

## **Developing a Scope 3 Greenhouse Gas Inventory.**

### **Case: Finnair and Carbon Disclosure Project 260 Nordic Report**

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<p>The objective of this project-based thesis is to create a roadmap and an inventory tool for a comprehensive scope 3 greenhouse gas (GHG) inventory for the commissioning company Finnair to be used in the company's Carbon Disclosure Project (CDP) reporting. A scope 3 inventory includes all indirect GHGs resulting from Finnair's activities. Finnair has participated in CDP reporting since 2008, being one of 6,000 companies providing information about their environmental strategies and GHG emissions for institutional investors globally through the CDP.</p> <p>There are various benefits and value in early voluntary reporting actions. Only by measuring its emissions can a company improve its environmental performance. Direct benefits from voluntary GHG emissions accounting can manifest in a continuous improvement in efficiency leading in turn to reduced costs. Through continuous improvement in its activities, a company can gain a competitive advantage. Indirect benefits can stem from transparency to shareholders, clients and the public audience. Transparency builds trust and commitment among internal and external stakeholders.</p> <p>The most essential step in the process of developing the inventory is identifying relevant scope 3 activities based on the company's business goals. In Finnair's inventory these are: purchased goods and services; fuel- and energy-related activities; upstream transportation and distribution; waste generated in operations; business travel; employee commuting; and upstream- and downstream-leased assets. Establishing integrated GHG data management to ensure efficiency in GHG accounting and reporting requires consistent supplier engagement from Finnair. As Finnair outsource their activities in increasing volumes, the reporting of indirect emissions becomes more prominent.</p> <p>The outcome of this thesis forms a rigid base for Finnair's scope 3 inventory. It rationalizes the backgrounds for GHG emission categories, offering the required tools for GHG data collection, as well as calculation methods and reporting guidelines.</p>	
<p><b>Keywords</b> Greenhouse gas emissions, environmental reporting, indirect emissions, scope 3 inventory</p>	

## Table of contents

1	Introduction.....	1
1.1	Project objective.....	2
1.2	Demarcation.....	2
1.3	Key concepts.....	3
1.4	The environmental effects of airtransport industry.....	4
1.5	Introduction of the commissioning company: Finnair.....	5
2	Voluntary GHG reporting.....	6
2.1	Corporate commitment to GHG management.....	7
2.2	Stakeholder expectations.....	7
2.3	Benefits from disclosing GHG emissions.....	8
2.4	Barriers for disclosure.....	9
3	Carbon Disclosure Project Nordic 260 Report.....	10
3.1	CDP scoring methodology.....	11
3.2	Introducing the GHG Protocol Scopes.....	12
3.2.1	Scope 1 - direct emissions.....	13
3.2.2	Scope 2 – indirect emissions.....	14
3.2.3	Scope 3 – indirect emissions.....	14
3.3	Implementing the full GHG inventory.....	14
3.4	Summary of theory.....	15
4	Case Finnair: Developing scope 3 inventory.....	17
4.1	The process for developing a scope 3 inventory.....	17
4.2	Finnair’s business goals of a scope 3 inventory.....	18
4.2.1	Identifying and understanding the risks.....	19
4.2.2	Identifying and understanding the opportunities.....	20
4.2.3	Engaging value chain partners in GHG management.....	22
4.2.4	Engaging employees in GHG management.....	22
4.2.5	Enhancing stakeholder information and corporate reputation through reporting.....	23
4.3	Principles for accounting and reporting of a scope 3 inventory.....	24
4.4	Identifying relevant scope 3 categories.....	25

4.5	Description of scope 3 categories involving Finnair.....	26
4.5.1	Purchased goods and services.....	27
4.5.2	Fuel- and energy-related activities.....	28
4.5.3	Upstream transportation and distribution.....	28
4.5.4	Waste generated in operations.....	29
4.5.5	Business travel.....	30
4.5.6	Employee commuting.....	30
4.5.7	Upstream leased assets.....	31
4.5.8	Downstream leased assets.....	31
4.5.9	Discarded categories from the inventory.....	31
4.6	Identifying relevant scope 3 categories.....	32
4.7	Collecting data.....	34
4.7.1	Data quality.....	35
4.7.2	Collecting primary data.....	35
4.7.3	Level of data.....	36
4.7.4	Collecting secondary data and filling data gaps.....	37
4.7.5	Allocating emissions.....	37
4.7.6	Tracking and reporting emissions performance over time.....	38
4.7.7	Assurance.....	40
4.8	Reporting.....	40
4.9	Implementation plan and schedule.....	41
5	Project design and methods.....	42
5.1	Collecting primary data.....	42
5.2	Collecting secondary data for the framework.....	43
5.3	Methods for designing the roadmap for scope 3 inventory.....	43
6	Discussion.....	45
6.1	Theory and product evaluation.....	45
6.2	Validity and reliability of the study.....	46
6.3	Own learning.....	47
6.4	Recommendations and next steps.....	48
6.5	Benefits of the study.....	48
	References.....	50

Attachment 1. Overlay Matrix for Product-Oriented Thesis.....	56
Attachment 2a. Inventory tool.....	57
Attachment 2b. Inventory tool.....	58
Attachment 2c. Inventory tool.....	59
Attachment 2d. Inventory tool.....	60
Attachment 2e. Inventory tool.....	61
Attachment 2f. Inventory tool.....	62
Attachment 2g. Inventory tool.....	63
Attachment 2h. Inventory tool.....	64
Attachment 2i. Inventory tool.....	65
Attachment 3. Interview Questions.....	66

# 1 Introduction

*"See that? By this afternoon, those vapor trails will have spread out into thin sheets and you won't be able to tell them from natural cirrus cover formations."*

*- Dr. Walter Orr Roberts, 23 Sept 1963, The New York Times*

Ever since the Wright Brothers undertook their first flight some 100 years ago, flying has had an influence on the development of humankind. It has substantially enabled global socio-economic development by facilitating the expansion of trade and inward investment. Nowadays a global network of air routes offers vast potential for leisure travel and tourism.

In the 1960's, however, as the first commercial jet planes started operation and condensation trails formed against blue skies out of the water vapor emissions and particles from the aircrafts' engines, so too did the first concerns about pollution caused by flying arise. Nowadays the aviation industry is one of the fastest-growing consumers of energy in transport. The significant environmental and social costs of air travel increasing year by year, threaten to outweigh the previously mentioned socio-economic benefits unless the industry somehow succeeds in mitigating its greenhouse gas emissions. Furthermore, airline investors and shareholders are currently demanding more robust and sustainable solutions regarding climate change than ever before. (Gössling & Upham 2009, 27-28.)

Finnair, the flag carrier of Finland, has been one of the most proactive airlines in the world when it comes to environmental reporting. Finnair first began reporting on its environmental impact in 1997. Since 2008 Finnair has reported according to guidelines established by the Global Reporting Initiative (GRI) on a voluntary basis. Being aware that the management of carbon is moving into corporate mainstream investment thinking, in 2008 Finnair also commenced participation in the CDP Nordic 260 reporting system. (Finnair 2013, 10.) The reporting system aims to gather relevant environ-

mental data from approximately 6,000 enterprises globally on their climate strategies and GHG emissions, on behalf of 551 institutional investors. (CDP 2012, 3.)

## **1.1 Project objective**

This thesis is a project-based study. The project objective (PO) is to develop a scope 3 GHG inventory for Finnair, thereby facilitating the commissioning company's collection and disclosure of their GHG emission data. The product consists of two parts:

- The roadmap for the scope 3 inventory, which is the Chapter 4 of this study
- The inventory tool, a pre-filled Excel-sheet for data collection (Attachment 2a-h.)

The purpose of this inventory is to include all indirect GHGs from Finnair's activities. Until 2012, Finnair had only reported direct emissions of their activities in their CDP reporting. As Finnair has outsourced many of its activities, the importance of indirect emissions has become more prominent in reporting.

The objective of the theoretical framework is to gain an insight into voluntary carbon disclosure and CDP reporting. Background information also enables understanding of the rationale behind developing a scope 3 inventory. The theory part discusses two elements: the importance of voluntary GHG reporting and the principles of CDP reporting. The attached overlay matrix (Attachment 1) illustrates the defined project tasks (PT) and the theoretical framework related to them.

## **1.2 Demarcation**

The intended outcome of this project-oriented thesis is to provide guidelines and platform for Finnair that help the company develop an inventory for indirect GHG emissions resulting from their activities. The outcome of this study can only be applied to Finnair, as each airline has their own business goals and other variables that would have an impact on the result. As a side-product, the author has designed a tool for data collection, calculation and reporting of scope 3 GHG emissions. The thesis concentrates only on CDP reporting, and excludes all other environmental reporting methods.

As the study focuses only on the scope 3 GHG emissions, it does not cover direct emissions, scope 1 and scope 2. The sole intention of the study is to develop the roadmap and the tool, so the study does not include results from scope 3 data collection, calculation or reporting. The implementation project did not fit into the thesis schedule and would have drastically exceeded the scope of the study.

### 1.3 Key concepts

This subchapter defines the most essential concepts related to CDP reporting. The Kyoto Protocol forms the basis for global GHG emissions objectives. In terms of harmonizing sustainability reporting there are intergovernmental protocols and standards that apply to all GHG disclosures.

**Kyoto Protocol** is an international agreement that was adopted by 37 countries and the European Community in 1997 for reducing greenhouse gas emissions. The agreement came into force in 2005 and is linked to the United Nations Framework Convention on Climate Change. The objective of the Kyoto Protocol is to commit countries to reducing their GHG emissions to an average of five per cent against the base year 1990 levels over the five-year period 2008-2012. (UNFCCC 2012a.)

**Greenhouse gas (GHG)** is the term that GHG Protocol uses when it refers to the greenhouse gases covered by the Kyoto Protocol. Those six greenhouse gases are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydro fluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>). Each gas has a different global warming potential (GWP). In order to achieve a uniform standard for GHG accounting and reporting, all GHGs are converted to CO<sub>2</sub>-equivalent (CO<sub>2</sub>e). This conversion is made by multiplying the mass of a given GHG by its GWP. The official set of GWPs for reporting purposes is based on international guidance produced by the Intergovernmental Panel on Climate Change (IPCC). The international reporting standard for CO<sub>2</sub> emissions is Metric Tonne (MtCO<sub>2</sub>e). (McKinnon, Cullinane, Browne & Whiteing 2010, 34-35.)



**The Greenhouse Gas Protocol (GHG Protocol)** that forms the basis of emission accounting for CDP reporting is the most internationally-recognized tool for managing, quantifying and understanding GHG emissions. The GHG Protocol serves business and government leaders in governing and tackling environmental issues by developing credible and effective environmental programs and accounting tools. (Fortune Oriental Environment & Resources 2012.) The GHG Protocol is built on the necessity of a standard for GHG accounting and reporting. The initiators included the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD). In 1998, the WRI and WBCSD agreed together to launch standardized methods for GHG accounting. They did so in co-operation with several Non-Governmental Organizations (NGOs), such as World Wildlife Fund, and industrial partners from the oil industry, such as Shell and Norsk Hydro. (Greenhouse Gas Protocol 2012a.)

**The GHG Protocol Corporate Accounting and Reporting Standard** (also referred to as the GHG Protocol Corporate Standard) was recognized by the International Organization for Standardization (ISO) in 2006. The ISO 14064-I approval “Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals” acknowledged the GHG Protocol Corporate Standard to become the standard for organizational GHG accounting and reporting. The standard is used in national and regional environmental programs in North America, Brazil, Europe, China, Australia and India. (Greenhouse Gas Protocol 2012a.)

#### **1.4 The environmental effects of airtransport industry**

Aircraft are the major sources of greenhouse gases out of all transport modes, especially for carbon dioxide (CO<sub>2</sub>), water vapor, and nitrogen oxides (NO<sub>x</sub>). When an aircraft burns 1 kg of fuel, 3.15 kg of CO<sub>2</sub> is discharged into the atmosphere. (Finnair 2012b. 57.) According to the International Air Transport Association (2012) air transportation accounts for 2 per-cent of man-made CO<sub>2</sub> emissions globally.

In 2008 the global number of passengers on international flights was 831 million and 1,249 million on domestic flights. These numbers are expected to further increase, in accordance with market growth in China. (Gössling & Upham 2009, 2.) Although airlines and aircraft manufacturers claim that they are undertaking substantial emissions reductions in their activities, the fact is that the industry's absolute emissions are constantly increasing. (Gössling & Upham 2009, 8.)

### **1.5 Introduction of the commissioning company: Finnair**

Finnair is the national flag carrier of Finland founded in 1923. It offers daily flights to 60 destinations in Europe and over 10 destinations in Asia. Helsinki is the main hub for its passenger and cargo traffic. The company has 7500 employees and its turnover in 2011 was EUR 2.3 billion. The company is listed on NASDAQ OMX Helsinki (Finnair 2012.) Finnair carried approximately 8 million passengers and 145 000 tons of cargo with a fleet of 60 aircraft in 2011. (Finnair 2012a; Finnair Cargo 2012.)

Finnair's flight emissions (CO<sub>2</sub>) in 2012 were approximately 2.5 billion kilograms (Finnair 2012a). The company has a continuing objective to reduce its emissions, which is discussed more in-depth in Chapter 4.

## 2 Voluntary GHG reporting

*"We shall require a substantially new manner of thinking if mankind is to survive."*

- *Albert Einstein*

According to the IPCC, the peak for GHG emissions must be reached before year 2015. Under the Kyoto Protocol extension, 37 industrialized countries and the European Community have committed to reducing their GHG emissions by 50-86 per-cent in 2050 against 2000 levels. (UNFCCC 2012b.)

Although governments work on the practical measures and legislation to achieve these objectives, they cannot achieve the objectives without help from the private sector. In the long run, the level of ambition needed to meet national and international goals falls short, if companies do not anticipate taking measures in reducing their emissions on a voluntary basis. Leadership and innovation from businesses is vital to making progress in reducing GHG emissions. It is essential that companies implement and integrate climate change policies into their mainstream business management. Setting targets for GHG emission cuts requires emissions calculations for decision-making throughout a company's value chain. (CDP 2012a, 6.)

The Kyoto Protocol represents a considerable movement towards motivating governments and organizations internationally to apply efforts for controlling their GHG emissions. Arguably, the most powerful driver for climate action, however, is public opinion. Public opinion surveys indicate that concern over air pollution is growing in all walks of life. (Financial Times, 2011.)

Following subchapters discuss issues related to companies taking voluntary action on developing their GHG inventories.

## **2.1 Corporate commitment to GHG management**

According to Borial (2006, 320.) the lack of corporate commitment to environmental actions can partly be explained by the widely-recognized perceptions of increased costs that affect productivity. If GHG reduction strategies generate savings and increase a company's productivity, managers can become more committed to environmental policies and their willingness to invest in means of decreasing environmental effects could increase (Borial, 320).

The study further suggests that adopting a proactive response can also reduce financial risks, as environmental issues are nowadays a widely-used criterion for assessing good governance and performance on financial markets. Reinsurance companies are increasingly concerned about the link between global warming and the disastrous natural phenomena causing billions of dollars damage and company insurance claims. These issues have increased the institutional pressure towards companies for putting a lid on their GHG emissions, and encouraged management to adopt proactive environmental measures into their core business strategies. And ultimately, it all boils down to improved corporate image. An improved corporate image can result in positive effect on consumer perception and product marketing. Although this phenomenon is difficult to anticipate and measure, it is presumed to mitigate the occurrences of ecological tactics and boycotts to which GHG-reduction-resistant companies are often exposed. (Borial 2006, 321.)

In Finnair's case as jet fuel alone counts for 25 per cent of the company's annual cost base, every liter of fuel saved or every Metric Tonne of CO<sub>2</sub> emissions reduced during the flight, improves the company's turnover. Finnair obviously has a palpable incentive to enhance their environmental performance, and emit less. (Finnair 2012b, 35.)

## **2.2 Stakeholder expectations**

Increased external stakeholder interest in environmental issues in recent years has had an impact on the relationships between businesses and stakeholders. According to a survey conducted by Bureau Veritas (2006, 6.) external stakeholder communication

increased from 60 percent to 85 percent between 1996 and 2005. This indicates a corresponding increase in its importance to businesses. The greatest improvement in communication regarding environmental matters among businesses and their external stakeholder groups has been with suppliers and contractors. This communication rose by 40 percent since 1996 reaching 92 percent in 2005. (Bureau Veritas 2006, 7.)

Figure 1 illustrates the change in society's expectations of business, in the past decades, and highlights some of the key events regarding environmental regulation.



Figure 1. Society's expectation of business and key events related to environmental regulation (Bureau Veritas 2006, 9).

### 2.3 Benefits from disclosing GHG emissions

The first step towards improving the corporate carbon footprint is quantifying it. Companies need a clear understanding of the source and level of GHG emissions. Companies must then implement an accurate inventory for GHG emissions, in order to clarify and simplify their accounting. (Lash & Wellington 2007, 138.)

The expected benefits from accounting and disclosing GHG emissions are various, and can be divided into direct and indirect benefits. Direct benefits are related to financial benefits, and have a direct impact on a company's profitability. Benefits of voluntary GHG emissions accounting can manifest in continuous improvement in effi-

ciency and lead to reduced costs. Through continuous improvement in its activities a company can gain a competitive advantage. (CDP 2012d.)

By developing a credible voluntary GHG inventory, a company may be rewarded when future regulations come in force by receiving recognition for their early voluntary emission reductions. Early voluntary action from companies also helps developing standards and regulations based on their experience from developing GHG inventories. (GHG Protocol 2012b, 3.)

Indirect benefits of accounting and disclosing GHG emissions can show in transparency to shareholders, clients and the public audience. Transparency builds trust and commitment among internal and external stakeholders. Voluntary disclosure can also highlight available business opportunities and permit an initial improvement in a company's reputation, as well as enhancing its brand image. (CDP 2012d; Allouche 2006, 214.)

#### **2.4 Barriers for disclosure**

The most common reasons for lack of voluntary disclosure relate to costs. Gathering data for GHG emissions is, as previously stated, a labor-intensive and time-consuming task. Applying adequate standards and protocols to the development of a GHG inventory can be complex and consequently discouraging. The private interests of directors can also act as gatekeepers for environmental data. The withholding of environmental data can be a result of a failure in a company's activities. (Allouche 2006, 207.)

### 3 Carbon Disclosure Project Nordic 260 Report

*"In god we trust. All others bring data."*

- *W. E. Deming*

What makes the CDP unique is that it currently represents the world's only *global* system for the disclosure of environmental information in the world, holding the largest environmental primary data. Since 2002 CDP has annually collected information about companies' climate strategies and GHG emissions. Now days 6,000 of the world's largest companies annually report their environmental data in a common format, replying to a standardized request that they receive from the CDP. In 2010 Harvard Business Review named this non-profit organization "the most powerful green NGO you've never heard of". It claimed that the CDP's power lies in the proactive and voluntary approach that they offer, engaging companies in transparent reporting on their carbon emissions. According to the UN's Climate Secretary, the CDP has the same magnitude of impact on the future of business as X-ray had on medicine: "how could we ever have seen the insides of one's health without it." (CDP 2012a; Winston, A. 2010).

On the one hand, the CDP is focused on helping companies to adapt more sustainable methods into their mainstream business thinking. On the other, with the high-quality environmental information it provides to financial institutions, the CDP aims to motivate investors to take possible environmental risks into account in their decision-making. The CDP also helps investors and shareholders to become more aware of the sustainability of their portfolios, and in doing so encourages them towards achieving stronger and more sustainable shareholder returns. (Green Air Online, 2012).

The companies participating in CDP reporting are recommended to follow the GHG Protocol Corporate Standard as a base for disclosing and reporting their GHG emissions. The CDP secretariat also works in close co-operation with GRI to ensure that the indicators used in both environmental reporting systems are closely aligned and

complementary (CDP 2012a). The CDP provides advisory support to reporting companies. The organization has built a network with partners, such as Price Waterhouse Coopers, Accenture and SAP who provide reporting companies assistance with their carbon disclosures (Winston, A 2010).

Finnair has been participating the CDP since 2008. The company has been a proactive in environmental reporting, collecting and reporting data for the GRI report since 2007, to benchmark its performance within the industry and also on the company level (Finnair 2012b, 9).

### 3.1 CDP scoring methodology

The CDP responses are assessed based on quality, and completeness of disclosure, and performance in contributing to climate change mitigation. There are two different scoring methodologies: disclosure score and performance score. (CDP 2012b, 32.)

In the **disclosure scoring** approach, a company receives points for each question depending on the completeness and quality of the requested information they submit. The number of points allocated to each question, in turn, depends on the importance of the information. Finally all points are calculated according to the following formula:

$$\textit{(Points awarded/ points attainable) X 100 = Disclosure Score}$$

(CDP 2013b, 3.)

In the **performance scoring** approach a company receives points based on their performance regarding GHG mitigation and their contribution to other climate change-related activities. GHG emissions with external verification improve a company's performance score. Only companies scoring a minimum disclosure score of 50 can acquire a performance score. Points are calculated with the same formula as in disclosure scoring. (CDP 2013b, 3.)



Companies participating the CPD can qualify for two leadership indices: Carbon Disclosure Leadership Index (CDLI) and Climate Performance Leadership Index (CPLI). The top 10 percent highest-scored companies in disclosure scores within its sample can qualify to CDLI, while inclusion to CPLI requires a certain score in over all climate performance. Both leadership indices require that the company's responses are publicly available. (CDP 2013b, 6.)

In 2012 Finnair achieved a rating 92 out of 100 in CDP, which placed them in the CDLI. This was the first time in the CDP's history that any airline reached this level. Finnair's previous ratings were 61 in 2010 and 78 in 2011. Finnair did not qualify for CPLI with its performance score in 2012. (Green Air Online 2012.)

### **3.2 Introducing the GHG Protocol Scopes**

The GHG Protocol has divided emissions into three scopes, to facilitate and clarify the accounting and reporting of a company's emissions. Figure 2 illustrates the greenhouse gases and the scopes into which they are divided across the company's value chain.

Upstream and downstream activities are related to indirect GHG emissions. Upstream emissions are related to purchased or acquired goods and services. These emissions derive from the support activities required for production. Downstream emissions occur when the company sells goods and services. (Greenhouse Gas Protocol 2012b, 5.)

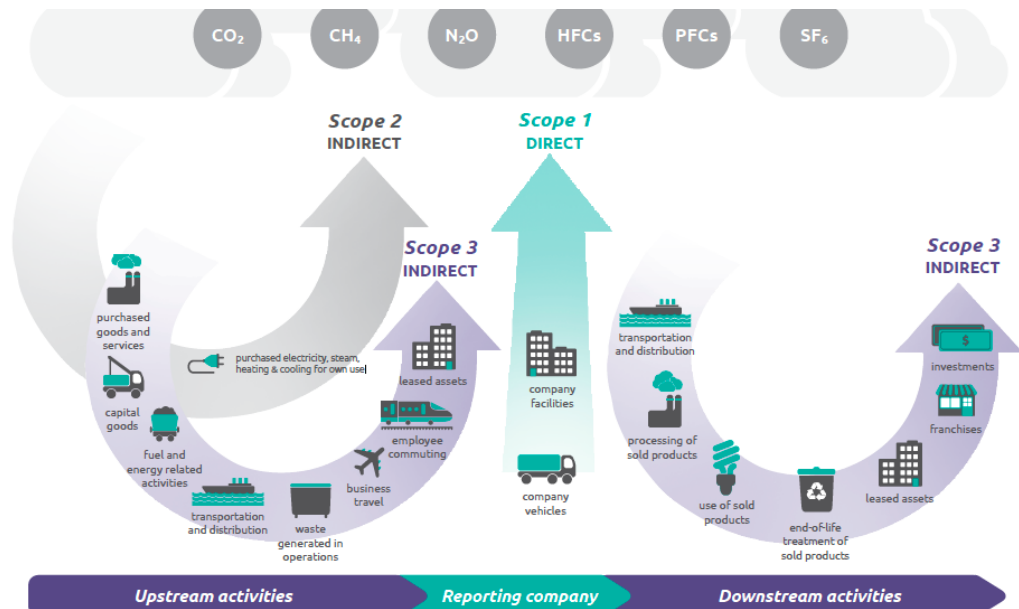


Figure 2. GHG Protocol emissions and scopes (Greenhouse Gas Protocol 2012b, 5.)

### 3.2.1 Scope 1 - direct emissions

Scope 1 emissions include direct emissions from the sources the reporting company owns or controls. These include company facilities and company vehicles. In the value chain scope 1 inventory represents emissions calculated from the production phase. (GHG Protocol 2012b, 6.)

Direct emissions are the most relevant with regards to Finnair's business goals. 99.8 percent of Finnair's scope 1 emissions originate from flight operations. The remaining 0.2 percent derives from ground operations. In 2011 Finnair's gross global scope 1 emissions amounted to 2,525,284 in Metric Tonnes of CO<sub>2</sub>e. All changes in flight procedures that result in cutting fuel consumption therefore have a significant impact on Finnair's overall GHG emissions. (Finnair 2012b, 57.)

Finnair has an intensity target to reduce its scope 1 emissions by 24 percent from the base level, from 2009-2017. Finnair intends to reach its target by renewing its fleet. The new generation aircraft, Airbus 350 XWB that replaces the current Airbus 330 and 340 wide body aircraft, will consume approximately 20 percent less fuel than its predecessor. This will result in a relative decrease in Finnair's GHG emissions. Finnair's abso-

lute GHG emissions are likely to increase, however, due to significant growth in traffic. (CDP 2012a, 3.1b.)

### **3.2.2 Scope 2 – indirect emissions**

Scope 2 emissions relate to the upstream activities. These indirect emissions are attributable to the purchased energy sources, such as electricity, steam, heating and cooling that the company consumes for running its production and operations. In scope 2 Finnair reports those activities that arise from the properties that it owns or that are in its operational possession. (GHG Protocol 2012b, 6.)

Finnair's gross global scope 2 emissions amounted to 24,920 Metric Tonnes CO<sub>2</sub>e in year 2011. This equals to approximately 1 per-cent of all emissions that Finnair reported in 2011. (CDP 2012a, 7.1.)

### **3.2.3 Scope 3 – indirect emissions**

Scope 3 emissions represent the most recent addition to the GHG accounting and reporting protocol. Scope 3 was established to support companies in building consistency and comprehensiveness in their accounting on indirect emissions in their value chain. Scope 3 takes into account all other indirect emissions associated with the company, both upstream and downstream, including transport-related activities in vehicles, such as leased cars. Scope 3 also includes emissions from purchased goods and services, capital goods, business travel and employee commuting. (GHG Protocol 2012b, 6.)

## **3.3 Implementing the full GHG inventory**

The GHG Protocol Corporate Standard requires companies to report their scope 1 and 2 emissions, whereas reporting their scope 3 emissions is optional. A company may report any scope 3 emissions they choose. (Trexler 2006.) “By definition, scope 3 occur from sources owned or controlled by other entities in the value chain.” (GHG Protocol 2012, 27.) The rationale behind the scopes is to avoid double accounting for the same emission. A company's scope 3 emissions usually represent an other

company's scope 1 or scope 2 emissions. In some companies scope 3 emissions can represent the major source of their emissions in the supply chain, offering the business model the most significant opportunity for GHG reductions. (Trexler 2006.)

The intention in applying the comprehensive GHG Protocol Corporate Standard to company's GHG reporting and measuring is to enable comparisons of company's GHG emissions over time. The Carbon Disclosure project (2012c, 7.) claims that in including the scope 3 inventory to the reporting, besides understanding their full value chain emissions impact, the scope 3 standard also helps companies to identify their GHG reduction opportunities, track their performance and engage their suppliers at the corporate level.

According to Trexler (2006), the way how companies approach scope 3 reporting varies. There are two major issues that prevent companies from applying to the scope 3 standard. Firstly, conducting a rigorous and accurate scope 3 analysis can be time consuming and expensive. Secondly, the results of the analysis can be an outcome that management does not wish to acknowledge. Depending on the industry, the indirect scope 3 emissions can exceed scope 1 and scope 2 emissions by orders of magnitude, bringing management a completely new understanding of the company's GHG impact. (Trexler, 2006.)

### 3.4 Summary of theory

Inevitably, the most successful airlines in the industry will be those able to provide their financiers with proof and transparent data of their environmental performance. As a pioneer among airlines in environmental reporting, Finnair now takes a step further to become one of the first airlines to develop a scope 3 GHG inventory on voluntary basis.

Figure 3 illustrates the connection between the key concepts and the theory. **The Kyoto Protocol** gives a definition for **GHG** emissions and sets global targets for emissions reductions. These two key concepts form rationale for voluntary GHG reporting and *development of a voluntary GHG inventory*.

**GHG Protocol** forms the basis for emissions accounting, and **GHG Protocol Corporate Standard** defines accounting and reporting guidelines for organizations. These two key concepts form the framework for GHG scopes and consequently for the *CDP Nordic 260 Report*.

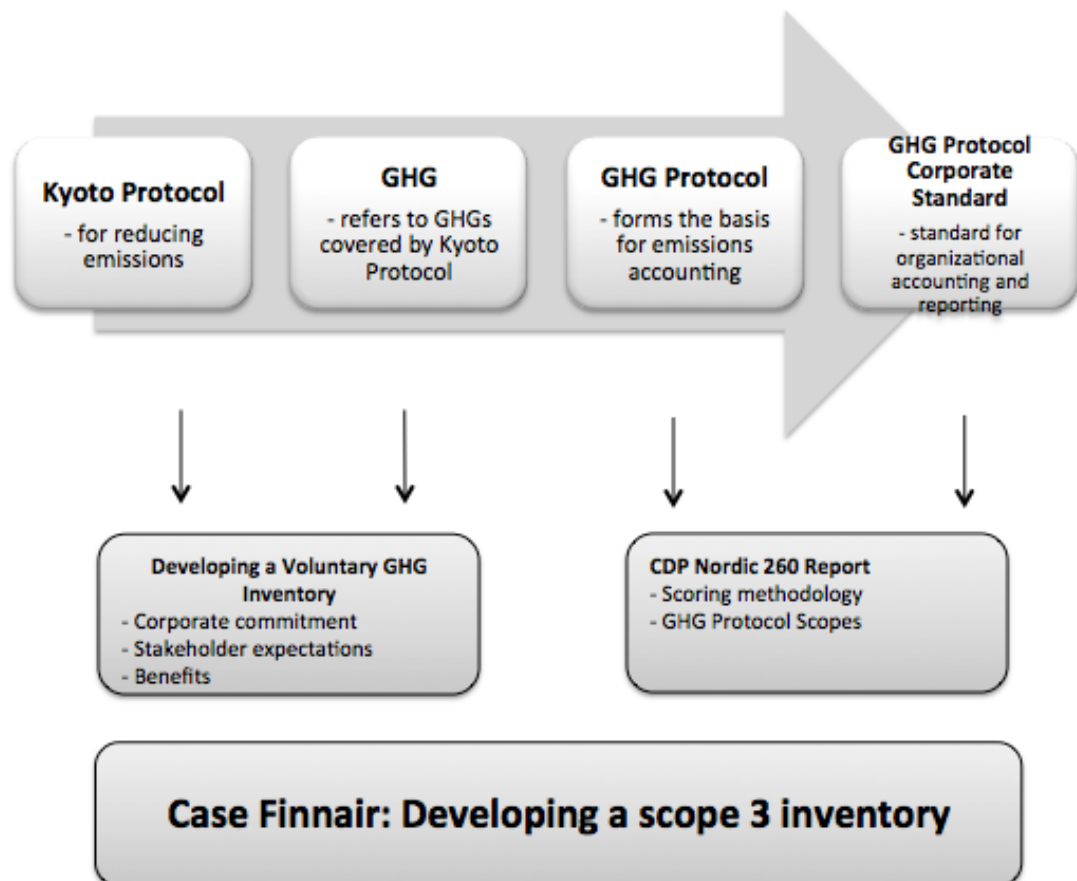


Figure 3. Connection between the key concepts and the theory. (Author's interpretation.)

## 4 Case Finnair: Developing scope 3 inventory

*“Developing scope 3 inventories strengthens companies’ understanding of their value chain GHG as a step towards effectively managing emissions-related risks and opportunities and reducing value chain GHG emissions”*

*- Greenhouse Gas Protocol*

Earlier chapters pinpoint the importance of developing a full corporate GHG emissions inventory and comprehensive reporting that incorporates all emissions throughout the company’s value chain. Doing so provides companies with a full understanding of the global warming implications of their activities, and enables organizations to better manage their GHG emissions.

In the CDP Nordic 260 Report, Finnair has so far been focusing on its scope 1 and scope 2 emissions, as the company represents a so-called carbon-intensive sector. Like the majority of reporting companies, so far Finnair has only reported its scope 3 emissions from the employee business travel. (CDP 2012b, 23.)

This chapter aims to design a scope 3 inventory roadmap for Finnair, and develop a more comprehensive and rigorous understanding of the overall emissions profile of Finnair’s upstream and downstream activities.

### 4.1 The process for developing a scope 3 inventory

Figure 4 illustrates the step-by-step process for developing a scope 3 inventory. The process starts by setting business goals, and then introduces the accounting and reporting principles defined by the GHG Protocol. The process then identifies the scope 3 activities within the company and determines which scope 3 emissions to include in the inventory. Data collection is followed by emissions allocation and emissions reporting. There are also optional phases in the process, such as setting targets for emissions over time, and assuring the emissions. (GHG Protocol 2012b, 21.) The following chapters

cover the entire process and implement it to the case company Finnair's CDP reporting.

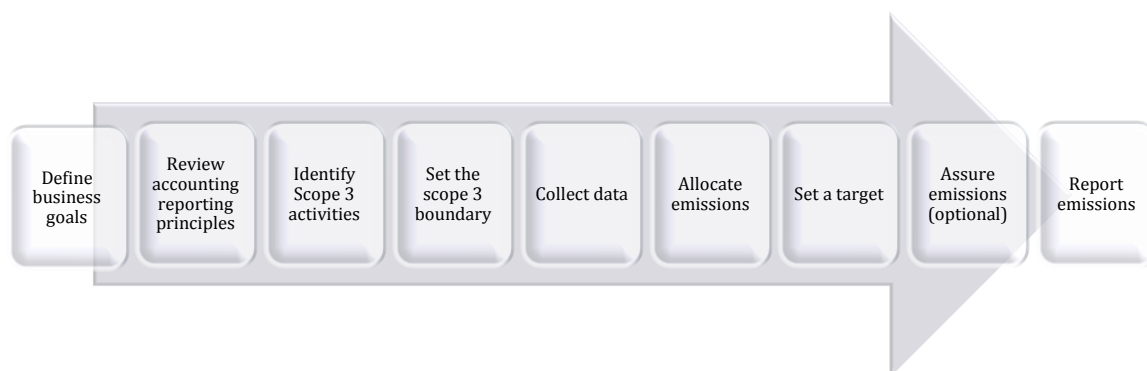


Figure 4. The process of scope 3 accounting and reporting (GHG Protocol 2012, 19)

## 4.2 Finnair's business goals of a scope 3 inventory

Goal-setting is the starting point for developing the scope 3 inventory. A company should consider the business goals it aims to achieve. Figure 5 illustrates the typical business goals served by a scope 3 GHG inventory. These goals include identifying and understanding the GHG-related risks and opportunities for a company's business. To achieve GHG reductions, a company must engage its value chain partners and employees in its activities. Finally, disclosure of GHG emissions enhances corporate reputation and improves stakeholder relations. (GHG Protocol 2012b, 12.) The following chapters discuss more in-depth how these business goals serve or relate to Finnair.

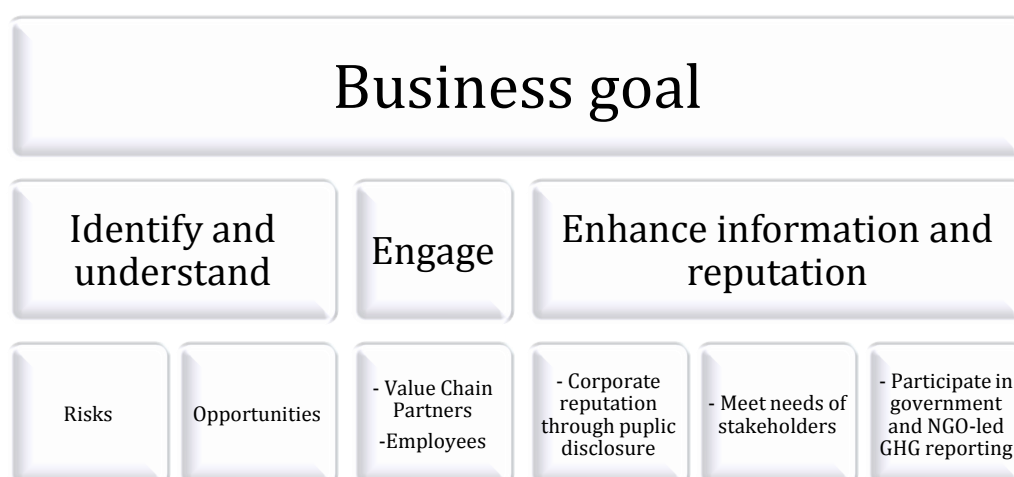


Figure 5. Business goals served by scope 3 inventory (GHG Protocol 2012b, 12.)

#### 4.2.1 Identifying and understanding the risks

Finnair includes the climate change-related risks in the assessment of its business risks. Finnair evaluates and monitors continuously environmental aspects related to their operations. Operations in this context relate to all services Finnair provides to their customers. In the CDP report Finnair contends that its climate risks manifest in such risk categories as: flight operations; environment and authorities; and reliability of operations. (2012a, 2.2.a)

**Flight operations:** The aviation industry is highly regulated and the risks associated with GHG value chain emissions therefore relate to scope 1, which account for over 90 per cent of Finnair's total GHG-emissions. Consumed fuel accounts for 25 percent of Finnair's annual cost base. The EU Emissions Trade System (ETS) poses a considerable risk for the industry ETS Phase 3 will apply to EU carriers starting in 2013. If a level playing field cannot be achieved within the regulation, there is a concern that Finnair's non-EU competitors could gain an unfair competitive advantage over EU carriers. (CDP 2012b, 20.) Finnair is trying to avoid the risks associated with scope 1 GHG emissions by optimizing its network, using shortest possible flight routes and acquiring fuel efficient fleet. (CDP 2.2.a)

**Environment and authorities:** Finnair has a global transportation network, so the company and its suppliers must comply with increased environmental legislation and with regulations that are introduced or pending in the regions where transportation activities take place. In some cases, new laws may increase environmental taxes paid by Finnair or its customers (GHG Protocol 2012b, 11). Failure to comply with these laws and regulations can be costly.

Finnair's Asian strategy is dependent on the overflight clearances in Russian airspace. Disputes Russia has with EU regarding EU's Emission Trading System still remain to be solved (European Commission 2013). Finnair's long haul fleet spends daily most of its flight time in the Russian airspace, thus any restrictions or rejections in overflight clearances would cause remarkably longer flight routes, thus greater fuel consumption for Finnair.



*Litigation risk* relates to GHG-related lawsuits directed toward entities in the value chain, or towards the company itself. Finnair can be exposed to this risk, if its value chain partners are not committed to the company's environmental policies. Lawsuits, customer and stakeholder backlashes, and negative media coverage of the company's GHG management practices can give the company a bad reputation (GHG Protocol 2012b, 13).

**Reliability of operations:** Finnair has over 1,200 approved suppliers that are divided to nine categories: Catering and customer service; Fuels; General procurement and facilities suppliers; Ground handling; Hotels and transportation; IT; Marketing; Technical maintenance; and Logistics and ground equipment (Finnair 2012c). According to Vice President of Sustainability (11 Jan 2013) Finnair Procurement Policy does not impose any general environmental prerequisites or policies on Finnair's suppliers. This increases the *regulatory risk*, as well as the *supply chain costs and reliability risk*, as Finnair's suppliers can pass higher energy- or emissions-related costs on to the company.

Representing a highly capital and energy-intensive sector, Finnair needs to take every measure to protect the sustainability of their business and act in accordance with environmental laws. Finnair should also stipulate the same from its subcontractors. Examples representing scope 3 emissions from the *products and technologies* category relate mostly to services and products that Finnair Group Travel Services and Finnair Cargo offer. Both of these entities buy services from various subcontractors, such as ground transportation companies. Increasing environmental awareness among their customers drives Finnair to find sustainable business solutions and transparency in their supply chains. In a process of tendering for air transportation or business travel, nowadays the customer often assesses the environmental impacts of the service offering. (CMI 2011.)

#### **4.2.2 Identifying and understanding the opportunities**

The GHG-related opportunities for Finnair, related to scope 3 emissions include the following (GHG Protocol 2012b, 13):

- efficiency and cost savings

- drive innovation
- increase sales and customer loyalty
- improve stakeholder relations
- company differentiation

A commonly used idiom: “What gets measured, gets improved” applies to *efficiency and cost savings* opportunities. A good example is Finnair’s operational costs generated by fuel consumption. A decrease in scope 1 GHG emissions corresponds to significant decrease in costs. The cost savings, in turn, lead to improved operational efficiency.

*Drive innovation* results from comprehensive GHG management. As the entire supply chain is engaged and aware of the GHG emissions reduction plan and incentives, it leads to new innovations in the product design and supply chain. Japanese car manufacturer Toyota (2012, 1) explains that the fundamental step in the design of their vehicles and green innovation is “hansei”, which means “reflection”. While designing and researching new innovations, members of the engineering, research and development teams reflect on the successes and failures of previous projects. They review what can be improved going forward. This way, the Toyota engineers are continually looking for ways to increase fuel economy and reduce pollutant emissions from their vehicles. (Toyota 2012, 1.) Waddock (Allouche 2006, 26) claims in her study that a process of continuous innovation and improvement gives a company a chance for remediation where necessary. A company can establish a feedback loop of learning from past problems and thereby become a learning organization in environmental issues. A feedback loop is necessary for ongoing performance improvement in the full range of a company’s management systems, and all stakeholders should be involved. (Allouche 2006, 26.)

*Increase sales and customer loyalty* relates to the increasing environmental awareness of customers. Along with the process of democratization, modern society launches common values and norms, and people are act upon them (Allouche 2006, 78). Businesses respond to these values by meeting customer expectations in their daily activities. De-

mand for new products that remarkably reduce emissions throughout the value chain will continue to grow (CMI 2011).

*Improve stakeholder relations* relates to proactive disclosure and demonstration of environmental stewardship (GHG Protocol 2012b, 13). Company engagement to environmental issues should not only be a matter of compliance with regulations or laws, however, nor of voluntary disclosure. Companies must be truly responsive to the stakeholders affected by their activities in order to generate long-term value for shareholders. The environment represents one of these stakeholders. (Bureau Veritas 2006, 1.)

*Company differentiation* is generated through reporting scope 3 inventory. It gives a company a unique opportunity to differentiate in an increasingly environmentally-conscious marketplace. (GHG Protocol 2012b, 13.)

#### **4.2.3 Engaging value chain partners in GHG management**

There are compelling reasons for Finnair to engage its value chain partners in its GHG management. Firstly, Finnair must quantify and report on emissions from various partners across the value chain in order to develop its scope 3 inventory. This way Finnair can encourage their suppliers to measure and reduce their GHG emissions, as well as report on their supplier performance. In many cases this leads to closer cooperation with supply chain partners and through that, a common understanding of the opportunities inherent in achieving GHG reductions. Secondly, Finnair can identify where its largest energy, material and resource uses are, excluding scope 1 and scope 2 inventories. This can lead to cost savings and improved overall efficiency, as discussed in previous subchapter. (GHG Protocol 2012b, 14-15.)

#### **4.2.4 Engaging employees in GHG management**

According to Mountain (2010), there are five key principles that should be taken into consideration in order to attain the desired employee engagement in a carbon management strategy. Firstly, starting with an organizational climate change program, the key to success is in creating a feeling of “by-in”. Employees must be involved in the

process from the beginning to get a feeling of being connected with the development of the project. (Mountain, 2010.)

Secondly, the importance of communication is paramount. The organization needs to communicate the goals and behavioral changes leading to significant reductions in carbon emissions. Communication and understanding must be mutual. Mixing different communication channels strengthens the message. Engaging the senior management team by organizing for example “environmental summits”, keeps management motivated and up-to-date about the progress of a company’s climate change strategy. (Mountain, 2010.)

Thirdly, climate change is a complex topic that requires education. It can be generalized, or customized according to job function. The goal of the training is to make employees understand how their own jobs relate to the strategic environmental goals of the company, and what their desired contribution to the entire process should be. (Mountain, 2010.)

Fourthly, the company should monitor, record and communicate its impact on the environment. This makes it easier for employees to realize the impact of their activities, and improve their environmental behavior as a result. (Mountain, 2010.)

Finally, when real behavioral change has been achieved and sustained in the longer term, employees must be continually reinforced, recognized and rewarded for their performance on these issues. (Mountain, 2010.)

#### **4.2.5 Enhancing stakeholder information and corporate reputation through reporting**

The call for greater disclosure of corporate activities and GHG information among stakeholders has become noteworthy throughout this study. By all indications, development of a scope 3 inventory by disclosing information about their indirect emissions and reduction activities should be a Finnair business objective. Proactive disclosure improves stakeholder relationships and demonstrates fiduciary responsibility to share-

holders (GHG Project 2012, 15). In Finnair's case this is an important aspect, acting in the energy and capital-intensive airline industry.

### 4.3 Principles for accounting and reporting of a scope 3 inventory

A scope 3 inventory GHG accounting and reporting is based on five principles: relevance, completeness, consistency, transparency and accuracy. Selected categories to the inventory shall reflect the relevant GHG emissions for Finnair. All relevant GHG sources shall be included into inventory, and all exclusions need to be justified. The transparency ensures that all GHG inventory related data endures closer review. Used methodologies must be consistent to be able to track emissions over time. Data must be accurate, as specific as possible, to ensure the users make decisions based on the GHG emissions report. In practice, however, companies implementing these principles to their accounting and reporting can encounter tradeoffs depending on their individual business goals. (GHG Project 2012, 23-24.)

The emissions included in scope 3 relate to all indirect upstream and downstream emissions, excluding scope 2 inventory, that occur in a company's value chain. Defining the organizational boundary and determining which operations are included in this boundary is an essential step in corporate GHG accounting. Finnair has chosen to use *Operational control* as their consolidation approach (CDP 2012a, 8.1.) Under this approach, Finnair accounts for 100 percent of the GHG emissions over which it has operational control. In practice, this means that the operations Finnair owns wholly or in which Finnair owns an interest, but over which Finnair does not have operational control, are not included in their GHG emissions accounting. (GHG Protocol 2012, 29.) There are some examples of these kinds of operations within Finnair's organization. One such operation is Finnair Catering Ltd., which is a wholly owned subsidiary of Finnair PLC. The company signed a five-year partnership agreement with LSG Sky Chefs (LSG) in August 2012, and transferred its operations regarding catering services to LSG (LSG Sky Chefs 2012.) Finnair therefore does not include the emissions from catering operations beyond September 2012 in its scope 1 or scope 2 inventories. Instead, Finnair includes emissions from the products and services it acquires from LSG in its scope 3 inventory. Another example is the fleet of four Embraer 170 aircrafts

that Finnair has leased to Estonian Air from Q1 2012 (Finnair 2012c, 9). The emissions from these leased assets are not included in Finnair's value chain emissions, as Finnair has no operational control over the aircraft while they are subleased.

Finnair's organization consists of the following five divisions, each of them holding several sub-divisions:

- Tour Operators, Travel Agencies & Catering (including Finnair Flight Academy)
- Commercial
- Customer Service
- Operations (including Technical Operations, Flight Operations and Ground Operations)
- Cargo.

(Finnair 2012a.)

The Procurement department is an individual support unit within the organization. The sourcing is divided into five categories: Fuels; Catering & Customer service; IT; Hotels & Transportation; and General Procurement & Facilities. (Leppänen, K 11 Jan 2013.)

#### **4.4 Identifying relevant scope 3 categories**

The scope 3 standard is comprised of 15 distinct categories, as listed in Table 1 and Table 2. This framework has been developed to provide companies with a tool to organize, understand, and report on different scope 3 activities within their corporate value chains. To avoid double-counting of emissions, the categories are designed to be mutually exclusive. (WRI & WBCSD 2011, 3.)

Companies do not need to account for emissions from each entity in its value chain. Excluding scope 3 activities from the minimum boundary of each category is permitted, provided that exclusions are disclosed and justified. By default, the upstream and

downstream categories include only those emissions not reported in Finnair’s scope 1 or scope 2 inventories. (GHG Protocol 2012b, 65.)

Figure 6 illustrates the criteria for prioritizing data collection efforts within a company. There are two alternative criteria that can be used to identify the most significant scope 3 GHG activities: *magnitude of GHG emissions* and *financial spend or revenue*. Prioritizing activities based on the magnitude is regarded as the most rigorous method, as it makes comparisons between the categories explicit. As Finnair mainly sells services, the financial spend is another criterion for use in the identifying process. Ranking among the categories is established by comparing the purchased product category’s spend to Finnair’s total spend. There are several other criteria for prioritizing data, such as activities related to influence, risk, stakeholders and outsourcing. (GHG Protocol 2012b, 65.)

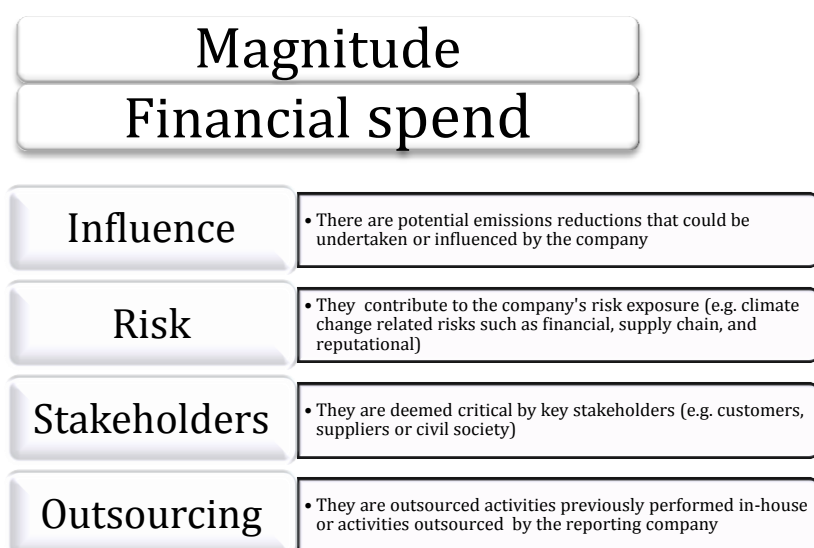


Figure 6. Criteria for prioritizing data collection efforts (GHG Protocol 2012b, 65, Authors interpretation.)

#### 4.5 Description of scope 3 categories involving Finnair

This subchapter describes the scope 3 categories and their relevance to Finnair’s scope 3 inventory. The emphasis is on the categories representing mostly upstream emissions, since Finnair’s outputs are mainly services. Finnair produces only components and technical services for its own use worth about EUR 3 million annually (Finnair

2012c, 37.) The relevance of downstream emissions is therefore not very significant to Finnair's scope 3 activities.

#### 4.5.1 Purchased goods and services

The *purchased goods and services* category includes emissions from all procurement categories, excluding fuels which are counted as scope 1 emissions (GHG Protocol 2012b, 38). Figure 7 presents the categories of materials and services Finnair purchased in 2011. The total amount of purchased goods and services was EUR 1,092.1 million in 2011. The graph shows that jet fuel accounted for 50,8 percent of goods and services purchased. (Finnair 2012c, 38.)

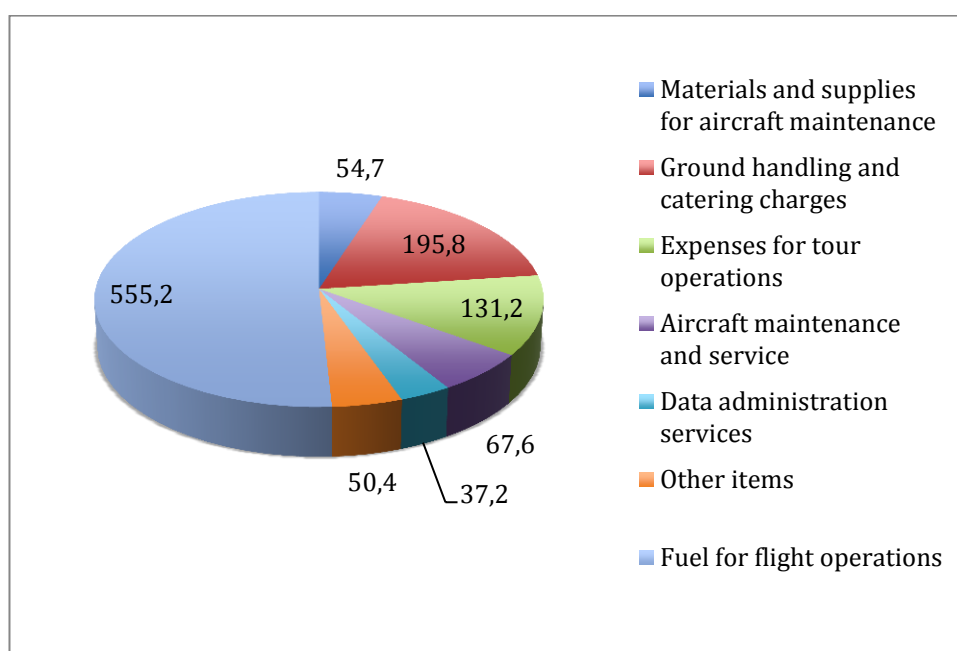


Figure 7. Purchased goods and services in EUR million (Finnair 2012c, 38.)

Including the purchased goods and services in the scope 3 inventory, Finnair has a particularly good opportunity to start tracking emissions from this category that present almost half of Finnair's turnover, which was EUR 2,257.7 million in 2011. (Finnair 2012c, 24.) Through selection of suppliers, Finnair can influence the emissions reductions. This category includes several risks that contribute to Finnair's risk exposure.



These risks relate to climate change, such as product and technology risks, and reputational risks.

#### **4.5.2 Fuel- and energy-related activities**

The *fuel and energy related activities* category includes emissions from the extraction and transportation of fuels that Finnair consumes. The category excludes all emissions from the production of fuels and energy consumption not reported in Finnair's scope 1 or scope 2 inventories. (GHG Protocol 2012b, 41.) The category in question is relevant for Finnair, since fuels account for over half of the company's purchases annually (Finnair 2012c, 38). Finnair does not have a significant impact on fuel transportation or fuel extraction, but this category poses significant *risks* for the company. Previous examples have illustrated that if anything fails in the fuel supplier's supply chain, environmental consequences may be catastrophic. This category is therefore also deemed critical by Finnair's key stakeholders, especially investors and society.

The indirect energy used in Finnair's facilities is mainly heat and carbon-neutral electricity. Finnair purchased 54,721 MWh electricity for its operating location at Helsinki-Vantaa Airport in 2011. (Finnair 2013, 54.) The GHG emissions from electricity production for Finnair's use are limited, since Finnair does not have production that uses electricity. Electricity production can consequently be left out of the category for reporting purposes.

#### **4.5.3 Upstream transportation and distribution**

*Upstream transportation and distribution* is a category wherein lies the potential for emissions reductions by Finnair Cargo and its customers. Both outbound and inbound cargo transportation, excluding the air transport, is included in this category, since it is a purchased service. Finnair Cargo leases truck services for forwarding and distributing incoming freight from the cargo terminal in Vantaa, Finland onwards to customers all over Northern Europe. The bottleneck for emissions tracking from these transportation activities has been marine transportation, as sea-shipping companies do not report their emissions. Finnair Cargo has developed a calculator in co-operation with software

supplier Basware, however, to calculate GHG emissions from freight transportation throughout the value chain. (Ihamäki, K. 11 Jan 2013).

#### **4.5.4 Waste generated in operations**

*Waste generated in operations* includes emissions from waste generated in operations owned or controlled by Finnair, provided that waste and wastewater is disposed of and treated by a third-party (GHG Protocol 2012b, 44).

Finnair purchases its food products from LSG Sky Chefs Finland. This category offers the most significant opportunities for emissions reductions, as the commissioning company has a great impact on the product offered to their customers. Even minor changes or innovations regarding packaging materials can have a significant impact on the amount of waste produced. Finnair should pay particular attention to the amount of waste imported from countries outside of the European Union (EU), as some waste cannot be recycled, requires special treatment and is expensive to handle. Waste from outside of the EU must be separated from other waste throughout the collection and transportation process. (Ministry of Agriculture and Forestry 2003, 4.2-4.3.)

Propylene glycol used for removing ice and snow from aircraft fuselages, poses the most significant risks regarding the environment. The use of propylene glycol can fluctuate from year to year, depending on the weather conditions. (Finnair 2012c, 52.) Finnair and the Helsinki-Vantaa Airport authority Finavia have taken measures to decrease the use of propylene glycol. Preflight treatment for the aircraft fuselage has been moved from the gate to a remote treatment area, located near the runways. By this arrangement the holdover time, the time-span between the aircraft's glycol treatment and the time it should take off, can be better guaranteed. If the aircraft does not take off within this timeframe, it must be retreated with the fluid, generating more unnecessary waste. These remote treatment areas are designed so that the spilled excess fluid can be recovered from the ground. (Ihamäki, K. 11 Apr 2013.)

Figure 8 illustrates the waste generated in Finnair's operations, showing the magnitude of propylene glycol and food purchases in waste generated in Finnair's operations.

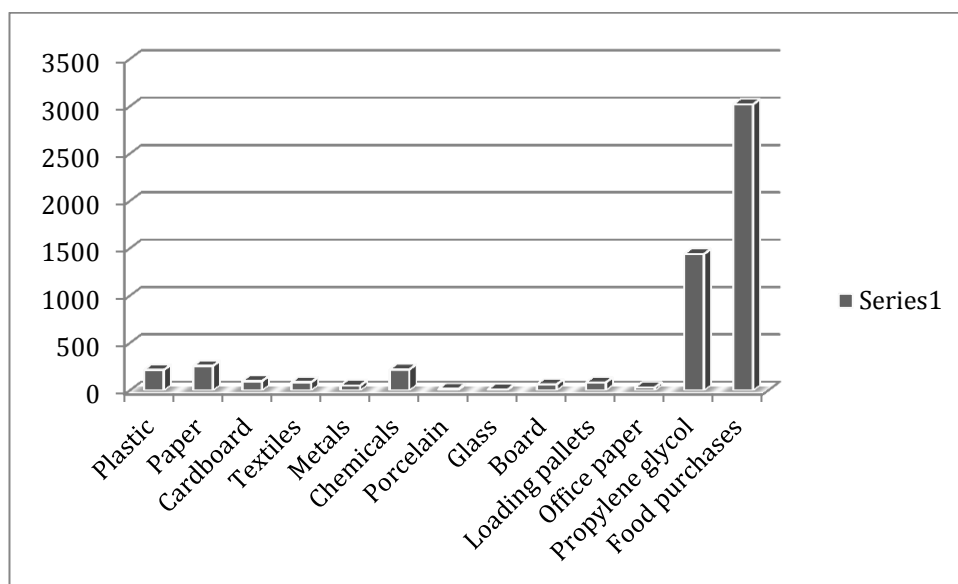


Figure 8. Waste generated in Finnair's operations, reported in 1 000 kilograms (Finnair 2012b, 52, Author's interpretation.)

#### 4.5.5 Business travel

Most emissions from Finnair employees' *business travel* arise from air travel. The flights for business travel on Finnair's own aircraft are reported in scope 1, whereas business travel on other companies' aircraft is reported in scope 3. According to the CDP Report 2011 (CDP 2012, 51.) this is the only category that Finnair reported in their scope 3 emissions in 2011. The relevance of this category is based on employee engagement in GHG reductions.

#### 4.5.6 Employee commuting

The *employee commuting* category comprises emissions that arise from all modes of employee transportation, when employees commute between their homes and worksites (GHG Protocol 2012b, 46). Accounting and reporting of this category is relevant for encouraging Finnair's 7,500 employees to find solutions for reducing emissions that arise from their commuting.

Based on the author's research, the accounting of this category's GHG emissions will be based on data received from Finnair's SAP database detailing cabin crew's commuting distances between their homes and Helsinki-Vantaa Airport. As the sample presents approximately 30 percent of the total number of employees it will be used as average-data.

#### **4.5.7 Upstream leased assets**

The *upstream leased assets* category includes mainly the cars that Finnair has leased for its employees as an employee benefit. All aircraft that Finnair has leased for its own operations are included in the scope 1 category due to the *operational control* consolidation approach, which Finnair has chosen to use in its reporting (CDP 2012a, 3.1b). As in previous categories, the rationale for reporting these emissions relates to employee engagement in reducing GHG emissions.

#### **4.5.8 Downstream leased assets**

The *downstream leased assets* category includes in Finnair's case, the emissions from the aircraft it owns but has leased to other operators (GHG Protocol 2012b, 50). This category has become more significant in size since Finnair leased its twelve-aircraft Embraer 190 -fleet to regional carrier Flybe Nordic at the end of October 2012 (Taloussanomat 2012). The routes that were previously operated by the Embraer 190 -fleet have been outsourced to Flybe Nordic.

Finnair also subleased two of its Embraer 170 aircraft to Estonian Air in February 2012 (Finnair 2012c, 7). Emissions from those operations are also included in this category.

#### **4.5.9 Discarded categories from the inventory**

The *capital goods* category includes the emissions from the production of investments that Finnair has acquired during the reporting year (GHG Protocol 2012b, 46). This

category becomes relevant only when Finnair makes significant investments, for example, to its aircraft fleet.

The *downstream transportation and distribution* category is excluded from the scope 3 inventory by Finnair, since Finnair has leased the transportation capacity of its cargo transportation and reports it in the *upstream transportation and distribution* category.

The *processing, use, and end-of-life treatment of sold products* categories are excluded from the scope 3 inventory, since Finnair does not produce products for sale.

The *franchises and investments* categories are excluded from the scope 3 inventory since Finnair does not operate franchises, and its emissions from investments in aircraft are included in the scope 1 inventory.

#### **4.6 Identifying relevant scope 3 categories**

Table 1 brings together all Finnair's scope 3 upstream activities discussed in the previous subchapters. Besides listing the primary criteria for each category, it also lists other significant criteria including the category in Finnair's scope 3 inventory. The table also gives a short description of each category.

Table 2 in turn brings together all Finnair's scope 3 downstream activities showing that there is only one significant scope 3 GHG source, *downstream leased assets*, included in these activities.

Table 1. Identifying and prioritizing Finnair's scope 3 upstream activities.

<b>Category</b>	<b>Primary criteria</b>	<b>Other criteria</b>	<b>Description</b>
Purchased goods and services	Financial spend Magnitude	Influence Risk Outsourcing	All upstream emissions from purchased goods
Capital goods	-	-	Category relevant only when significant investments done
Fuel and energy-related activities	Magnitude	Risk Stakeholders	Upstream emissions of purchased fuels
Upstream transportation and distribution	Magnitude	Influence Stakeholders	Transportation and distribution of purchased goods, and cargo transport
Waste generated in operations	Financial spend Magnitude	Influence Risk Stakeholders	Disposal and treatment of waste generated in the reporting company's operations
Business travel	Magnitude	Influence	Transportation of employees for business
Employee commuting	Magnitude	Influence	Transportation of employees between their homes and their worksites
Upstream leased assets	Financial spend	Influence	Operation of cars leased by the reporting company

Table 2. Identifying and prioritizing Finnair's scope 3 downstream activities.

<b>Category</b>	<b>Primary criteria</b>	<b>Other criteria</b>	<b>Description</b>
Downstream transportation and distribution	-	-	-
Processing of sold products	-	-	-
Use of sold products	-	-	-
End-of-life treatment of sold products	-	-	-
Downstream leased assets	Magnitude	Outsourced	Assets the company owns but have leased outside
Franchises	-	-	-
Investments	-	-	-

## 4.7 Collecting data

The previous subchapters prefigure that collecting scope 3 emissions data is more complex and time-consuming task, than collecting scope 1 and scope 2 emissions data. It requires an unyielding, long-term engagement from several entities, such as supply chain partners and the reporting company's internal departments for collecting the data.

After identifying and prioritizing a company's scope 3 activities the data should be selected according to on the relevant importance of the activities and also the availability and quality of data. The available data can be primary data, such as supplier-specific data, or secondary data, such as industry-average data. (GHG Protocol 2012b, 65-66.)

**Primary data** refers to the data that has been collected for a specific research purpose. This kind of data offers inclusive and thorough information about a company's value chain activities. Collecting primary data from value chain partners can be prohibitively expensive, however, as it is often time-consuming and labor-intensive. A company can encounter difficulties in verifying the quality and sources of this data. (Saunders & Reva 2007, 122.)

**Secondary data** refers to data that has been previously obtained for the purposes of other research, but can be used for the research in question. (Saunders & Reva 2007, 123). Secondary data in this context may refer to industry-average data. Collecting secondary data is beneficial in accounting for emissions from minor activities. Secondary data also represents an alternative for unavailable or insufficient primary data. On one hand, compared to primary data, secondary data is more cost-efficient. On the other hand, secondary data might not represent a company's specific activities and ignores operational changes undertaken by the value chain partners in terms of emission cutting. Primary data should therefore always be chosen when tracking specific GHG emission performance from operations. (GHG Protocol 2012b, 74.)

### 4.7.1 Data quality

When selecting data, the collector should pay special attention to its technological, temporal and geographical representativeness. The selected data should also be complete and reliable. The rationale for assessing data quality indicators is to enable data quality to be tracked and enhanced over time. (GHG Protocol 2012b, 76.) Figure 9 illustrates the data quality indicators that should be considered in data selection.

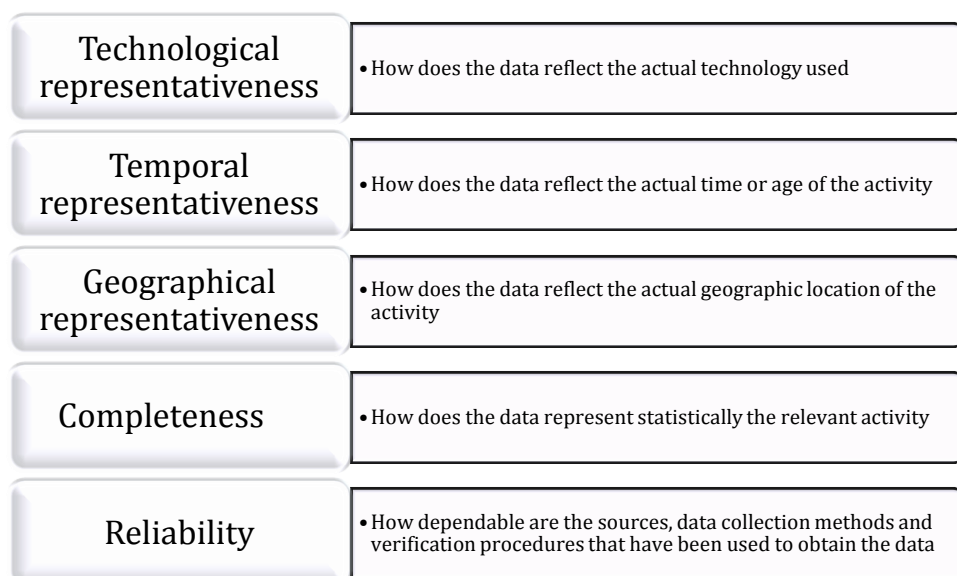


Figure 9. Data quality indicators (GHG Protocol 2012b, 76).

### 4.7.2 Collecting primary data

To obtain adequate primary activity data, a company should encourage and engage its most relevant suppliers and partners in developing a GHG inventory (GHG Protocol 2012, 78). Tier 1 supplier refers to a supplier that provides goods and services directly to the company. Finnair's tier 1 suppliers are those that provide Finnair with materials, services and other supplies through purchase orders. According to Development Manager of Procurement, Finnair does not currently require their suppliers to provide GHG emissions data from their activities). Some logistics service providers, however, such as DHL are pioneers in environmental reporting and therefore able to offer this kind of information about their activities. Finnair's Procure to Pay –project that implemented in 2012 to enhance procurement processes within Finnair, facilitates identi-



fication of the most relevant suppliers by providing more accurate data about supplier-specific spending by category. (Leppänen, K 11 Jan 2013.)

There are many ways to select relevant tier 1 suppliers for GHG data collection. Based on the author's researches, in Finnair's case the most explicit way to collect tier 1 data is by prioritizing suppliers based on their contribution to Finnair's total spending. Finnair can then rank those tier 1 suppliers that represent 80 percent of total spending, and request GHG activity data from those suppliers. From the remaining suppliers that represent 20 percent of total spending, Finnair can choose those that are expected to have significant emissions.

Finnair should create an electronic form to the partners and suppliers in its value chain requesting the following information:

- product life cycle GHG emissions data
- scope 1 and scope 2 emissions data from the reporting year
- supplier's upstream scope 3 emissions
- methodologies used to quantify emissions
- methods supplier used to allocate emissions
- whether the data has been verified and how
- any other relevant information regarding the suppliers emissions

(GHG Protocol 2012b, 79.)

#### **4.7.3 Level of data**

To acquire the most comprehensive emissions and activity data, the level of primary data should be product-specific (GHG Protocol 2012b, 79). This way a company can avoid allocation of emissions, which adds uncertainty to the emissions estimates. If product-specific data is not available, a company should obtain GHG activity data from the supplier for the activities, processes, or production lines that produce the product. If this data is also unavailable, the company should obtain facility-level data, or business unit data. Figure 10 explains the different levels of data.

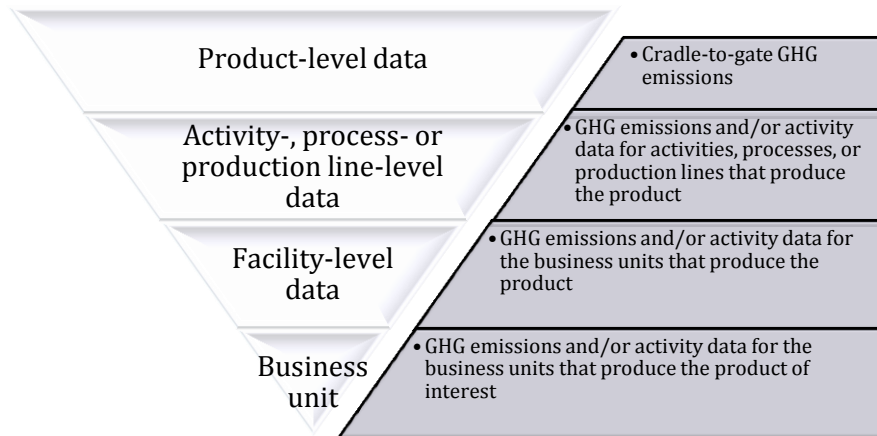


Figure 10. Levels of data (GHG Protocol 2012b, 80).

#### 4.7.4 Collecting secondary data and filling data gaps

A company should only use secondary data to calculate emissions from those activities where supplier-specific data cannot be obtained. (GHG Protocol 2012b, 78.) The data used should originate from national governments or carry international recognition.

**Proxy data** refers to data obtained from similar activity in previous researches (Saunders & Reva 2007, 19). It is stand-in data that can be used if the quality of acquired data is not sufficient.

Assessing data quality is an ongoing process. In the initial phase of the development of a scope 3 inventory, Finnair is unable to report data of premium quality from all of their activities. As soon as high-quality data becomes available, Finnair should replace the low-quality data.

#### 4.7.5 Allocating emissions

Emissions allocation is a process whereby GHG emissions of a single source are divided among several categories. Allocation should be avoided or minimized whenever possible. Allocation is necessary, however, when a single manufacturer produces sever-

al outputs or when emissions are not quantified by each output. (GHG Protocol 2012b, 87.)

Refining jet fuel is an example where allocation can take place. Neste Oil's refinery in Porvoo is the only jet fuel supplier in Finland (Neste Oil, 2013). As the refinery produces also other outputs, allocation is needed, if Neste Oil could not quantify separately the amounts of scope 3 GHG emissions from their production of jet fuel for Finnair's purposes.

GHG Protocol Product Standard has developed a three-step decision tree for supporting companies in selection of an appropriate allocation approach.

Step 1. Avoid allocation if possible

- Try to acquire product-specific GHG data.
- Try to separately sub-meter the energy use or other activity data used to produce each output.
- Search for engineering models to separately estimate the energy use or other activity data used to produce each output.

Step 2. Consider physical allocation, if allocation cannot be avoided

- Use when physical factors best reflect the causal relationship between the production of the outputs and the resulting emissions and there is data available from the physical quantities of the produced outputs.

Step 3. If data is not available, use another method

- Use economic factors or other relationships for allocation.

(GHG Protocol 2012b, 89.)

#### **4.7.6 Tracking and reporting emissions performance over time**

In order to be able to set GHG reduction target and track emissions over time there must be a baseline, a year against which to track performance. As earlier mentioned in

subchapter 4.2, setting the target and tracking performance of scope 3 emissions is essential in order to meet a company's business goals: to identify the risks and opportunities, engage employees in emissions mitigation and to enhance the company's information and reputation among shareholders.

2013 will be the first year Finnair reports scope 3 emissions from several categories. The collected data will therefore not be complete and sufficiently reliable to form a baseline year for scope 3 emissions. According to GHG Protocol (2012b, 100) Finnair can set the baseline year later, when it finds the inventory sufficiently reliable and complete.

As Finnair has several significant scope 3 activity categories, they can choose to set separate targets for its individual scope 3 categories. The benefits of this target boundary according to GHG Protocol (2012b, 101) are as follows:

- the ability to customize targets according to circumstances
- improved transparency by category
- increased number of metrics for tracking progress
- baseline year calculation is not needed when adding new categories
- ease of tracking specific activities and their performance.

When it comes to the target type, implementing a combination of absolute and intensity targets seems the most appropriate solution for Finnair. The implementation allows more transparency to Finnair's reporting (GHG 2012b, 102). In practice it means that Finnair sets an absolute target for their entire scope 3 inventory. Finnair can also set intensity targets by different categories to better reflect performance improvement regardless of business growth or decline.

As soon as the baseline year is set, Finnair can also set the recalculation policy. In practice, this means that there should be a threshold regarding possible significant changes in Finnair's structure or inventory methodology, at which point the recalculation take's

place. This maintains consistency and ensures appropriate comparison between categories over time. (GHG 2012b, 104.)

#### **4.7.7 Assurance**

As mentioned, scope 3 inventory GHG accounting and reporting is based on five principles: relevance, completeness, consistency, transparency and accuracy. According to ISO 14064 (2005), assurance is the level of confidence, which ensures that these attributes manifest.

According to the CDP verification, a synonym the CDP use for assurance, of the data is not required. Assurance has a significant impact on the score, however as full points can only be gained by providing verification for the given data. Verification must be performed by a third party. (CDP 2013b, 3.) Finnair has used PriceWaterhouseCoopers (PwC) as the assurer for its scope 1 emissions. Finnair's scope 2 emissions have not been verified yet. (Ihamäki, K. 11 Jan 2013.)

#### **4.8 Reporting**

The CDP report is submitted through the Online Response System (ORS). The CDP offers a comprehensive climate change responder pack on their web page with all needed forms and instructions. CDP's (2013a) Question Pathway requires the following information:

- organization's scope 3 emissions
- verification/assurance status and proportion of verified emissions
- further details of the verification and needed certificates
- comparison to previous years
- engagement with value chain members (suppliers, customers, other partners) regarding GHG emissions
- details of the methods of possible engagement.

Attachment 2 further explains the data collection plan and calculation methods.

#### **4.9 Implementation plan and schedule**

The implementation of Finnair's scope 3 inventory took place in April 2013. The author was invited to work as a project coordinator responsible for the scope 3 inventory development.

The author started collecting data from the divisions by sending them the inventory tool, a pre-filled Excel sheet (Attachment 2), in mid-April 2013. The author also gave a short brief to the divisions concerning the data-collection methods. The actual reporting will take place in May 2013 when the required data is available and verified.

## 5 Project design and methods

This chapter discusses how the methodological choices of this study were made for both the theoretical framework and the project design.

### 5.1 Collecting primary data

The primary data was mainly acquired by interviewing Finnair representatives. The author used the semi-structured interview method when acquiring primary data and background information for her study.

According to Bryman & Bell (2003, 574) a **semi-structured interview** refers to a situation in which interview questions form only a loose framework for the interview. The questions are predefined but interviewees are encouraged to engage in further discussion of the topic. The semi-structured interview allows the interviewer to ask more specific questions about issues that arise from the replies he or she receives. Firstly, in the very early phase of the thesis project the author interviewed the Vice President of Sustainability, in order to clarify Finnair's overall stance on the development of a scope 3 inventory (Attachment 3.). Through this interview, the author also gained valuable insights into Finnair's environmental reporting.

Secondly the author interviewed the Development Manager of Procurement to get an understanding of Finnair's current status and stance on how Finnair's vendors are engaged to provide information about their GHG emissions to Finnair (Attachment 3.). Another objective of this particular interview was to find out how much GHG emissions data is available in different procurement categories. Both of these interviews were conducted in January 2013.

Finally, the author attended several meetings for planning GHG emissions data collection from different divisions within the organization. These meetings and discussions have given the author a comprehensive understanding of the kind of information essential in terms of roadmap design. In April 2013 the author also represented Finnair

in a workshop organized by Finnish Business & Society where she gained valuable insights into environmental responsibility in a supply chain.

## 5.2 Collecting secondary data for the framework

The underlying concept regarding the first part of the theoretical framework is focused on finding arguments and rationale for *voluntary greenhouse gas reporting*. The two questions the author wanted to investigate, therefore, were as follows:

- “Why is development of a voluntary GHG inventory beneficial for a company?”
- “What are the typical barriers that may hinder a company from voluntary reporting?”

To answer these questions the author used the qualitative approach method. According to Bryman & Bell (2003, 573) the **qualitative research method** is used when the data being collected and analyzed is not quantified, but rather expressed with words. This study uses the **inductive research method**, meaning that the research is generated out of theory (Bryman & Bell 2003, 570). The author studied the related literature, journals and several Internet sources to form an understanding of this phenomenon. The author’s aim was to convince Finnair that reporting scope 3 GHG emission is important.

For the second part of the framework the author investigated Finnair’s *Carbon Disclosure Project Nordic 260 Report* responses from previous years and studied the scoring methodology. The author also researched background information about CDP from various Internet sources and literature. To gain a deeper understanding into reporting instructions, the author also studied video material from CDPs web-pages.

## 5.3 Methods for designing the roadmap for scope 3 inventory

The project itself is a roadmap for developing the scope 3 inventory (Chapter 4), supplemented with the inventory tool (Attachment 2.). Figure 11 illustrates the standards



and protocols for the roadmap collected from three different sources. Firstly, Finnair provides essential information about the amounts of resources used in their operations, and discloses the financial figures and some environmental information about their activities. Secondly, the GHG Protocol accounting and reporting standard lists all the requirements that must be followed for a scope 3 inventory to be in conformance with the standard (GHG Protocol 2012 b, 23). Finally, the Guidance for Calculating Scope 3 Emissions provides methods for calculating scope 3 emissions for each of the fifteen scope 3 categories (IPCC 2012c, 7).

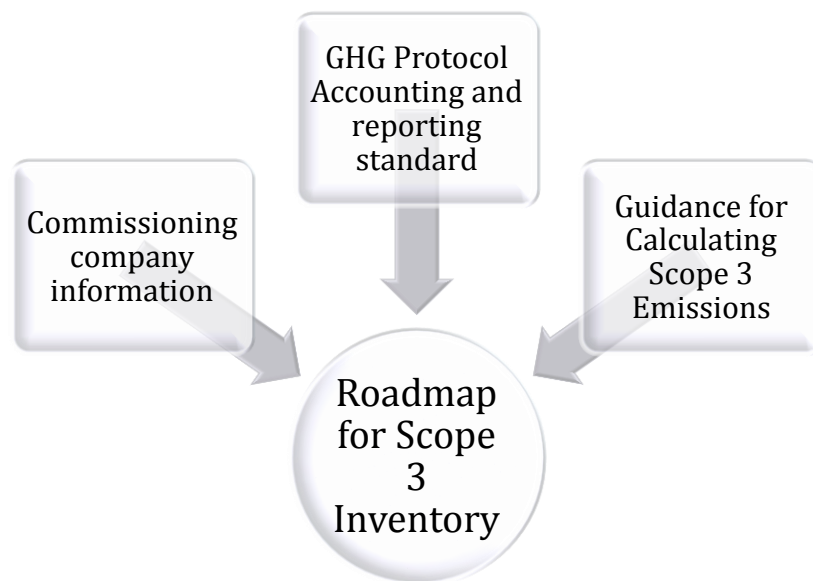


Figure 11. Designing roadmap for Scope 3 Inventory (Author's own interpretation).

## 6 Discussion

*"Alone we can do so little; together we can do so much."*

- *Helen Keller*

The author started this thesis project in November 2012. At that time, development of scope 3 inventory was not a topical issue for Finnair. Finnair was mainly focused on the main sources for its emissions, and on mitigation of the direct scope 1 GHG emissions from their flight operations activities. After investigating the GHG Protocol and other secondary data related to scope 3 emissions, however, the author identified many opportunities. Firstly, she claimed that Finnair did not know the environmental impacts of their indirect emissions, as they do not have an inventory of them. Secondly, the author rationalized that mitigation of indirect emissions could not be systematically controlled if they were not measured. Finally, the author was convinced that her product, the scope 3 inventory would help Finnair to further improve its performance in CDP reporting in upcoming years.

Two months after the thesis project started, the CDP announced that the emphasis on 2013's reporting would be on disclosure of scope 3 emissions. The benefit of this thesis project for Finnair became palpable.

### 6.1 Theory and product evaluation

The author can point out clear arguments addressing the investigative questions of the theoretical framework by using various sources and researching the topic from different standpoints.

The theory research clarifies how important corporate commitment and employee engagement in environmental reporting is in GHG reporting success. Increasing stakeholder expectations towards climate change activities, in turn, motivates management and employees to engage in voluntary disclosure.

In the second chapter the author provides essential background information on the CDP. This chapter gives an overview of GHG emissions in a company's value chain and infrastructure. This information is needed to enable an appreciation of the role of a scope 3 inventory plays in the value chain.

Finally, the author provides a comprehensive roadmap, in Chapter 4, for designing the product itself, the scope 3 GHG inventory for Finnair. This chapter goes step-by-step through the process, including all necessary company-specific information to the road map. Based on the roadmap, the author designed a tool for scope 3 emissions calculation and reporting to support the disclosure process (Attachment 2).

Even though this study offers a rigid framework for Finnair's scope 3 inventory, the data collection process will undoubtedly be challenging in practice. There is a vast amount of data that cannot easily be acquired. The requirements for suppliers regarding GHG data may be unattainable as well. Managing these challenges will involve patience and a long-term commitment to this project from Finnair.

The project objective "Creating a roadmap for a comprehensive scope 3 GHG inventory development for Finnair" was successfully completed according to schedule. The results were reviewed and approved by Finnair's Vice President of Sustainable Development. The tool the author developed for calculation and reporting purposes, furthermore, was taken into use by all divisions involved in the project.

## **6.2 Validity and reliability of the study**

According to Bryman & Bell (2003, 575) "**Validity** refers to the integrity of the conclusions that are generated from a piece of research." The roadmap provides the required framework for the GHG emissions by defining Finnair's business goals that are served by scope 3 inventory, identifying the relevant scope 3 categories, providing instructions for collecting data, and reporting. In addition, the roadmap provides the required data related to Finnair's scope 3 GHG emission sources. Combining the previously mentioned framework with Finnair-related data forms the validity of this study.

If data related to Finnair's *purchased goods and services* category would change drastically within one year, for example, it would also have an impact on the category-related risk assessment and many other variables as well.

According to Bryman & Bell (2003, 33), **reliability** refers to the repeatability of the results of a study. The question regarding this study is: "Does the user repeatedly receive the same results by using the same data and the inventory tool developed by the author?" The sources used in developing the roadmap and the calculation tool represent publications and protocols published by renowned institutions like WFI and WBCSD.

Based on sources the author used in this study, Finnair's calculated scope 3 emission data will fulfill the required standards and will be reliable. For each category, the author has provided two or three calculation method options and formulas to facilitate reporting. Especially in the early stages of the scope 3 GHG data collection, as a limited amount of data is available, average-data will be used as the calculation method. This affects on Finnair's data quality during the first years of reporting.

### **6.3 Own learning**

The author is contented with the outcome of the thesis. She is grateful that her employer supported her in researching a topic in which she was interested. The author's contacts and long experience working with Finnair helped her to access the required data. During the thesis project, the author gained a comprehensive understanding of how carbon disclosure projects is conducted within organizations, supported by a vast number of professionals both inside and outside of the case company.

The author assumes the outcome of the thesis could have been even better if she had started with the product and only after that begun work on the theory part. While researching background information for the roadmap, the author formulated theories that would have been even more compatible with the theoretical framework.

## **6.4 Recommendations and next steps**

In order to develop a comprehensive scope 3 GHG inventory, the author strongly recommends that Finnair starts systematically require GHG disclosure from their suppliers. The suppliers should be notified of the disclosure requirement in the assessment and selection phase. Only those suppliers capable of providing this information concerning their products and services would therefore be able to participate in the supplier-selection process. Finnair should design an electronic form through which suppliers can submit their data. This would save time and costs for Finnair and suppliers, as well as offering Finnair the opportunity to quantify and follow up on the amounts of its indirect emissions and consequently take measures to mitigate emissions in a systematic way.

Time does not permit Finnair to acquire verifications of its scope 3 GHG emissions for the 2012 CDP report, since the deadline for disclosures is the end of May 2013. The verification project should preferably be executed in autumn of 2013 to successfully conclude the process by the next reporting year. The process will be costly and time-consuming, but by accomplishing it Finnair will be rewarded with better carbon management and improved environmental reporting in the short run, and even greater benefits in the longer term.

The further development of the scope 3 inventory would ideally require a coordinator who would manage data collection, verification processes and reporting. A coordinator could ensure that all required steps in the process are taken in a timely manner. A coordinator could also manage the required internal and external communication regarding the CDP project, as this is one of the most important factors when it comes to successful reporting.

## **6.5 Benefits of the study**

Environmental reporting is a complex, time-consuming and costly process for a large organization like Finnair. The most critical phase of reporting is the designing phase. In order to succeed in the reporting, the fundamentals must be meticulously dealt with.

The author worked several weeks on converting the standard and instructions to serve the purposes and needs for Finnair's CDP reporting. The objective and the "red string" for the author in developing the roadmap and reporting tool for the scope 3 inventory was to make it as simple and explicit as possible. Her aim was to include only relevant instructions regarding data collection, GHG calculations and reporting to ensure the data accuracy and user-friendliness of the product.

The scope 3 GHG inventory affects Finnair's score in CDP reporting. Disclosure of indirect emissions adds value to Finnair's environmental reporting and daily operations. By accounting indirect emissions, Finnair is better able to evaluate their environmental performance when it comes to the mitigation of GHG emissions overall.

The theoretical framework of this thesis can help companies develop their own scope 3 GHG inventories, by providing clear arguments for the benefits of reporting indirect GHG emissions. Companies can also use the roadmap and calculation tool where applicable.

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## Attachments

### Attachment 1. Overlay Matrix for Product-Oriented Thesis

<b>Project Objective (PO)</b>	<b>Project Tasks (PTs)</b>	<b>Theoretical Framework *</b> (concepts & models)	<b>Gantt Chart Items</b>	<b>Output</b>
Creating a roadmap for a comprehensive Scope 3 GHG inventory development for the commissioning company	Finding sources and theories	Reading materials regarding aviation and environment Finnair's sustainability reports	1	Needed material gathered for the theoretical framework
	Studying theory and the GHG protocol	The GHG Protocol CDP Nordic 260 Report GHG Protocol Corporate Standard	2	Needed background information for the study
	Writing the theoretical framework	The GHG Protocol CDP Nordic 260 Report GHG Protocol Corporate Standard	3	Theoretical framework for the report
	Process description – developing the roadmap	GHG Protocol Corporate Standard The Greenhouse Gas Protocol Initiative	4.1-4.7	Roadmap for the report
	Developing the tool for reporting	GHG Protocol Corporate Standard	5	Inventory - instructions and report
	Writing the Discussion & evaluation	Methods literature	6	Discussion of the study

# Attachment 2a. Inventory tool

## Summary of Finnair's scope 3 inventory (CDP 2013b, 14.1-14.4d).

### Carbon Disclosure Project's Finnair's Scope 3 Inventory Report

Sources of scope 3 emissions	Q14.1 Evaluation Status	Q14.1 Metric tonnes CO2e	Q14.1 Methodology	Q14.1 Percentage of emissions calculated using primary data	Q14.1 Explanation	Q14.2b Type of verification or assurance	Q14.2b Relevant verification standard	Q14.2b Attach the document	Q14.3a Reason for change	Q14.3a Emissions value (%)	Q14.3a Direction of change	Q14.3a Comment
Purchased goods and services Capital goods Fuel and energy related activities (not included in Scope 1 or 2) Upstream transportation and distribution Waste generated in operations Business travel Employee commuting Upstream leased assets Downstream leased assets												

Q14.2: Please indicate the verification/assurance status that applies to your scope 3 emissions. Third party verification underway but not yet complete in first year has taken place

Q14.2a: Please indicate the proportion of your scope 3 emissions that are verified/assured. More than 10% but less than 20% equal to 10%

Q14.3: Are you able to compare your scope 3 emissions for the reporting year with those for the previous year for any sources? Yes, from business travel and?

Q14.4: Do you engage with any of the elements of your value chain on GHG emissions and climate change strategies? Yes, our customers

Q14.4a: Please give details of the methods of engagement, your strategy for prioritizing engagements and measures of success

Number of suppliers	% of total spend	Comment

Q14.4b: To give a sense of scale of this engagement, please give the number of suppliers with whom you are engaging and the proportion of your total spend that they represent

Q14.4c: If you have data on your suppliers' GHG emissions and climate change strategies, please explain how you make use of that data

How you make use of the data	Please give details

Q14.4d: Please explain why not and any plans you have to develop an engagement strategy in the future

Source: WRI's WBCSD, 2011  
 URL: <http://www.ghgprotocol.org/files/ghgp/tools/GHG%20Protocol%20Guidance%20for%20Calculating%20Scope%203%20Emissions%20-%20DRAFT%20August%202011.pdf>

# Attachment 2b. Inventory tool

## Purchased goods and services (WRI & WBCSD 2011, 13-22).

**Purchased goods and services**

Division: Procurement  
 Owner: Jari Huhtinen/Kati Leppinen  
 Contact: Head of category  
 - Catering & customer service (Heidi Niemankanto-Järvinen)  
 - IT (Eerika Mattinen)  
 - Hotels & Transportation (Anne Oksanen)  
 - General procurement & facilities (Marjo Heiskanen, Maarit Rimpelä)

**Category description:**

- all upstream emissions from the production of products purchased
- applies to both goods and services
- cradle-to-gate: all emissions that occur in the life cycle of purchased products up to the point of receipt by the reporting company

**Calculation methods:**

**Option 1: Product Level Method**  
 to be used when tier 1 supplier can provide product-level cradle-to-gate GHG data of sufficient quality  
 Formula:  $1 \text{ QTY} * \text{CO}_2\text{e/kg}$

**Option 2: Supplier-specific Method**  
 to be used when tier 1 supplier can provide scope 1 & 2 data of sufficient quality  
 Formula:  $1 \text{ emission factors for purchased goods} + \text{material inputs} + \text{transport} + \text{waste outputs} + \text{others}$

**For purchased services:**  
 Formula:  $1 \text{ Scope 1 \& 2 emissions} + \text{mass or value} + \text{mass of waste}$

**Option 3: Material- or Spend-Based Approach**  
 to be used in case no other GHG data is available  
 - industry average activity data or proxy data from other products  
 Formula:  $1 \text{ kg/€/€}^2 * \text{emission factor per unit}$

Purchased goods and services	
Types and sources of data being used for CO2e calculation	Description of Methodologies, Allocation Methods & Assumptions
<b>Activity data (primary data):</b> Product level method -quantities or units of goods and services purchased Supplier-specific calculation method for purchased goods Allocation: Scope 1 and 2 data by tier 1 supplier relating to purchased goods -Mass of material inputs used by tier 1 supplier -Distance of transport of material inputs to tier 1 supplier -Other emissions embodied in provision of the purchased goods as applicable Supplier-specific calculation method for purchased goods -Scope 1 and 2 emissions of tier 1 supplier, mass and value of goods used, quantities of waste produced Material or spend based calculation method -mass or number of units of purchased goods or services or amount spent on purchased goods Emission factors (secondary data): Product-level method -supplier-specific emission factors for the purchased goods or services Supplier-specific calculation method for Purchased goods -Emission factors for materials, incoming transport of input materials, and waste outputs by tier 1 supplier to produce purchased goods -Other emission factors as applicable Supplier-specific calculation method for Purchased Services -emission factors for goods per unit of mass or value and emission factors for waste outputs by tier 1 supplier to produce purchased services Material or spend based calculation method -cradle to gate emission factors per unit of mass or unit of product	
Data quality of emissions	
Percentage emissions calculated using data provided by suppliers or other value chain partners	

**Project plan**

Task	Week 17	Week 18	Week 19	Week 20	Week 21
Data collection					
Accounting					
Verification					
Reporting					

Notes
Consider sampling (simple random sampling or stratified sampling)

# Attachment 2c. Inventory tool

## Fuel and energy related activities (WRI & WBCSD 2011, 30-38).

**Fuel and energy related activities**

Division: Procurement  
 Owner: Ippo Juhola, Anja Niinimäki  
 Contact:

**Category description:**

- energy purchased and consumed (those that are not included in scope 1 or 2)
- extraction and transportation of fuels consumed by AF

**Calculation methods:**

**Purchased fuels**

Option 1: Supplier-specific approach  
 - to be used when tier 1 supplier can provide fuel-provider-specific emission factors on extraction, production and transportation of fuels per unit

Option 2: Average data approach  
 - to be used when fuel-provider-specific data is not available or applicable

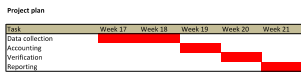
Formula:  $1 \text{ Fuel consumed} + \text{Upstream fuel emission factor (kg CO}_2\text{/kWh)}$   
 Where:  
 - Upstream fuel emission factor = Cradle to gate emission factor - Combustion emissions factor

**Purchased electricity**

Option 1: Supplier-specific approach  
 - to be used when tier 1 supplier can provide utility-specific emission factors on extraction, production and transportation of fuels consumed per MWh of electricity, steam, heating or cooling generated

Option 2: Average data approach  
 - Grid region, country, or regional emission factors for extraction, production and transportation of fuels per unit of consumption of electricity, steam, heating or cooling generated

Formula:  $1 \text{ (Electricity consumed (kWh)} \times \text{Upstream Electricity Emission Factor (kg CO}_2\text{/kWh)} + \text{Steam consumed (kWh)} \times \text{Upstream Steam Emission Factor (kg CO}_2\text{/kWh)} + \text{Heating Consumed (kWh)} \times \text{Upstream Heating Emission Factor (kg CO}_2\text{/kWh)} + \text{Cooling consumed (kWh)} \times \text{Upstream Cooling Emission Factor (kg CO}_2\text{/kWh)}$   
 Where:  
 - Upstream emission factor (fuel, electricity, steam, heating, cooling) = Cradle to gate emission factor (fuel, electricity, ...) - Combustion emissions factor (fuel, electricity, ...)



Fuel and energy related activities	
Types and sources of data being used for CO2e calculation	Description of Methodologies, Allocation Methods & Assumptions
Activity data (primary data): Quantities and types of fuel consumed AND Quantities of electricity, steam, heating or cooling purchased and consumed per unit of consumption	
Emission factors (secondary data): Fuel-provider-specific emission factors on extraction production and transportation of fuels per unit of fuel consumed by the reporting company AND Utility-specific emission factors for extraction, production, and transportation of fuels consumed per MWh of electricity, steam, heating or cooling generated	
Data quality of emissions	
Percentage emissions calculated using data provided by suppliers or other value chain partners	

**Notes**



# Attachment 2d. Inventory tool

## Upstream transportation and distribution (WRI & WBCSD 2011, 39-52).

**Upstream transportation and distribution**

Division: Finnair Cargo  
 Owner:  
 Contact:

**Category description:**

- transportation and distribution of the products purchased by AY
- third-party transportation and distribution services by AY
- air, rail, road, marine (volume) transport
- storage of purchased products in warehouses

**Calculation methods:**

**Transportation**

*Option 1: Fuel-based method*

- involves determining the amount of fuel consumed (derive from scope 1 and 2 emissions from transport providers) and apply the appropriate emissions factor for that fuel

- Formula 1:  $\Sigma$  Quantity of fuel consumed (litres) X emission factor for the fuel (kg CO<sub>2</sub>e/litre) +  $\Sigma$  Quantity of refrigerant leakage (kg) X emission factor for refrigerant (kg CO<sub>2</sub>e/kg)

- Formula 2: Total distance travelled (km) X Fuel efficiency of vehicle (litres/km)

- Formula 3: Total fuel consumed (litres) X (Mass/volume of company's goods + Mass/volume of goods transported)

*Option 2: Distance-based method*

- involves determining the mass, distance, and mode of each shipment, then applying the appropriate mass-distance emissions factor for the vehicle used

- Formula:  $\Sigma$  Mass of goods purchased (onner or volume) X Distance travelled in transport leg (km) X emission factor of transport mode or vehicle type (kg CO<sub>2</sub>e/tonne or volume/km)

**Distribution**

*Option 1: Site-specific method*

- collecting site-specific fuel and energy data from the storage facility (warehouses, distribution centres, etc.) of individual events and multiplying them by appropriate emission factors

- Formula: Emissions of storage facility (kg CO<sub>2</sub>e = (fuel consumed (kWh) X Fuel emission factor (kg CO<sub>2</sub>e/kWh)) + (Electricity consumed (kWh) X Electricity emission factor (kg CO<sub>2</sub>e/kWh)) + (Refrigerant leakage (kg) X Refrigerant emission factor (kg CO<sub>2</sub>e/kg))

Then:  
 Allocated emissions of storage facility = (Volume of reporting company's purchased goods (m<sup>3</sup>)/Total volume of goods in storage facility (m<sup>3</sup>)) X Emissions of storage facility (kg CO<sub>2</sub>e)  
 Finally, sum across all storage facilities:  
 $\Sigma$  Allocated emissions of storage facility

*Option 2: Average data method*

- to be used where supply-chain specific data is unavailable
- Formula:  $\Sigma$  Volume stored goods in reporting year (m<sup>3</sup>) X Emission factor for storage facility (kg CO<sub>2</sub>e/m<sup>3</sup>) N.B. or pallets instead of goods

Upstream transportation and distribution	
Types and sources of data being used for CO <sub>2</sub> e calculation	Description of Methodologies, Allocation Methods & Assumptions
<p>Activity data (primary data):</p> <p><i>Transportation</i>            Quantities of fuel (diesel, jet fuel, etc.) consumed and refrigerant leakage</p> <p>Distance travelled by transportation suppliers</p> <p><i>Distribution</i>            Site-specific fuel, electricity use and refrigerant leakage            OR            Volume of purchased goods, or number of pallets needed to store purchased goods</p> <p>Emission factors (secondary data):</p> <p><i>Transportation</i>            Fuel emission, expressed in units of litres of fuel consumed (CO<sub>2</sub>e/litres)            Refrigerant leakage emission factors, expressed in units of emissions per unit of refrigerant leaked (CO<sub>2</sub>e/kg)</p> <p>Emission factor by mode of transport or vehicle types, expressed in units of greenhouse gases per unit of mass or volume travelled</p> <p><i>Distribution</i>            Site-Specific or regionally specific emission factors for energy sources per unit of consumption and emission factors of fugitive and process emissions</p> <p>Collect data which allows the calculation of emissions per unit stored, such as factor per pallet stored in facility, per m<sup>2</sup>/m<sup>3</sup> stored, per TEU stored</p>	
<b>Data quality of emissions</b>	
<b>Percentage emissions calculated using data provided by suppliers or other value chain partners</b>	
<b>Notes</b>	
Consider sampling (simple random sampling or stratified sampling)	

**Project plan**

Task	Week 17	Week 18	Week 19	Week 20	Week 21
Data collection					
Accounting					
Verification					
Reporting					

## Attachment 2e. Inventory tool

### Waste generated in operations (WRI & WBCSD 2011, 53-57).

**Waste generated in operations**

Division:  
Owner:  
Contact:

**Category description:**  
- emissions from third-party disposal and treatment of waste and wastewater generated from AY's owned or controlled operations i.e. those operations that are purchased by AY from other operators

**Calculation methods:**

*Option 1: Waste-type specific method*  
- type of waste (e.g. cardboard, food-waste, wastewater)  
- waste treatment method

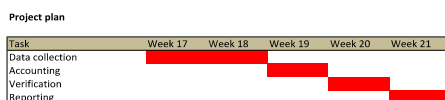
- Formula:  $\sum$  Waste product (tonnes) X Waste type and waste treatment specific emission factor (kg CO<sub>2</sub>e/tonne)

*Option 2: Average-data method*  
- collect data based upon the total waste diversion rates

Formula:  $\sum$  Total mass of waste (tonnes) X proportion of total waste being treated by waste treatment method X emission factor of waste treatment method (kg CO<sub>2</sub>e/tonne)

Waste generated in operations	
Types and sources of data being used for CO <sub>2</sub> e calculation	Description of Methodologies, Allocation Methods & Assumptions
<p><b>Activity data (primary data):</b></p> <p><i>Waste-type specific method</i> Waste produced (e.g. tonne, m<sup>3</sup>) and type of different waste generated in operations.</p> <p>For each waste type, specific waste treatment method applied (e.g. landfilled, recycled, etc.)</p> <p><i>Average-data method</i> Total mass of waste generated in operations and proportion of this waste being treated by different methods (% e.g. landfilled, recycled, etc.)</p> <p><b>Emission factors (secondary data):</b></p> <p><i>Waste-type specific method</i> Collect waste type and waste treatment specific emission factors based upon the individual waste types and how these waste types are treated</p> <p><i>Average-data method</i> Collect average waste treatment specific emission factors based upon all waste disposal types</p>	
<b>Data quality of emissions</b>	
<b>Percentage emissions calculated using data provided by suppliers or other value chain partners</b>	

**Notes**



## Attachment 2f. Inventory tool

### Business travel (WRI & WBCSD 2011, 58-61).

**Business travel**

Division: ID travel  
 Owner: Minna Pekkala  
 Contact:

**Category description:**  
 Emissions from the transportation of employees for business-related activities in vehicles owned or operated by third parties (aircraft, train, bus, and passenger car)

**Calculation methods:**

Involves multiplying activity data by emission factors, taking into account the vehicle type.

*Distance-based method*

Formula:  $\sum$  Distance traveled by vehicle type X vehicle specific emission factor + (optional)  $\sum$  Annual number of hotel nights X hotel emission factor

Business travel	
Types and sources of data being used for CO2e calculation	Description of Methodologies, Allocation Methods & Assumptions
Activity data (primary data): Total distance travelled by each mode of transport for all employees	
Emission factors (secondary data): Use emission factors that represent kilograms of CO2e emitted per kilometer or passenger-kilometer for each mode of transport	
<b>Data quality of emissions</b>	
<b>Percentage emissions calculated using data provided by suppliers or other value chain partners</b>	

Notes
Consider sampling (simple random sampling or stratified sampling) Crew transportation in destinations Hotel emission project SAP Airtravel included in Scope 1 Travel with other airlines

**Project plan**

Task	Week 17	Week 18	Week 19	Week 20	Week 21
Data collection					
Accounting					
Verification					
Reporting					

## Attachment 2g. Inventory tool

### Employee commuting (WRI & WBCSD 2011, 67-69).

**Employee commuting**

Division:  
Owner:  
Contact:

**Category description:**  
Emissions from the transportation of employees between their homes and their worksites

**Calculation methods:**  
Involves multiplying activity data by emission factor.

*Option 1: Company-specific method*

Formula:  $\Sigma$  One way distance between home and work (km) X 2 X number of commuting days per year

*Option 2: Average-data method*  
If company specific data is unavailable, use average data of distances, modes of transport and commuting days per week.

Formula:  $\Sigma$  Total number of employees X % of employees using mode of transport X one way commuting distance X 2 X working days per year X emission factor of transport mode (kg CO<sub>2</sub>e/vehicle km or kg CO<sub>2</sub>e/passenger km)

Employee commuting	
Types and sources of data being used for CO <sub>2</sub> e calculation	Description of Methodologies, Allocation Methods & Assumptions
<b>Activity data (primary data):</b>  <i>Company-specific method</i> Collect data on total distance travelled by employees and the mode of transport they are using  <i>Average-data method</i> Number of employees, average distance, average breakdown of transport modes, average number working days	
<b>Emission factors (secondary data):</b>  <i>Company-specific method</i> Collect emission modes for each mode of transport  <i>Average-data method</i> Emission factors for each mode of transport expressed as kg GHG emitted per passenger-kilometer travelled	
<b>Data quality of emissions</b>	
<b>Percentage emissions calculated using data provided by suppliers or other value chain partners</b>	

Notes
Consider sampling (simple random sampling or stratified sampling)  For company specific data: - SAP - Webropol - HR division

**Project plan**

Task	Week 17	Week 18	Week 19	Week 20	Week 21
Data collection					
Accounting					
Verification					
Reporting					

## Attachment 2h. Inventory tool

### Upstream leased assets (WRI & WBCSD 2011, 67-69).

**Upstream leased assets**

Division:  
Owner: Jari Huhtinen  
Contact:

**Category description:**  
Emissions from the operation of assets that are leased by the reporting company and not included in Scope 1 or 2 inventories.

**Calculation methods:**

*Option 1: Site-specific method*

Formulas:  
- Assets:  $\Sigma$  Scope 1 and 2 emissions of each leased asset  
- Leased space (kWh): (Reporting company's area/building's total area) X (building's total energy use/building's occupancy rate)

*Option 2: Average-data method*

Involves estimating emissions for each leased asset, or groups of leased assets, based on average statistics and secondary data

Formulas:  
Commercial assets (building type):  $\Sigma$  Floor space X average emission factor (kg CO<sub>2</sub>e/m<sup>2</sup>/year)  
Other assets:  $\Sigma$  Building/Asset type X average emissions per building/asset type

Upstream leased assets	
Types and sources of data being used for CO <sub>2</sub> e calculation	Description of Methodologies, Allocation Methods & Assumptions
<p>Activity data (primary data):</p> <p><i>Site-specific method</i> Collect data on site-specific fuel, electricity use and refrigerant leakage</p> <p><i>Average-data method</i> Collect data on floor space, number of leased assets (by building type, company cars, aircraft, etc.)</p>	
<p>Emission factors (secondary data):</p> <p><i>Site-specific method</i> Collect site or regionally specific emission factors for energy sources per unit of consumption and of fugitive and process emission</p> <p><i>Average-data method</i> Collect average emission factors by floor space, by building type or by asset type</p>	
<b>Data quality of emissions</b>	
<b>Percentage emissions calculated using data provided by suppliers or other value chain partners</b>	

Notes
Office space Leased cars

**Project plan**

Task	Week 17	Week 18	Week 19	Week 20	Week 21
Data collection					
Accounting					
Verification					
Reporting					

## Attachment 2i. Inventory tool

### Downstream leased assets (WRI & WBCSD 2011, 91).

**Downstream leased assets**

Division:  
Owner: Jari Huhtinen  
Contact:

**Category description:**  
Emissions from the operation of assets that are owned by AY (acting as a lessor) and leased to other entities in the reporting year that are not included in Scope 1 or 2.

**Calculation methods:**

*Option 1: Site-specific method*

Formulas:  
- Assets:  $Z$  Scope 1 and 2 emissions of each leased asset  
- Leased space (kWh): (reporting company's area/building's total area)  $\times$  (building's total energy use/building's occupancy rate)

*Option 2: Average-data method*

Involves estimating emissions for each leased asset, or groups of leased assets, based on average statistics and secondary data

Formulas:  
Commercial assets (building type):  $Z$  Floor space  $\times$  average emission factor (kg CO<sub>2</sub>e/m<sup>2</sup>/year)  
Other assets:  $Z$  Building/Asset type  $\times$  average emissions per building/asset type

Downstream leased assets	
Types and sources of data being used for CO <sub>2</sub> e calculation	Description of Methodologies, Allocation Methods & Assumptions
<p>Activity data (primary data):</p> <p><i>Site-specific method</i> Collect data on site-specific fuel, electricity use and refrigerant leakage</p> <p><i>Average-data method</i> Collect data on floor space, number of leased assets (by building type, company cars, aircraft, etc.)</p>	
<p>Emission factors (secondary data):</p> <p><i>Site-specific method</i> Collect site or regionally specific emission factors for energy sources per unit of consumption and of fugitive and process emission</p> <p><i>Average-data method</i> Collect average emission factors by floor space, by building type or by asset type</p>	
<b>Data quality of emissions</b>	
<b>Percentage emissions calculated using data provided by suppliers or other value chain partners</b>	

Notes
Leased aircraft

**Project plan**

Task	Week 17	Week 18	Week 19	Week 20	Week 21
Data collection					
Accounting					
Verification					
Reporting					

## Attachment 3. Interview Questions

Interview questions

10 Jan 2013

Kati Leppänen, Development Manager of Procurement

1. Does Finnair have a code of conduct for their suppliers?
2. Does Finnair have prerequisites regarding environmental performance for their suppliers (e.g. GHG emissions or other environmental related data)?
3. Is there any GHG data available from Finnair's suppliers?
4. Does procurement collect any data on GHG emissions from Finnair's purchased goods and services?

Kati Ihamäki, Vice President of Sustainability

1. What are Finnair's targets in CDP reporting in 2012?
2. Has Finnair considered developing a scope 3 inventory?
3. What would be the most significant challenges for Finnair in scope 3 reporting?