if “the government” were pressured to come up with “the right sort of price signals”. All interviewees indicated that carbon-sensitive asset allocation and the forward-looking perspective that such allocation would entail had little to do with market exigencies. Ideally, there should be little to no difference between reporting on greenhouse gas emissions and environmental impacts compared to other types of reporting which report on the value of the corporation. But as Barthes reminds us, the meaning of the text is not fixable. Carbon reports have the potential to produce mythologising, subjective meanings. A carbon intensity measure that moves, for example with a company’s reported full-cost economic value, would entail a different conceptualisation of assets and liabilities to that holding sway today.

We have shown that carbon approximates a nebulous, imaginary quantity at financial institutions. The enthusiasm of investors to take carbon into account in decision-making processes is couched by isomorphism, the regulatory set-up, the potential of markets to provide various perspectives on firm value, and the diversity of methods used to calculate, measure and report carbon emissions. While matters such as the reporting venue, the quantum of data, and bases for comparability might one day be useful in asset allocation, the current utility of carbon reporting consists of an heuristic for corporate governance assessment.

## Notes

1. See Elton and Gruber (1995), Markowitz (1952, 1971) and Sharpe (1992).
2. The comments of an anonymous reviewer are acknowledged here.
3. Carbon Disclosure Project, Climate Disclosure Standards Board, Global Reporting Initiative, World Resources Institute, Greenhouse Gas Measurement and Management Institute, Accounting for Sustainability.

4. Climate Institute (see [www.climateinstitute.org.au/images/supersurveyreport.pdf](http://www.climateinstitute.org.au/images/supersurveyreport.pdf)) and US-based National Association of Insurance Commissioners (available at: [http://www.naic.org/documents/committees\\_ex\\_climate\\_climate\\_risk\\_disclosure\\_survey.pdf](http://www.naic.org/documents/committees_ex_climate_climate_risk_disclosure_survey.pdf); both accessed 23 March 2009).
5. Estimations of \$US9.5bn in direct private investments in carbon emissions rights and project-based mechanisms are a fraction of the \$US74.3tr under private management (0.7 percent) (World Bank, State and Trends of the Carbon Market 2008, available at: [http://wbcarbonfinance.org/docs/state\\_trends\\_finale.pdf](http://wbcarbonfinance.org/docs/state_trends_finale.pdf) (accessed 23 March 2009).
6. Available at: [www.iigcc.org/docs/pdf/internal/iigccs\\_submissiontothesternreview.pdf](http://www.iigcc.org/docs/pdf/internal/iigccs_submissiontothesternreview.pdf) (accessed 19 March 2009).
7. The sample used is based on 233 companies that responded to a questionnaire sent by CDP in 2007 to the Chair of the Board of all FTSE 350 companies. After matching this data with available data extracted from the Orbis database, the final sample size is 161 companies.
8. Seven sectors are considered here as carbon emissions-intensive: chemicals and pharmaceuticals; construction and building products; manufacturing; oil and gas; raw materials, mining, paper and packaging; transport and logistics; and utilities. Four sectors have been designated as non-emissions-intensive: financial services; retail and consumer; hospitality, leisure and business services; and technology, media, and telecommunications.
9. Description and results of this group of tests are not presented for reasons of space. They are available to the interested reader.
10. Available at: [www.cdproject.net/carbon-disclosure-leadership-index.asp](http://www.cdproject.net/carbon-disclosure-leadership-index.asp) (accessed 19 March 2009).
11. World Economic Forum, World Resources Institute, Carbon Disclosure Project, CERES, Climate Group, Climate Registry, and International Emissions Trading Association.

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### Appendix. Selected pronouncements on mandated and voluntary reporting of company carbon emissions

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