

# **Travel carbon emission reduction: managing and accounting in a global company**

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### **ABSTRACT**

**Purpose:** This case study explores how a global company does or does not adapt to climate change through changes in managerial action. Specifically, the research concerns a travel project in a global consulting company based in London, the stated aim of which was a 25% reduction of carbon emission generated by air travel in one year. The research explores the actions undertaken to achieve carbon emission reduction.

**Design:** A case study method is employed to follow the travel project over one year to examine its contributions, if any, to carbon emission reduction.

**Findings:** Several solutions were implemented by management aimed at reducing carbon emission by air travel. Travel incentive schemes to reduce flight travel were implemented, with a focus on new communication technology. Despite significant managerial effort, carbon was not reduced. When, at the completion of the analysis, the stated objective of achieving 25% carbon emission reduction had not been met, the company instead changed its targets to adapt to much higher levels of carbon emissions to meet its actual levels, which had increased significantly.

**Research limitations:** This case study is limited to a branch of a global organisation, and the research focus was on air travel reduction over 12 months.

**Practical implications:** The evidence suggests that voluntary corporate actions to reduce carbon emissions may not be workable in practice.

**Originality:** This research examined a branch of a global company and how it tried to manage and account for a voluntary reduction of carbon.

**Key words:** Case study, global organisation, carbon emission, airline travel

# **Travel carbon emission reduction: managing and accounting in a global company**

## **1. INTRODUCTION**

An increasing number of global companies are building long-term commitments to corporate sustainability (Gray and Laughlin, 2012), to manage their business processes in a way that will have lower negative impact on the environment (Dumay *et al.*, 2010). This paper considers a socially and environmentally relevant issue to which management and accounting research can contribute, that is emission reduction (Lane, 2010). Emission reduction is one of a range of activities aimed at reducing the negative impact of climate change. The increase in air travel and its associated CO<sub>2</sub> emission contributes to global warming (Milne and Grubnic, 2011), The following case study explores one organisation's attempt to reduce its carbon emissions, specifically those created by air travel. It outlines how practices inside the organisation affect the organisation's environment impact and how it may enable change (Fraser, 2012). The research questions are as follows: what practices does the organisation put in place to reduce carbon emissions by air travel? Has the goal to reduce carbon emissions been achieved? If so how and why?

Company Beta, based in London, developed a travel project to enact the head office strategy to reduce carbon emissions caused mainly by air travel by 25% during the FY 2011-2012. The case study follows the attempts of Company Beta's management to meet this goal. It finds that the organisation's stated aim to reduce voluntary air travel was not met. Although the company developed a strategy for carbon emission reduction using incentives for voluntary emission reduction, travel activity by the most frequent travellers within the organisation did not change and the planned reductions were not achieved. This analysis compares FY11 and FY12 to establish if management incentives influenced travellers.

The paper proceeds as follows. Section 2 provides the motivations for undertaking this study and briefly examines the contextual literature. Section 3 introduces the research method and the research site. Section 4 presents the analysis of data and findings. Section 5 concludes and provides policy implications, in terms of risks and opportunities.

## **2. BACKGROUND AND MOTIVATION**

Climate change and corporations' action or inactions in relation to it have been discussed in the accounting literature (e.g., Bowen and Wittneben, 2011; Milne and Grubnic, 2011; Ascui and

Lovell, 2011; Boston and Lempp, 2011; McNicholas and Windsor, 2011; Cooper and Pearce, 2011; Solomon *et al.*, 2011). As international debate about climate change and its impact continues, there is a view that acting in a more sustainable way, by reducing carbon emissions is essential: “At the very heart of the response to climate change, however, lays the need to reduce emissions. In 2010, various governments agreed that emissions need to be reduced so that global temperature increases are limited to below 2 degrees Celsius” (UFCCC, 2012, p. 1).

Climate change is a complex issue, with potentially wide-ranging social, economic and environmental consequences for our planet, including poverty, economic development, population growth, sustainable development and resource management. Sustainable action at a national, corporate and individual level is required (WCED, 1987). In the 1990s, relying in part on the use of global warming potentials to enable the commensuration of different GHGs emitted in different places at different times, economists such as began to frame climate change as essentially an optimal control problem, the ideal policy solution to which would lie at the point where marginal abatement costs would equal the marginal damages caused by climate change. The IPCC states that (2007, p. 5):

Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004. Carbon dioxide (carbon) is the most significant anthropogenic GHG. Its annual emissions grew by about 80% between 1970 and 2004. The long-term trend of declining carbon emissions per unit of energy supplied reversed after 2000.

Milne and Grubnic (2011, p. 951) highlight that “Despite the growing tide of corporate activity on climate change no meaningful progress is being made on global GHG emissions reduction”. One avenue for carbon emission reduction in corporations is a change in travel policy, with possible changes occurring in both amount of travel and adoption of carbon efficiency alternatives. For example, emissions from international aviation increased by almost 70% between 1990 and 2002, according to the Commission of the European Union (McCarthy, 2010). The United Nations Intergovernmental Panel on Climate Change indicated that the impact of aircraft emissions on climate would be 2.6 to 11 times as large in 2050 as it was in 1992. “If, as many argue, GHG emissions must be reduced 50% to 80% in that time period, emissions from aviation would need to be drastically reduced to provide a proportional share of the targeted reduction” (McCarthy, 2010, p. 1).

Milne and Grubnic (2011) indicate that, for 2010-2029, Airbus forecasts global air passenger growth rates will be 4.8% per annum. They state (2011, p. 952): “To meet a tripling of capacity, it anticipates an additional 25,000 aircraft ... While fuel burn efficiency and aircraft loading rates have improved ... they have not kept up with capacity increases and nor are they anticipated to”. Regardless of improved technology to produce more environmentally friendly aircraft global air passenger growth rates will mean more carbon emissions.

The case study analysed has attempted to decrease carbon emissions. Prior literature suggests that this can both enable the implementation of a green agenda (Dwyer, 2009) and improve a company’s image: “being perceived as a green company may improve a company’s image and reputation, thus attracting more talented workers and green-conscious customers” (Yu *et al.*, 2009, p. 1065).

There are enormous challenge and opportunities related to organisational carbon emissions management and reporting. This motivates us to explore how a global company adapts, or otherwise, to climate change through changes in managerial action associated with air travel.

### 3. RESEARCH METHOD AND RESEARCH SITE

The case study method provides an understanding of a contemporary accounting phenomenon in an organisational setting. This method is suitable for the examination of a phenomenon in a particular context and makes possible the answering of questions of “how” and “why” in relation to what is happening within that organisation at a particular time (Yin, 2003). It emphasizes detailed contextual analysis with reference to a limited number of events and their relationships. Yin (1984, p. 23) states “the case study research method is an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used”.

This case study analyses how a global company, hereafter referred to as Company Beta, attempted to reduce its carbon emissions and its success or otherwise. One of the researchers worked at Company Beta for six months and was provided access to internal documents, employees and other material<sup>1</sup>. These documents were analysed and interviews undertaken with a small number of air travellers in Company Beta to ascertain their views on management actions to reduce air travel and

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<sup>1</sup> Company Beta understood she was undertaking research and writing up the observations of the travel project.

to establish their motivations for undertaking journeys by air. These form the basis of the data for the research.

Company Beta is a global management consulting, technology services and outsourcing company, with more than a quarter of a million people serving clients in more than 120 countries. It collaborates with clients to help them become high-performance businesses and governments. Through its corporate citizenship focus, it is committed to equipping its people around the world by 2015 with the management skills needed to achieve sustainability. The company generated net revenues of US\$25 billion for the fiscal year ended August 2011.

In 2011, Company Beta strategy stated it was committed to addressing its environmental impacts and to fostering environmental responsibility among its stakeholders. Company Beta began disclosing CO2 data in FY 2007, with the aim of reducing its carbon emissions. As established by document analysis and interviews with the staff of Company Beta, there were several reasons for this. These include the following. Company Beta is a large global consulting firm, and subject to a range of EU legislation, international agreements and protocols. Governments are increasingly enacting policies and legislation to reduce the impact of business on the environment. To retain and attract clients Company Beta needed to demonstrate environmental “best practice”. This aspect is important because one of Company Beta’s roles is to advise clients about sustainability. Company Beta has already developed several significant sustainability services to assist client organisations to achieve substantial improvements via integrated programs focused on social, environmental and economic issues. Company Beta works globally with clients in a range of industries and countries to integrate sustainability approaches into their business strategies, operating models and critical processes.

Because Company Beta is a large global organisation, it is a significant consumer of energy. Its size means it can exert influence on its suppliers and partner closely with its clients and within its communities. Also to consider and maintain its reputation. Table 1 illustrates several activities which affect Company Beta, as well as Company Beta’s impact on the environment.

*Table 1 – Environmental activities, aspects and impacts of Company Beta.*

Printing	Paper Consumption	Depletion of Natural Resources
Leaving lights/computer on	Energy Consumption	Depletion of Natural Resources Contribution to Climate Change
	Increase in CO <sup>2</sup> Emissions	
Travel	Energy Consumption	Depletion of Natural Resources
	Increase in CO <sup>2</sup> Emissions	Contribution to Climate Change
Waste Generation	Generation, storage and disposal of general waste	Waste to Landfill sites Hazardous Waste
Catering/Maintenance: Potential Spills and leaks	Cleaning/Other chemicals	Emissions to water/natural environment

*Source: Company Beta (2011 internal report), Company Beta's Environmental Programme Overview, p 6.*

Company Beta has adopted a series of actions to foster environmental responsibility among employees, clients and suppliers. One of these is the Global Environmental Policy. Company Beta states that it is committed to incorporating leading environmental practices into its business strategy and operations and to fostering environmental awareness and responsibility among its stakeholders, including employees, clients and suppliers. Another is its adoption and retention of Global ISO 14001 Certification. ISO 14001 is the internationally recognised standard for EMS (Environmental Management System), which supports organisations to demonstrate environmental commitment to their stakeholders – clients, employees, shareholders – while better managing environmental impact and risk. To obtain ISO 14001 certification companies must identify significant impacts – such as carbon emissions, energy use, and water consumption – and implement environmental management programs to control and improve them. ISO 14001 means that a company's EMS is reviewed by external auditors and if compliant with the requirements of the ISO 14001:2004 standard, the company will receive certification. In 2009, Company Beta achieved Global ISO 14001 certification, thus promoting EMS operations globally. A further action to foster environmental responsibility is the aim of achieving environmental targets. Some of Company Beta's progress against environmental targets for 2011 are highlighted in Table 2. This study focuses on two items indicated in Table 2 in terms of carbon emission disclosure: reduce carbon emissions per employee by 40% (Global Target FY07-FY12) UKI; and reduce carbon emissions per employee by 40% (Global Target FY07-FY12) Globally.

Table 2 – Progress against environmental target.

Target	FY10 actual	FY11 actual	outcome (%) compared to FY10	Status
Reduce electricity consumption by 1% per m <sup>2</sup>	198 kWh per M2	189 kWh per M2	-4%	<input checked="" type="checkbox"/>
Decrease waste sent to landfill by 10% per person	18.8 kgs pp	10.9 kgs pp	-42%	<input checked="" type="checkbox"/>
Increase recycling rate to 42%	42%	52.3%	+13%	<input checked="" type="checkbox"/>
Reduce paper consumption by 5% per person	6.21Kg pp	5.7kg pp	-8%	<input checked="" type="checkbox"/>
Reduce travel carbon emissions (per person) from flights compared to predicted FY11 levels by 6%	1.47 T CO2 pp	1.51 T CO2 pp	+2.72%	<input checked="" type="checkbox"/>
Reduce carbon emissions per employee by 40% (Global Target FY07-FY12) <b>UKI</b>	2.66 T	2.62 T	(N/A)	<input type="checkbox"/>
Reduce carbon emissions per employee by 40% (Global Target FY07-FY12) <b>Globally</b>	3.0 T	TBC	(N/A)	<input type="checkbox"/>

Source: Company Beta (2011 internal report), Company Beta's Environmental Programme Overview, p. 7

Company Beta (CB) has established its targets for the FY12 as illustrated in Table 3.

Table 3 – FY12 - Environmental Targets for United Kingdom and Ireland.

<p><b>1.1 EMPLOYEE ENGAGEMENT:</b> Engage local employees with local Environment activities</p> <ul style="list-style-type: none"> <li>• Strategic eco champions and plans in place on top 5 UKI accounts</li> <li>• Contribute to 1% improvement in Environment CCP score in UKI</li> <li>• Drive up participation in FY12 Eco Challenge to 20%</li> </ul>
<p><b>2.1 TRAVEL REDUCTION:</b> Reduce the environmental impact of business travel</p> <ul style="list-style-type: none"> <li>• Reduce carbon emissions from business travel with <b>zero increase of carbon levels</b> from FY11 levels</li> <li>• Stretch target: Reduce the carbon impact from Business travel by <b>25%</b></li> <li>• <b>Roll out of EX90</b> single TelePresence screens UKI wide</li> </ul>
<p><b>3.1 ENERGY CONSUMPTION:</b> Explore additional methods of increasing energy efficiency by using smart meter technology to monitor and manage consumption.</p> <ul style="list-style-type: none"> <li>• <b>Reduce</b> electricity consumption per m<sup>2</sup> <b>by 1%</b> compared to FY11 consumption.</li> </ul>
<p><b>3.2 PAPER CONSUMPTION:</b> Analyse data from Equitrac technology tools to reduce paper consumption.</p> <ul style="list-style-type: none"> <li>• <b>Reduce</b> paper consumption <b>by 3%</b> per person compared with FY11 consumption</li> </ul>
<p><b>3.3 Waste and Recycling: Increase waste recycling:</b></p> <ul style="list-style-type: none"> <li>• Increase waste recycling <b>to 50%</b> of total waste</li> <li>• Reduce <b>waste to landfill by 10%</b> per employee from major offices.</li> <li>• Increase employee led recycling <b>by 5%</b></li> </ul>

Source: Company Beta (2011 internal report), Company Beta’s Environmental Programme Overview, p. 8

In order to achieve its goal of reducing carbon emission from air travel, Company Beta established a travel project. In introducing the project Company Beta management stated: “Business travel and energy use make up the majority of our footprint. We are minimising by finding cost and energy efficient solutions that meet the demand of business. In fiscal year 2011, we reduced our per employee carbon emissions by approximately 30% from our fiscal 2007 baseline”. Also, Company Beta’s web site states:

The strong increase in demand for our services and our expansion into emerging growth markets over the past year resulted in an associated increase in air travel, which has slowed our progress toward our goal of reducing per employee carbon emission 40 percent by 2012 from our fiscal 2007 baseline. As a result, we are updating our fiscal 2012 goal: we will continue to maintain a per employee carbon reduction of approximately 30 percent against our fiscal 2007 baseline.

It is clear from this statement that the company’s attempt to reduce carbon emission was not achievable so it was forced to review and lower its carbon emission goal per employee in 2012.

To achieve this aim, during August 2011, Company Beta reviewed its environmental target and a general 40% target reduction in carbon emissions was set, with respect to the baseline in 2007. The carbon emissions of the London office in 2011 were the result of travel (80%) and utilities (20%), with 51% generated by air travel.

The company considered air travel its greatest cause of carbon emission so focused on reduction of air travel in its environmental target setting. To achieve the carbon emissions target set by the New York head office Company Beta air travel would have to be reduced by 50%. However, Company Beta set FY12 targets at a 25% reduction in air travel compared to FY11. Achieving a reduction of 25% in air travel would significantly reduce the company's carbon emissions, which would assist in progressing towards the global target of 40%. Furthermore, this reduction also would deliver a saving of up to £5.5 million over the course of a 12 month period.

Data collection for the case study focused on three aspects of Company Beta's approach to carbon emission reduction with the aim of answering the research questions: what practices does the organisation put in place to reduce carbon emissions by air travel? Has the goal to reduce carbon emissions been achieved? If so how and why? The data collection, involving analysis of internal and external documents and interviews with staff, is outlined in the following subsections.

### *3.1 Management action*

To achieve the 25% reduction in FY12 air travel against FY11 levels, several management actions were undertaken:

1. understand the most significant clients generating travel;
2. identify the top 100 travellers in terms of carbon impact;
3. produce individual traveller carbon impact statements for the top 100;
4. identify the most significant travel routes in terms of carbon impact;
5. work with top travellers to identify drivers for travel, best practice and solutions to reduce air journeys;
6. introduce an incentive scheme to encourage travellers to 'do the right thing';
7. increase the awareness and use of existing technology; and
8. improve the use of communications channels.

### *3.2 Top 100 travellers*

The staff of Company Beta was identified by level. Also, business entities were established in order to determine which business entity was the heaviest user of air travel. Second, the company's travel distribution impact was established. A group of 100 people were identified as causing the most carbon emissions from air travel, based on flights in business and first class (the top 100).<sup>2</sup> This was established by merged data from travel agency data and credit card data and then calculated carbon based on miles flown, aircraft used, route taken and class of travel. From a geographic point of view, Company Beta is organised in three geographic regions: North America, EALA (Europe, Middle East, Africa & Latin America) and Asia Pacific.

### *3.3 Reasons for travel*

To understand why Company Beta personnel travel, we have selected the reasons they fly: business development, client meetings, internal meetings, market development, personal, project fly back, recruiting and training or workshops. To know where Company Beta employees travel, we have selected the destination countries to which they fly the most. These are domestic, continental and intercontinental destinations and, in particular, cities based in Europe, US, Asia, Africa, Latam (Latin America) and within the UK. Interviews were used to ask each of the top 100 travellers were questions about their travel habits.

## 4. ANALYSIS AND FINDINGS

This section discusses the analysis of the top 100 travellers and most travelled routes, and the motivations for travel established and how these contribute to the generation of air travel related carbon emissions over a 12 month period.

### *4.1 Management action*

Several incentive schemes were developed by Company Beta to reduce its carbon emissions, mostly focused on staff policy for travel. The incentive schemes are:

- Virtual Technology: investment in new and improved technological tools to be deployed in different CB/I locations in order to increase the use of virtual meetings rather than face-to-face and thus reducing the need to travel. This was scheduled starting from 2012.
- New Travel Policy: to test the impact of the new global travel policy on travellers, since 2011.

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<sup>2</sup> Business and first class have been chosen because these discharge a greater amount of carbon due to the greater space available per traveller.

- Rail travel: to encourage the use of train instead of plane where possible, especially for routes inside the UK (ie. from London to Edinburgh), since 2011.
- Marketing and Communication: to influence travellers through a communication plan.

We compared FY11 and FY12 to determine whether the incentives were effective in influencing travellers. For FY12 the findings show a 26% overall rise in carbon emissions across all business entities, specifically: Business Process Outsourcing rose 20%, Technology 43% , Management Consulting 39%, and Enterprise 84%.

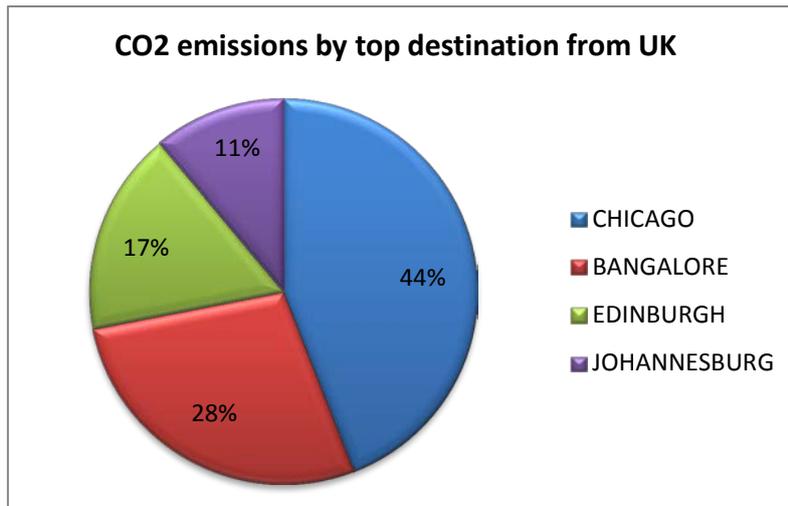
#### *4.2 Top 100 travellers*

It was found that the organisational level that travels most is the Senior Executive level. The business entity that flies the most is Technology. The main destination regions are: US, UK, India and South Africa and specifically Chicago, Edinburgh, Bangalore and Johannesburg. The majority of travel is non chargeable, mainly for client meetings. Interview data suggested that, despite management actions to use alternative technologies, 17% of those interviewed were restricted by lack of availability of Telepresence, otherwise they would have used this facility. Some support was expressed for using alternative technologies, with 13% of the respondents indicating a strong interest in using more virtual technology and 8% wanting to install a Telepresence unit in their own home. However 6% of travellers responded that it was essential to have a face to face relationship with clients and business partners and therefore little reduction in travel would be achieved by provision of alternative technologies.

#### *4.3 Reasons for travel*

The top four destination cities are Chicago, Bangalore, Edinburgh and Johannesburg (see Figure 1). These routes were analysed to establish: (1) carbon emissions by level; (2) carbon emissions by business entity; (3) the main reason and client for non chargeable travel; (4) the main client for chargeable travel. Analysis of the Chicago route is a useful example.

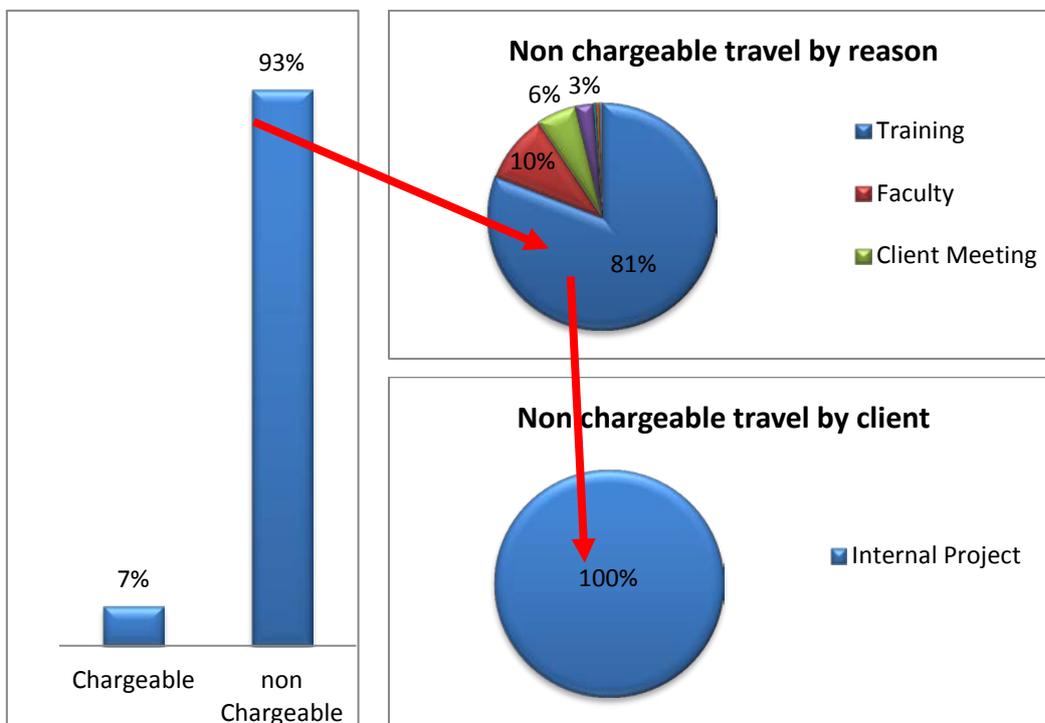
Figure 1: Level of CO2 emissions by top destination from UK



We observe that 44% of carbon emissions from UK air travel are the result of flights to Chicago. Also, as represented in Figure 2, the level that travels the most is manager (30%) follow by consultant (26%). The business entity that flies the most is Technology (43%), with 93% of Technology travel non chargeable, as shown in Figure 3, mainly for training (81%) and all for internal project (100%). Only 7% is chargeable, mainly for Internal Project (44%).

Figure 2: CO2 emissions by level

Figure 3: Non chargeable travel by reason



Clearly, management actions to reduce air travel are not likely to reduce the extent or motivations for travel on the Chicago route, which is indicative of the data collected for all four routes. Despite evidence that Company Beta management attempted to reduce carbon by introducing incentives for voluntary emission reduction, in fact emissions increased. The company changed its target from 51% (originally) to 25%. However, even the 25% was not reached; rather there was an increase of 26% from Quarter 1 of FY2011 and Quarter 1 of FY2012.

## **5. CONCLUSION**

Milne and Grubnic (2011, p.968) stated there was “an enormous challenge and opportunity to undertake urgent research into a wide range of accounting and auditing issues concerning climate change, GHG emission accounting, reporting and assurance, and emissions management and reduction”. This paper has attempted to address this need by analysing carbon disclosure, management actions and accounting activities in a large case study consulting firm. Also, the paper attempts to respond to the call from Lee (2009, p. 1101), requiring further research in order to identify how “management practice might reduce negative sustainability impacts”.

The paper has shown how Company Beta attempted, unsuccessfully, to reduce carbon emissions by reducing air travel, given that is the main source of emissions. Despite the willingness of management to use alternative technologies, 17% of interviewees found the alternative technology was not available or suited to their purpose. The need to have a face to face relationship with clients and business partners was stated by 60% of interviewees, a barrier to reduction in travel by the use of alternative technologies.

The introduction of the travel project and management action in the form of incentives did not translate into action by staff to reduce air travel. Overall, the company stated that they did not succeed because there was an increase in workload. For this reason, the amount of carbon did not decrease and they actually had to change their targets (reduction from 51% to 25 from FY2011 to FY2012). While the travel project identified the who, why and how of travel, the individual behaviour within the organisation did not change as a result of management incentives. It seems that regulation and action are required, rather than individual incentives. These actions could include better availability of alternative technologies, a revised travel policy that emphasises alternative modes of travel, such as rail, and better marketing and communication of alternatives to air travel.

Company Beta's approach to emission reduction focused on changing individuals' behavior rather than on organizational change.

For Company Beta, and organisations generally, there are risks and opportunities in their management of carbon emissions (Nelson et al., 2011). The possible risks include financial risks, where increased investment in new technology has no impact on travel, hence increasing costs for the company without any associated benefit. There are also business risks. If the company does not conform to government legislation and policies, it can lose its environmental certifications acquired so far and also the reputation for providing sustainability consulting advice it has built up over many years of business. Operational risks may ensue if new technology is not used in an effective way, leading to a failure both from a technology point of view and for employees who support people the use of this new technology.

On the other hand, opportunities for Company Beta, and organisations generally, may be a decrease in costs if the implementation of new technology is effective in reducing air flight travel expenditure and an increase in the quality of work (and work environment) because of less travel. There is potential enhancement to the organisation's reputation, potentially bringing new customers. It can also improve its position in the market: in a very competitive market differentiation is critical in fighting off competition. Finally, there are potential improvements in operational effectiveness if new technology is used as an alternative to flight travel, meaning an increase in the effectiveness of systems.

Although the potential risks and opportunities outlined above are considered in the specific context of Company Beta, its experiences can inform policy in other organisations seeking to reduce carbon emissions. However, generalisability should be considered with caution because this study examines only one organisation over one year, focusing on one specific project and its attempts to reduce carbon emissions.

## References

- Ascuri, F., and Lovell. H., (2011), "As frames collide: Making sense of carbon accounting", *Accounting, Auditing & Accountability Journal*, Vol. 24, No. 8, pp. 978-999.
- Boston, J., and Lempp, F., (2011), Explaining and solving the mismatch between scientific urgency and political inertia, *Accounting, Auditing & Accountability Journal*, Vol 24, No. 8, pp. 1000-1021.
- Bowen, F., and Wittneben, B., (2011), Carbon accounting. Negotiating accuracy, consistency and certainty across organizational fields, *Accounting, Auditing & Accountability Journal*, Vol. 24, No. 8, pp. 1022-1036.
- Cooper, S., and Pearce, G., (2011), "Climate change performance measurement, control and accountability in English local authority areas", *Accounting, Auditing & Accountability Journal*, Vol. 24, No. 8, pp. 1097 – 1118.
- Dumay, J., Guthrie, J., and Farneti, F., (2010), "Contemporary international sustainability reporting guidelines for public and third sector organisations: A critical review", *Public Management Review*, Vol. 12, No. 4, pp. 531 – 548.
- Dwyer, R., (2009), "Keen to be green" organizations: a focused rules approach to accountability", *Management Decision*, Vol. 47, No. 7, pp. 1200 – 1216
- Fraser, M., (2012), "Fleshing out' an engagement with a social accounting technology, Accounting", *Auditing & Accountability Journal*, Vol. 25, No. 3, pp. 508-534.
- Gray, R., and Laughlin, R., (2012), It was 20 years ago today: Sgt Pepper, Accounting, Auditing & Accountability Journal, green accounting and the Blue Meanies, *Accounting, Auditing & Accountability Journal*, Vol 25, No. 2, pp. 228-255.
- Intergovernmental Panel on Climate Change (IPCC), (2007), Synthesis Report, Summary for Policymakers, online resources accessed the 2nd of August 2012 [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)
- Lane, JE., (2010), Economic catch-up and emission reductions, *Sustainability Accounting Management and Policy Journal*, Vol. 1, No. 1, pp. 96-102.
- Lee, K-H.. (2009), "Why and how to adopt green management into business organizations?: The case study of Korean SMEs in manufacturing industry", *Management Decision*, Vol. 47, No. 7 pp. 1101 – 1121
- McCarthy J., (2010), Aviation and Climate Change, *Congressional Research Service*.
- McNicholas, P., and Windsor, C., (2011), "Can the financialised atmosphere be effectively regulated and accounted for?", *Accounting, Auditing & Accountability Journal*, Vol. 24, No. 8, pp. 1071-1096.
- Milne, M., and Grubnic, S., (2011) "Climate change accounting research: keeping it interesting and different". *Accounting, Auditing & Accountability Journal*, Vol. 24, No. 8, pp. 948–977.
- Nelson, T., Wood, E., Hunt, J., and Thurbon, C., (2011), "Improving Australian greenhouse gas reporting and financial analysis of carbon risk associated with investments", *Sustainability Accounting, Management and Policy Journal*, Vol. 2, No. 1, pp. 147-157.
- Rankin M., Windsor C. and Wahyun D., (2011), "An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system: Australian evidence", *Accounting, Auditing & Accountability Journal*, Vol. 24 Iss: 8 pp. 1037 - 1070
- Solomon, J. F., Solomon, A., Norton, S, and Joseph, N., (2011), "Private climate change reporting: an emerging discourse of risk and opportunity?", *Accounting, Auditing & Accountability Journal*, Vol. 24 Iss: 8 pp. 1119 – 1148.
- United Nations Framework Convention on Climate Change, (UFCCC) (2012, p.1), Background on the UNFCCC: The international response to climate change, Website accessed on the 2nd of August 2012, [http://unfccc.int/essential\\_background/items/6031.php](http://unfccc.int/essential_background/items/6031.php)

- World Commission on Environment and Development (WCED), *From One Earth to One World: An Overview*, Oxford, Oxford University Press, (1987), online resources accessed the 25th of November 2009, <http://www.wsu.edu/~susdev/WCED87.html>
- Yin, R. (1984). *Case study Research: Design and methods*. Newbury Park, CA: Sage.
- Yin, R., (2003), *Case Study Research: Design and Methods*, Sage Publications.
- Yu, V., Ting, H.I., Wu, Y.C.J., (2009), "Assessing the greenness effort for European firms: A resource efficiency perspective", *Management Decision*, Vol. 47 No. 7. pp. 1065 - 1079