How do Finnish tourism companies measure their carbon footprint and what can be done to reduce it?

A case study of 10 companies

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ABSTRACT

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Tourism is one part of traveling, being traveling for pleasure, and it can better be defined as people staying at a destination, outside their ordinary environment for at least one night (Mason, 2015; Page & Connell, 2006), while at the longest usually staying for one year (Yu, Kim, Chen & Schwartz, 2012). When talking about climate change and the greenhouse gases, traveling becomes an important aspect accounting for 5% of the global carbon dioxide emissions (Hall, Scott, Gössling, 2013; Peeters & Dubois, 2010, p. 477). Tourism also accounts for 8% of the global greenhouse gas emissions (Carbon Brief, 2018; Lenzen et al., 2018).

Altogether tourism can have a carbon footprint of 4.5Gt CO2 and it is expected that the emission factor will increase 3.2 percent per year, up to 2035. From the emissions of tourism 75% is caused by *transportation*, 21% is caused by *accommodation* and 4% is caused by *activities.* Additionally, *food* usually accounts for about 25% of the total emissions caused by humans.

The thesis aims to answer the questions 'How can Finnish tourism companies measure their carbon footprint, in which phase they are in measuring the carbon footprint and how have they succeeded so far.' These questions will be answered by conducting a case study where 10 companies doing business in Finland will be interviewed. The selected companies are of different ages and sizes and they represent different functions. This thesis is of qualitative nature and it used semi-structured interview questions.

Finnish tourism companies measure their carbon footprint by using primary and secondary data, and the previous year or the previous three year's average are used as baselines. The companies also use the Greenhouse Gas Protocol corporate standard and available carbon footprint calculators and emission databases. Additionally, some companies use a third-party verification.

All the companies have not measured their carbon footprint yet. These kinds of companies show increasing interest in calculating it in the future by themselves, or with help from another company.

There are many ways for the Finnish tourism companies to reduce the carbon footprint of tourism. The ways are related to becoming more energy efficient, switching to renewable energy, recycling and avoiding waste, as well as reducing the use of plastic and disposable utensils. Also, they make environmentally friendlier choices regarding the vehicles they use.

Finally, it was possible for all the companies to create a carbon handprint, by being able to decrease their customers' carbon footprint.

Keywords: Carbon footprint, Carbon handprint, Tourism, Traveling, Climate change

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TIIVISTELMÄ

Tekijä
Lotta Mannonen

Työn nimi
Miten suomalaiset turismialan yritykset mittaavat hiilijalanjälkeään ja millä tavoilla sitä voidaan pienentää? Tapaustutkimus 10 yrityksestä

Oppiaine	Työn laji
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Turismi on yksi osa matkailua, matkailua nautinnon vuoksi ja se voidaan paremmin määritellä niin että ihmiset oleskelevat kohteessa, joka on heidän tavanomaisen ympäristönsä ulkopuolella, vähintään yhden yön (Mason, 2015; Page & Connell, 2006) ja enintään yhden vuoden (Yu, Kim, Chen & Schwartz, 2012). Puhuttaessa ilmastonmuutoksesta ja kasvihuonekaasuista, matkailulla on iso rooli, sillä sen osuus maailmanlaajuisista hiilidioksidipäästöistä on 5% (Hall, Scott, Gössling, 2013; Peeters & Dubois, 2010, p. 477). Turismi vastaa myös 8% osuutta globaaleista kasvihuonekaasupäästöistä (Carbon Brief, 2018; Lenzen et al., 2018).

Yhteensä turismin hiilijalanjälki voi olla 4.5Gt CO2e ja päästökertoimen oletetaan nousevan 3.2% vuodessa, vuoteen 2035 asti. Matkailun päästöistä 75 % syntyy *kuljetuksista* 21 % *majoituksesta* ja 4 % *aktiviteeteista*. Lisäksi, *ruoan* osuus ihmisten päästöistä on noin 25%.

Tämän pro-gradun tavoitteena on vastata kysymyksiin 'Miten suomalaiset turismialan yritykset voivat mitata hiilijalanjälkeään, missä vaiheessa ne ovat hiilijalanjäljen määrittämisessä ja kuinka ne ovat onnistuneet tähän mennessä.' Tämä pro-gradu myös tutkii millä tavoin suomalaiset turismiyritykset voivat pienentää turismin hiilijalanjälkeä ja pysyvätkö kyseiset yritykset luomaan positiivisen hiilikädenjäljen. Tästä otetaan selvää tapaustutkimuksella, jossa haastatellaan 10 Suomessa toimivaa yritystä. Valitut yritykset ovat eri ikäisiä ja kokoisia, sekä edustavat eri toimintoja Tämä pro-gradu on laadullinen tutkimus, jonka pohjana on käytetty vapaamuotoisia haastattelukysymyksiä.

Suomalaiset turismialan yritykset mittaavat hiilijalanjälkeään käyttämällä primääri- ja sekundääri dataa, ja vertailukohtana käytetään tyypillisesti joko edeltävää vuotta tai kolmen edeltävän vuoden keskiarvoa. Yritykset käyttävät myös Greenhouse Gas Protokollan yritys standardia, sekä saatavilla olevia hiilijalanjälkilaskureita ja päästötietokantoja. Lisäksi kolmannen osapuolen varmennusta käytetään joissakin yrityksissä.

Kaikki haastatellut yritykset eivät vielä ole laskeneet omaa hiilijalanjälkeään. Kasvava kiinnostus hiilijalanjäljen määrittämistä kohtaan näkyy myös tällaisissa yrityksissä, ja hiilijalanjälki on tarkoitus laskea tulevaisuudessa, joko itse tai toisen yrityksen avustuksella.

Suomessa toimivat turismialan yritykset voivat pienentää omaa hiilijalanjälkeään monin eri tavoin. Päästövähennyskeinot liittyvät energiatehokkuuteen, uusiutuvan energian suosimiseen, kierrätykseen ja jätteen vähentämiseen sekä muovin käytön ja kertakäyttötavaroiden vähentämiseen. Yritykset valitsevat myös ympäristöystävällisempiä kulkuvälineitä.

Lopuksi, kaikkien yritysten oli mahdollista luoda positiivinen hiilikädenjälki, auttamalla vähentämään asiakkaidensa hiilijalanjälkeä.

Asiasanat: Hiilijalanjälki, Hiilikädenjälki, Turismi, Matkustaminen, Ilmastonmuutos

Säilytyspaikka: Jyväskylän yliopiston kirjasto

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1 INTRODUCTION

1.1 Background

Today, Climate change, or ''Climate crisis'' is a serious problem we are facing, with the potential of affecting ours, as well as other living species and ecosystems' future dramatically in the entire world. We as humans have played our part in the equation, as the greenhouse gas emissions we have produced until this point in time (anthropogenic emissions) are historically extraordinary high (Allen et al., 2018, IPCC, 2014) and have accounted for a 1°C increase in the temperatures when comparing to the beginning of Industrial revolution in the mid-1700s (IPCC, 2018). The climate change has consequences whose magnitude and severity have been something we have not been able to understand before, being warming up of the oceans and climate, the frequent extreme weather conditions (extreme cold winters and warm summers), loss of snow and ice, as well as the rise of the sea levels (IPCC, 2014; Radu, Scrieciu & Caracota, 2013) and if nothing is done to try to mitigate climate change, the increase in the temperatures can rise 1,5°C in 2030 and even 30 years after (IPCC, 2018), having even more dramatic consequences than ever before. In order to make the effects of climate change a bit less severe in the future, we must pay attention to the greenhouse gas emissions we produce, develop measures to calculate and recognize them, and eventually, decrease them. This is because if this is to happen, adequate living conditions including human health and survival, having access to food and water, as well as financial safety are at great risk (IPCC, 2018) and insecurity is likely to increase. To be able to survive on this planet, the climate change needs to be acted upon. The greater the rise in temperature, the higher and more severe the risk of a lifetime catastrophe.

When talking about climate change and the greenhouse gases, traveling becomes an important aspect accounting for 5% of the global carbon dioxide emissions (Hall, Scott & Gössling, 2013; Peeters & Dubois, 2010, p. 477). This is also in line with Sharp et al. (2016). Tourism also accounts for 8% of the global greenhouse gas emissions (Carbon Brief, 2018; Lenzen et al., 2018). When allocating the emissions for single passengers, the emissions per traveler has decreased, while at the same time the traveling industry is getting bigger; people are traveling more than ever, which means that the overall emissions are increasing (Lenzen et al., 2018). Traveling stands for making a journey for different reasons that can be traveling for business, leisure and pleasure and visiting relatives or friends (Lenzen et al., 2018, pp. 274-275), but in leisure purposes people most commonly travel in order to; *vary their usual environment and routines, relax or exercise, start a new hobby, meet a friend or relative, get to know new cultures and learn the local language.*

There are as many reasons for traveling as there are people. People travel in order to do something they do not usually do or activate themselves in other

environment than the usual everyday surroundings. The carbon dioxide emissions from traveling consist of:'' *traffic* (75%) [transportation, which is from now on used instead of traffic], *accommodation* (21%) and *activities* (4%).''(UNWTO, 2008). *Food* usually accounts for about 25% of the total emissions caused by humans (Koivula et al., 2019), but its carbon dioxide emissions related to traveling are more difficult to determine, since they include food eaten on the way and at the destination. These are the 4 most relevant categories (functions) that also UNWTO (2007) acknowledges. They will be used as a basis for the interviews that I am going to conduct for this study because of their significant relevance to the carbon dioxide emissions of tourism.

Between the mid-1900s and 2015 the number of international tourists has increased gradually from 25 million to about 1.2 billion in the year 2015, and the number of tourists is expected to rise to 1.8 billion by the year 2030, according to UNWTO (2018). It has reported a 7% increase in the international tourist flow in 2017, when ''…Asia and the Pacific led growth in 2016 with a 9% increase in international arrivals, followed by Africa (+8%) and the Americas (+3%). The world's most visited region, Europe (+2%) showed mixed results, while available data for the Middle East (-4%) points to a decline in arrivals (UNWTO, 2017, p.3).'' Asian people travel the most (about 6,6% of the population between 2005 and 2015), whereas the 2,8% of the European population traveled during the same time frame (Glaesser et al., 2017). Even if there have been signs of global warming and its harmful effects, traveling cannot disappear entirely, but distance traveling that has been more popular up to this point, may decrease in the future and people can be likely to make more short trips (Puhakka, 2011).

The forms of traveling are usually *subways and trains, cars, airplanes, buses, ships, bikes and scooters*. They can be chosen based on the purpose and demands of the trip and they all have different carbon footprints. From this list aviation has the biggest tourism impact on the climate change, while accounting for ''50-96% of the total carbon footprint (Dwyer, Forsyth, Spurr & Hoque, 2010; Rico et al., 2018; Sharp, Grundius & Heinonen, 2016) and about 2% of the global emissions (Air Transportation Action Group, 2019).'' This is not a surprise. On the other hand, the global average greenhouse gas emissions per capita for housing account for 0,7 tons per CO2 equivalent (CO2eq), food for 1,5- , while goods and services are responsible for 2,1 tons- in 2010 (Salo & Nissinen, 2017). To put these numbers into perspective, when these numbers are compared to the textile industry, which is another, emission intensive industry, the difference is significant. ''Textile industry accounts for 1,2 billion tons per CO2 equivalent each year, having a bigger carbon footprint than international flights and maritime shipping (Ellen MacArthur Foundation, 2017, p.20).'' Still, this does not mean that traveling would be less relevant to study.

Tourism is one part of traveling, being traveling for pleasure, and I will concentrate on that from now on to be able to understand a more specific part of traveling that affects everyone, since not everybody travels for work, but most of the people travel in leisure purposes. Tourism can be better defined as people

staying at a destination, outside their ordinary environment for at least one night (Mason, 2015; Page & Connell, 2006), while at the longest usually staying for one year (Yu, Kim, Chen & Schwartz, 2012). This means that a tourist does not stay in one place too long, while doing some activities at the destination and getting to know the local culture. It does not have one universal definition and the time-related definition cannot be taken for granted, since, in reality, tourists could also stay at a destination for even a longer period of time. This wide definition can be even too broad (Swarbrooke & Horner, 2012), but to make this simpler, most of the studies about tourism do not include traveling for business purposes in the definition, making tourism more comprehensible (Swarbrooke & Horner, 2012), which is also the definition I will use.

The carbon footprint of the tourists is estimated ''…to be 4.5 GtCO2e, accounting for about 8% of global greenhouse gas emissions (Lenzen et al., 2018).'' Also, the amount of carbon dioxide emitted by the tourists is expected ''…to grow at an average rate of 3.2% per year up to 2035 (Peeters & Dubois, 2010 p. 447).'' This is a result of the growing world population and because in the future, people will in general travel more than ever before, because of the emerging middle-class in the developing countries (Hanusch & Fürsich, 2014). China serves as one example of this kind of country. In 2013, it was stated that in the next three years more than 75% of its people are expected to earn up to 34,000$ (Barton, Chen & Jin, 2013). The expansion of the middle-class means that in the future there will be more people who can afford to travel, and this increases the number of trips made. Still, there are many people who may not travel at all, and there are also people who currently travel a lot and do not see a need for traveling less, and these latter people create the increasing trend in traveling. This makes tourism a significant industry in terms of the global warming and greenhouse gas emissions (Dwyer et al., 2010; Gössling & Peeters, 2015; Rico et al., 2018).

Both the climate change and tourism are sensitive themes and they can be useful in determining the background for this study and eventually understanding the need for measuring the carbon footprint of tourism industry companies and being able to reduce their greenhouse gas emissions. The term 'carbon footprint' seems to be a trend but has remained widely unclear as a concept, which is why this thesis will focus on that theme. After having determined the carbon footprint, it will be discussed whether a positive carbon handprint can be created.

There is a lot of talk about reducing one's carbon footprint, while only little action is taking place. It has various definitions but the one from Pajula et al., (2018) will be used in this thesis. They describe the carbon footprint as ''… the *negative* environmental impact caused by greenhouse gas emissions throughout the life cycle of a product – (Pajula et al., 2018).'' This negative perspective is common among people, partly because they might get a feeling that their impact on the climate can only be minimal. On the other hand, a carbon handprint ''… refers to the *positive* environmental impact of a product throughout its life cycle

(Pajula, et al., 2018).'' This shows a completely other way at looking the environmental impacts and seeing possibilities for a better environment, should be used even more, in order to motivate people to do their best. This is because even small actions can together lead to a great, positive environmental impact that would not otherwise be possible. The carbon handprint has also many definitions, but the main difference between these two themes is that the carbon handprint ''…is the reduction of the carbon footprint of a customer or customers'' (Pajula et al., 2018, p.9), while carbon footprint can be calculated for actual products or services of a company, like a night at a hotel, travel package, event or a flight. The organizations aim to have a carbon footprint close to zero and a carbon handprint as great as possible (Pajula et al., 2018).

The scope of the thesis will mainly be the carbon footprint of tourism industry, while the concept of carbon handprint is also discussed. The tourism industry will be further investigated, with a focus on the emissions of airplanes, ships and cars as used transportation forms. In terms of the carbon handprint of traveling, accommodation, food, traveling and activities will be investigated, depending on the chosen company that will be interviewed and their business practices. Narrowing down the scope makes the study more in-depth and compact. Since tourism plays such a vital role in the emissions game, the scope of the study is very current and extremely crucial, in order to understand more about it and aiming for the tourism industry to have a great, positive carbon handprint, if possible.

1.2 Research questions

My area of concern is the travel industry and carbon footprint of tourism industry companies. The combination of these themes needs more comprehension and research, aiming to find answers to a very current and controversial topic, which is a reason for the need for this research to be made. A troubling question that exists in practice becomes; How do Finnish tourism companies measure their carbon footprint and what can be done to reduce it.

The research questions become:

- ***How can the carbon footprint of tourism be measured in Finnish tourism companies?***
- ***In which phase are the Finnish tourism companies in measuring their carbon footprints?***
- ***What kind of measures do Finnish tourism companies use to reduce their carbon footprints?***
- ***Is it possible for the Finnish travel industry services to have a positive carbon handprint?***

1.3 Purpose

The purpose of this research is, by answering the research questions, discuss the methodologies related to calculating the carbon footprint from the tourism point of view. The aim is also to find out how the carbon footprint is calculated at present, to be able to develop it for different companies from the tourism industry point of view. The purpose is to find out 'weaknesses' or absence of information in the companies' current carbon footprint calculations and come up with suggestions for improvement.

1.4 Motivation for the research

The scientific motivation for this research is the ability to broaden the knowledge of the concept of carbon footprint from the travel industry point of view and evaluate if carbon footprint and carbon handprint in a longer term are suitable tools for communicating about the (un)sustainability of the travel industry companies' services or products.

I am personally interested in the travel industry, since it is such a big polluter and popular topic at present. In the industry there are lots of improvements that need to be made, but to fully be able to understand the industry, the carbon footprint calculations need to be developed further. Also, the positive perspective to the topic is very interesting, since the topic of traveling is heavily criticized, which is why I also wanted to include the concept of carbon handprint in the thesis. I am currently working in the climate business and want to expand my knowledge in terms of the travel industry.

1.5 Structure of the thesis

The outline of this study is as follows: In the first section, the concepts of climate change, traveling, tourism, carbon footprint standards and the carbon handprint calculation methodology developed by the Lappeenranta University of Technology (LUT) and the Technical Research Center of Finland (VTT) will be presented through a comprehensive literature review and their relations are explained thoroughly. Then, the methodology of this study will be explained and reasoned, and thereafter the empirical findings from primary and secondary data are presented and analyzed. After that a conclusion of the findings will take place and within that, the research questions will be answered. Lastly, ideas for future research will be presented.

2 THEORETICAL FRAMEWORK

2.1 Climate change

At present, the knowledge about climate change has made us more aware (Scott et al., 2008) of the impact of our everyday activities as well as that something needs to be done to ensure a safer future. We have become more willing to even decrease our climate burden and act against climate change. Even if there is willpower, people need more motivation that leads to concrete action, which is describes as ''attitude- action gap'' (Sheth, Sethia & Srinivas, 2011) and when others act, as well as the regulations demand us act in a more environmentally friendly way, we will be more likely to act.

Climate change is an environmental catastrophe, where the average temperature of the entire world will increase, making living on the planet more difficult. The atmosphere is constructed so that it enables the sun to warm the Earth as much as needed, while radiating the excess heat back to space, but the climate change impacted the equation by keeping more warmth than needed in the lower atmosphere, warming up the Earth excessively. It is mainly caused by us humans and our (over) consumption habits. According to IEA (2012), land use (for example farming) and fossil fuels (energy) (Radu et al., 2013) have the biggest potential to affect the climate change (IPCC, 2013).

In 2016, at least about 60% of the energy used in Finland was from non-renewable sources, namely fossil fuels (Mäkinen, 2018). This shows that Finland has a big effect on climate change and there is a lot to be done for having a bit safer future than predicted if no change takes place. This underlines the pressure for the tourism companies to start using more renewables and become more sustainable in all their operations, because neglecting or denying the facts, might cost them a business.

Mitigation plans have already taken place when ''the European Union has set the target to reduce **the greenhouse gas [from now on ghg] emissions** by 20% until 2020, compared to 1990 level (Radu et al., 2013).'' This demands tremendous action to be taken, but the biggest change could be achieved by shifting to renewable energy sources instead of fossil fuels (IPCC, 2011).

There is a promising market for the renewable energy sources and materials, but the demand is currently bigger than the actual supply ability. It would be possible to make the change gradually, since big investments in infrastructure and business models are also needed and because they do not happen overnight. Also, what the tourism companies can do for their part is reducing their carbon footprint by making more environmentally friendly choices, like focus on organic food and producing as little (food and other) waste as possible. Additionally, the

tourism companies can also compensate (WWF, 2019a) for the emissions they have generated (Radu et al., 2013) by investing in carbon sinks for example. Lastly, while the companies would reduce their carbon footprint, they would be able to increase their customers' carbon handprint, while helping them take better care of the environment and contributing to positive change. More about the carbon footprint and handprint will be discussed later, in the sections *2.2.1* and *2.2.2, respectively*.

Intergovernmental Panel on Climate Change (IPCC) has as its aim to analyze climate change based on already available information for it to be useful in the environmental decision-making (IPCC, 2019). It has been created with fear of climate change in order to mitigate its impacts on the world. In 2018, IPCC published a 'Special Report on Global Warming of 1.5 °C', which continues on where the Paris agreement (Making sure the global temperature does not rise by 2°C , but rather to 1,5°C at the maximum) was left with- by concentrating on the effects of the temperature rise and ways to mitigate it (Allen et al., 2018). '' This new target can be achievable, when people begin to act accordingly, by demanding better alternatives for the environment and new legislations start to form. For reaching this goal of global warming at the rate of 1,5°C, net human-caused emissions of carbon dioxide (CO2) would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050 (IPCC, 2019).'' This means that by 2050, all the greenhouse emissions we produce, would have to be compensated by carbon sinks, for example, in a way that they bind as much emissions as we produce.

The aim of the report is to show consequences and ways to mitigate emissions and keep the global warming at maximum 1,5°C (IPCC, 2019), which already endangers the humans' future greatly. The risks of the climate change will become the more severe the higher the temperatures get. All the countries should aim at the specific degree goal, and inside countries, even companies have a big responsibility in whether the goal can be reached, since they produce almost everything people need in their daily lives. Change is inevitable, and a shift in attitudes and investments in new technology, and forming new laws, while adapting to a new, sustainable way of doing things.

Since the emissions from tourism industry play such a vital part in climate change, it has a lot of power to affect the peoples and planet's future (Hall, Scott & Gössling, 2013; Peeters & Dubois, 2010, p. 477). A contradiction exists where even if some people feel like they cannot affect (Tobler, Visschers & Siegrist, 2012) the carbon footprint of traveling and stay within the 1,5°C limit, they as customers have a lot of power (Deighton & Kornfeld, 2009). They can demand the tourism companies to become more sustainable and for example, eventually changing to renewable fuel, and they can also decide on not to purchase the tourism industry companies' services anymore if they do not change for the better.

2.2 Sustainability

Sustainability can be strongly linked to the climate change and the carbon footprint and carbon handprint of tourism (which will be discussed in detail in the following sections *2.2.1 and 2.2.2) respectively.* The concept of sustainability is a very up-to-date topic in the tourism organizations who increasingly want to show their environmental contribution and ways of decreasing emissions, making them more environmentally friendly and decreasing their carbon footprint. Many organizations have started to pay attention to their business and becoming more sustainable (Geissdoerfer et al., 2017), because of the increasing pressure from the key stakeholders such as customers and competitors (Carrol, 2015). It has a great amount of definitions, depending on the user and the context.

The most widely accepted definition dates back to 1988 and it is still valid today. It means being cautious about how to live one's life, making sure the people living in the future have the same abilities to enjoy their life as the current generations have now (Ehrenfeld, 2005; Martin & Schouten, 2011; McMichael, Butler & Folke, 2003). The definition has evolved from this and on the other hand, Elkington (1997) has added three dimensions of sustainability, being economic-, social- and environmental sustainability into the definition and in their intersection, a sustainable balance between people, planet and profit can be found, and they become visible in the actions of companies (Dow Jones Sustainability Group Index, 2012) and customers. The best-case scenario would mean overall sustainability, which stands for having equal emphasis on all those three aspects at the same time (Elkington,1997).

The concept has been criticized for only focusing on long-term, being ''fuzzy, elusive, ideological and controversial (Carrol, 2015, p.93).'' Also, the prior research [For example, Elkington, 2013; Molthan- Hill, 2015, pp.44, 323] shows that achieving overall sustainability where the environmental, economic and economic factors (also referred to as *triple bottom line*) are taken into consideration with the same priority, should be aimed at.

Evidence can be found that companies that do business in a responsible way are more profitable in a long term (Hategan et al., 2018; Graafland & Mazereeuw-Van der Duijin Schouten, 2012). For example, the latest research shows that responsible businesses have an ability to for example save in energy expenses (Harmsen et al., 2011). Additionally, new business opportunities emerge within eco innovations and circular economy (European Commission, 2009; Sitra, 2019a) and responsibility in the company's own business and supply chain is part of the company's risk management (Sprinkle & Maines, 2010).

Sustainability and especially the sustainable development goals are essential in the IPCC reports, aiming at better equality and life on land and water, for example. The goals can also be linked to climate change (IPCC, 2019). The goal 13 ''Climate action'' is directly related to the climate change (Allen et al., 2018, United Nations, 2019a). The goal is one of the 17 to be reached by 2030, and it includes''…strengthening resilience and adaptive capacity to climate-related hazards and natural disasters; integrating climate change measures into national

policies, strategies and planning; and improving education, awareness raising and human and institutional capacity (Allen et al., 2018, p.28).'' This report will also concentrate on this one specific goal number 13 and it becomes especially evident when interviewing tourism companies about what do they do to reduce their negative impact on climate and their carbon footprint.

2.2.1 Carbon footprint

The carbon footprint is a mechanism used to evaluate the environmental harm (ghg emissions) caused by a product or service, event or a tourism company itself and it is also used to measure (un)sustainability (Agraval & J. Pandey, 2011; Ilmasto, 2019; Sundha & Melkania, 2011; Wiedmann & Minx 2008; Wiedmann, 2010). This too, becomes evident in research made by Koivula et al. (2019), Norris (2015), Pertsova (2017) and Ilmasto-opas (2019). **It can be calculated for example for a trip, accommodation, food or activities (for example festivals, theater) at a resort.** It is measured in carbon dioxide equivalents (Fantozzi & Bartocci, 2016), also expressed as ''CO2eq'' (Pajula et al., 2018; Scott et al., 2008; Weidmann & Minz, 2008).

The carbon footprint is often confused with the term 'ecological footprint.' The latter describes (un)sustainability and it has been developed by Warkenagel and Rees in 1997. It is stated that'…the ecological footprint compares the use of natural resources (water and land area) with the ability of nature to replenish those resources and …the results can be expressed in how many planets' worth of resources are being used (Biemer, Dixon and Blackburn, 2013, p.146).'' This definition makes the environmental impact easier to understand, since a concrete aspect of evaluation is presented. Hopton and White (2012), as well as Phumalee et al. (2018) end up to a similar definition, which has been widely accepted. The carbon footprint is based on the ecological footprint, but it is a separate definition, and it distinguishes itself with considering different ghgs, scope of interest and different life cycle phases (Čuček et al., 2012).

The carbon footprint is measured as Global Warming Potential (GWP), where ''*carbon dioxide (CO2), methane (CH4), nitrous oxide (CO), hydrofluorocarbon (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6)* (Muthu et al., 2012; Radu et al., 2013;)…'' are measured in terms of CO2 equivalents based on how radiative they are and this is used in making a Life cycle assessment (LCA). The LCA stands for analyzing a service or a product from cradle to crave (Čuček, Klemeš & Kravanja, 2014; Weidema et al., 2008). LCA is used to calculate a product or service's environmental impact during their lifetime, including all the way from collecting the materials needed to the disposal phase. When the carbon footprint of a service or a product has been found out, the value should affect the companies producing them and as a result, try to make them more environmentally friendly. The policymakers should tighten the regulation for environmentally harmful products and services as well.

When discussing the carbon footprint, it is important to define the system boundaries that determine the relevancy and reliability of the carbon footprint calculations. It means deciding what phases are included and which ones are left out. Based on the selection, the results can vary greatly and do not necessarily present the most accurate value. Also, sometimes there is not enough relevant data available that would be used in the calculation process, making the definition of a carbon footprint even more difficult.

2.2.1.1 Defining the ghg emissions

Based on the Greenhouse Gas protocol Standard, a tourism company can define its ghg emissions by using three scopes; **Scope 1** includes direct emissions from the company, while **Scope 2** includes indirect energy emissions from the company and **Scope 3** refers to all other indirect emissions from the company, but not the ones included in Scope 2 (Carbon Trust, 2019; Greenhouse Gas Protocol, 2019; Radu et al., 2013). Direct emissions can be linked to the company's services, like emissions caused by flying an airplane in the case of an aviation company. Indirect emissions are emissions that are not completely controlled by the company and can be for example the emissions caused by choosing a certain electric company to produce electricity. Other indirect emissions are also somewhat out of complete control of the company and can be for example the emissions caused by the sewage water. The Scope 3 is very essential, since it includes so many other indirect emission sources than energy, having endless options (Larsen et al., 2013; Liu et al., 2017; Matthews et al., 2008; Rico et al., 2018). Still, the Scope 3 has been criticized widely because of the difficulty of identifying the 'other indirect emissions.'

2.2.1.2 Calculating the carbon footprint

''The carbon footprint is expressed as the mass of the emitted emissions, depending on the situation, either in tons, kilograms or grams… (Clonet, 2019b)'' and it can be calculated for an individual, event or a company. For example, when discussing energy, the unit is gCO2eq/kWh. The carbon dioxide equivalent ''…is calculated by multiplying the emissions of each of the six ghgs by their 100 year … Global Warming Potential (Carbon Trust, 2019; Sundha & Melkania, 2016; Wright, Kemp & Williams, 2019).'' Other ways of investigating how the carbon footprint can be calculated are using the **LCA** method discussed earlier, or **input-output analysis** (Hertwitch & Peters, 2009; ISO 14040), where the aim is to get representable data for a specific industry (Lenzen et al., 2018), like travel industry. They have been used for calculating specific tourism- related aspects such as ''—**hotels** (Puig et al., 2017), **events** (El Hanandeh, 2013) and **transportation infrastructure** (Luo, Belken & Zhong, 2018; Pereira, Ribeiro & Filimonau, 2017).''

Also, two additional methods with different purposes have been generated to calculate the carbon footprint, namely **Residence- based accounting (RBA) and Destination- based accounting (DBA)** that aim to show how unfairly the negative environmental impacts are distributed (Lenzen et al., 2018). These can be used in evaluating the sustainability of tourism and ''…while RBA allocates the consumption- based emissions to the tourist's country of residence, DBA allocates them to the tourist's destination country (Lenzen et al., p. 522).'' The RBA considers how often people travel, how far and in which form (for example, a car or an airplane), underlining the negative emissions caused by tourists, while DBA concentrates on how the carbon footprint can be decreased in the tourism destination (ICAO, 2016).

Even if this division of calculating the carbon footprint is not perfect, the idea behind the division serves as a good example for the different point of views it can be used for. The only important aspect with the calculations is to remember to clearly show the method behind the calculations and motives behind the selected method. This aims at improving the transparency and reliability of the methods to the specific purposes of use.

There are as many ways of calculating a carbon footprint than there are users and several carbon footprint calculators have been developed and they have until this time, been studied inadequately. Each of them has an emphasis on different aspects. A few examples of different carbon footprint calculators are offered by WWF (Footprint calculator), Sitra (a test about the way you live your life) and Climate Diet. These are all meant for calculating individuals' carbon footprints (Ilmastodieetti, 2019; Sitra, 2019b; WWF, 2019b). There are also several carbon footprint calculators available for (tourism) companies, like ''Y- Hiilari'' and ''Juhilas (Suomen ympäristökeskus 2019a & 2019b)'' as well as the carbon footprint calculators of OpenCO2.net and Ilmastobisnes.fi platforms.

When calculating the carbon footprint, the results may vary in terms of the chosen ghgs as well as which phases of LCA are included and the scope (Koivu la et al., 2019). There is no right way of calculating the carbon footprint but as the aim for making the calculating easier, some standards have been developed, to act as inspiration, but they are not mandatory to follow (Koivula et al., 2019; Rudy, Scieciu & Caracota, 2013), which can prove difficult for getting as accurate value as possible and comparing different carbon footprints with each other. Having this much freedom creates misunderstandings and it is possible that some of the values can be counted twice (Laurent et al., 2012; Radu et al., 2013). Having too much freedom in choosing the way how the carbon footprint will be calculated, can even make it harder to compare the carbon footprint of different products with each other if they are calculated using different methods (Dias & Arroja, 2012). Also, even if the calculations help to get a numeric value for the generated emissions, it does not help to decrease and deal with the impacts (Scipioni et al., 2012).

2.2.1.3 Reasons for reducing one's carbon footprint and ways to reduce it

There are many motives behind companies wanting to decrease their carbon footprint; efficiency and thereby monetary savings, holding the license to operate and an ability to differentiate from the competitors (Suryata, 2010). Additionally, the pressure from the stakeholders like the NGOs, customers or competitors can also pressure the companies to change. When decreasing a company's carbon footprint, its operations can become more efficient, which could be an internal reason for changing behavior. Also, tourism companies can decrease their carbon footprint in a number of ways. They can ensure that the products they use, and sell are sustainable, produced by using renewable energy as well as are recyclable and avoid plastic and excess packaging. The companies should not use disposables unless where necessary. Waste should be avoided at all times and informative recycling possibilities should be offered. Food and electricity should be responsibly produced and renewable, allowing for smaller environmental harm.

There are two ways for tourism companies to reduce their carbon footprint. Firstly, they can reduce their emissions by taking own emission reduction actions (by making their operations more efficient). Secondly, they can offset (compensate) emissions, which is a complementary way to use when reducing the emissions is not possible in any other way. When a tourism company is willing to reduce its carbon footprint, the method of emission reduction matters, which is also a view supported by Sitra (2019a). Depending on which approach the companies choose, may determine the motives behind their actions.

Some examples of how the tourism companies can decrease their emissions by themselves are; *improvements in energy efficiency (efficient use of heating and cooling of the empty premises), increased investments in and the use of renewable energy (solar panels, LED lights and energy efficient equipment), increased use of renewable fuel and reduced fuel consumption, decreased water consumption, food waste reductions, material reuse, avoiding disposable utensils and plastic use, favoring environmentally friendlier activity, transportation, food and accommodation options.*

2.2.1.4 Critisism

From a Finnish perspective, it is true that often the tourists traveling from further away, like Asia have a bigger carbon footprint, because they travel longer, usually by airplane that emits more CO2 than the locals who would not have to travel as far. This means that not all the emissions come from staying at a destination, eating or doing activities, but the traveling to the resort and back can also be included in calculating the carbon footprint. By using Finnair's emission calculator as an example, the CO2 emissions per person can be as high as about 370 kg when traveling between Helsinki and Shanghai, whereas the value would be about 80 kg when traveling inside Finland, from Helsinki to Rovaniemi (Finnair, 2019). In this example, flying has been chosen as the form of traveling. The values from Finnair's emissions calculator do not take other traveling forms into account but it can serve as a simplified average for the emissions resulting from flying.

A criticism the carbon footprint has gotten is that it can be overly simple (Laurent, Olsen, & Hauschild, 2012; Weidema et al., 2008). It is understandable that not everything can be included and what is left out can have a big effect on the result that can be very different in various situations.

2.2.1.5 Compensation

There are many ways and options through which to compensate; for example, the United Nation's carbon offset platform invests money in environmentally friendly projects (United Nations, 2019b). Another example is to use Nordic offset's compensation service that among other things, offers its clients a possibility to compensate their carbon footprint with certified emission reductions and increase the number of carbon sinks (Nordic offset, 2019). Also, the Compensate-foundation invests in planting and protecting forests (Compensate, 2019). As a last example, buying emission allowances from the EU's emissions trading scheme (EU ETS) can also be a compensation alternative, being a part of the CO2Esto's compensation service, called ''the CO2 emissions cutter.'' Using the service means that the amount of emission allowances others can purchase will decrease (CO2Esto, 2019; European commission, 2019b) and therefore, emissions have to be reduced in Europe.

Strasdas et al., (2010) states that there are three essential aspects that need to be in order when thinking about compensating, which are ''*credible calculation of emissions* (for example accuracy of calculations), *valid compensation mechanisms* (transparent and independent verification and certification) [and] *customer relations and communication* (transparency of emission calculations, -compensation, -company work in progress, -prices/ share of money used in the projects) (as cited in Scott, Hall & Stefan, 2012, p.176).'' The aspects mean that the calculation of the CO2 emissions have to based on scientific, confirmed sources and the emissions have to be compensated in a trustable way, through a known organization for example. Transparency has to do with the credible calculation of the emissions and valid compensation mechanisms, and it can therefore be regarded as an essential part of the compensation process. Additionally, all of the three aspects can be considered important, because if the company compensating its emissions would not clearly state where the money would go, would not let an independent entity to verify the process and the outcome, as well would use random calculations, it would be cheating. The best way would be to do it right from the beginning.

If there would be information missing regarding compensation or if the values used in the calculations would be wrong, greenwashing could be suspected. Additionally, if the companies are truly responsible for their generated emissions and are ready to take action to mitigate them or if they only want to compensate for their emissions, and not taking any other kind of action, it may seem like drawing the attention away from the real motives of the company, making them appear more environmentally friendly than they actually are. This

can be a sign of possible greenwashing. (Delmas & Burbano, 2011; Martin & Shouten, 2011; Siano, Vollero, Conte, & Amabile, 2017)

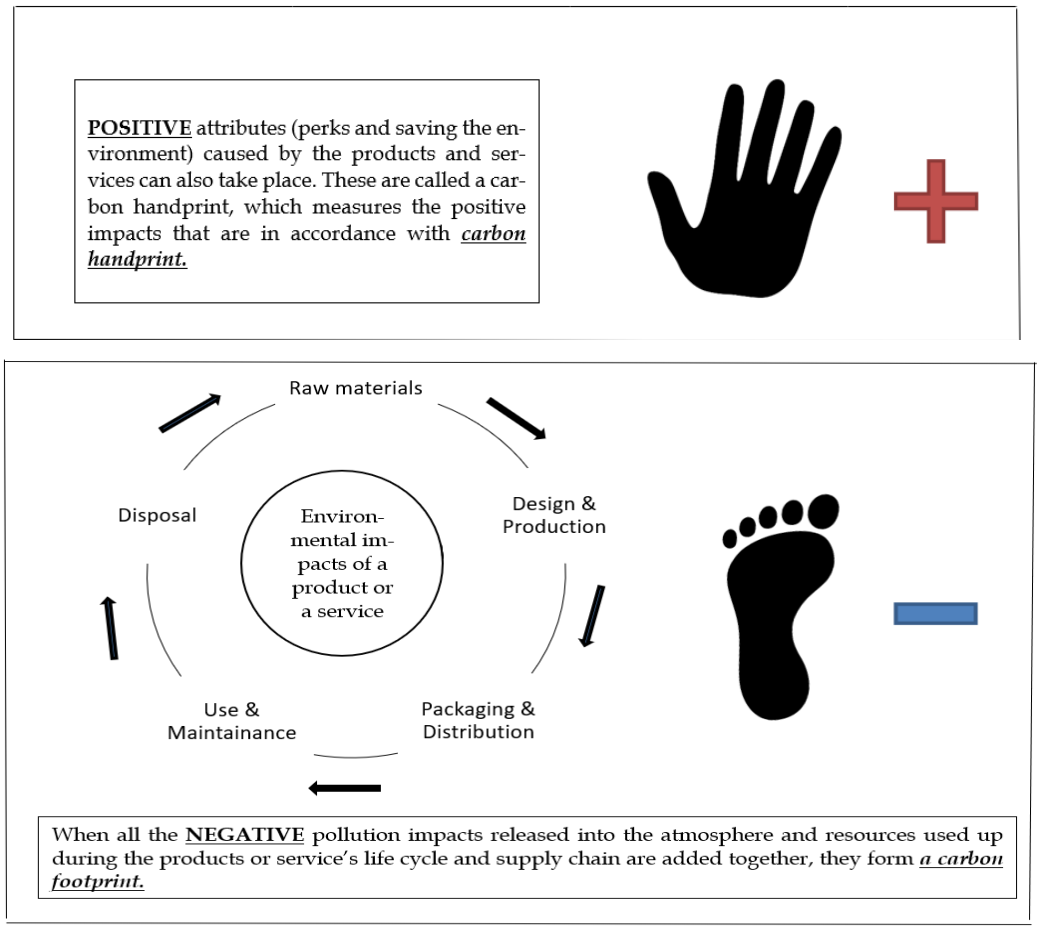
2.2.2 Carbon handprint

Ecological handprint is yet another term used in the context of sustainability, often used simultaneously with carbon handprint, but the former is a result of a change of paradigm in the language perspective ''…from impact assessment (ecological footprint…) … to deregulated action … (Rawes, 2013, p. 223).'' The carbon handprint adds to the concept ''ecological handprint'', being current and independent, simultaneously used concept in the field of research and there has been only little research about it. The ecological handprint is used for inspiring others to do good for the environment, while the carbon handprint can be used as a tool to actually do good for the environment (Biemer et al., 2013). The ecological handprint is used to motivate people to take part in positive climate actions and motivate others to do the same, by having a positive and encouraging perspective to sustainability.

Carbon handprint is a rather new term in the research, and it is also confused with the concept 'carbon footprint', even if they too, have different meanings. Their key differences are summarized in the **Figure 1** below. They are both based on LCA, but carbon footprint focuses on the negative environmental aspects in the past, while carbon handprint focuses on the future's positive environmental attributes (Sitra, 2019c). The carbon handprint stands for emission reduction potential of a service, product or a process for the customer (Pajula et al., 2018) and it is ''*The Good We Do*… '' for the environment (Biemer et al., 2013). This means that a tourism company can offer environmentally friendly alternatives for the customers to be able to increase its carbon handprint. Also, with regard to the carbon handprint, there is no limit in the positive effect that can take place, whereas in the carbon footprint, the aim is to end up close to, or at zero, having no harmful effects on the environment (Biemer et al., 2013; Business Finland, 2019b; Clonet, 2019a; Pajula et al., 2018).

For calculating a carbon handprint, a carbon footprint needs to be calculated, as well as all the previous steps need to be decided upon (Grönman et al., 2019). It can be formed by '' preventing/ avoiding footprints that would otherwise have occurred (this includes reducing the magnitude of footprints that take place…) … and creating positive benefits which would not otherwise have occurred (Norris, 2015, p.1).'' This shows the positive environmental impact and effort beyond usual. Here companies have a great role; they should focus on providing effective solutions that decrease their customers' carbon footprint and communicate about it clearly. The bigger the tourism company's carbon footprint, the bigger the responsibility to decrease it and contribute to a positive carbon handprint.

Figure 1. A model indicating the key differences between the carbon footprint and carbon handprint. Adapted after Outotec (2018).



In a study by LUT and VTT, the carbon handprint can be calculated for a product ''…by comparing the carbon footprint of the baseline solution with that of the carbon handprint solution when used by a customer (Clonet, 2019a).'' **A baseline solution** is used as a comparative or current measure that shares identical usability with the other product that is being evaluated (Pajula, 2018) and the way it is determined plays a vital role in the end; if a low baseline is used, it shows the alternative positive carbon handprint greater than it actually is (Pajula, 2018). This is because there is more room for improvements than if a more optimistic and positive baseline was chosen. In addition to this, the values chosen must be well- justified and made available to relevant stakeholders affected by the decision, to become more transparent. The baseline serves as criticism to the concept; the results vary greatly depending on the baseline used. Also, if the selection of appropriate baseline is not well- justified, the results could be highly irrelevant, not true and therefore invalid, making the carbon handprint methodology unnecessary.

There are many ways to increase the positive carbon handprint, for example; using renewable materials and energy instead or non- renewable options (''Material and energy use''), avoiding planned obsolesce (''Lifetime and performance''), Producing less waste and recycling (''waste''), and investing in carbon

sinks (''Carbon capture and storage'') (Pajula, 2018, p. 10). For tourism industry companies the categories ''material and energy use, …lifetime and performance, … [and] waste'' would be the easiest alternatives to tackle in order to reduce emissions, because they are directly linked to the companies and their operations. This way they can offer more climate-friendly services than their competitors do.

Currently the carbon handprint of services, products and processes can be calculated in 10 steps that are presented in the **Table 1** below. They are found in the research of Grönman et al., 2019, (which will be presented next), which is based in the research by Pajula et al., (2018).

First, it must be decided what the carbon handprint is calculated for; for example, in a hotel, is it only calculated for the accommodation services or is food also included. The company calculating the carbon handprint must know its customers (Grönman et al., 2019), because they are target of the company's solutions for increasing their carbon handprint. The most essential step is to define the target, why is this calculating done and what is the aim of the process. Defining the baseline, functional and communicational unit, as well as system boundaries and what data is used and if it is available are also crucial steps (Grönman et al., 2019). The system boundaries form a base for the entire carbon handprint calculation, since they determine how wide the calculation is and whether it is applicable elsewhere. Deciding on adequate boundaries the results are more comparable and justified to use and the calculation is also made manageable.

Lastly, if needed, a step may be taken back, and the process may be re-reviewed to get a more accurate result. As a criticism to the calculation of carbon handprint, there is a need for constant update of the results and calculation methods because, according to Grönman et al., (2019), the handprint is representable as long as the situation in which the carbon footprint is calculated remains the same. If something in the equation changes, the results need to be re-calculated. Still, this is understandable, since all the information gets old someday.

This thesis also discusses the carbon footprint, since I want to give the tourism industry companies a chance to show their environmental improvements and effort to make a positive change.

The carbon handprint methodology has been up to this point developed for products and services, and a company-specific carbon handprint methodology is under development.

Calculating the carbon handprint	STEP
Choosing the product for handprint calculation	1
Defining the customers	2
Defining the aim	3
Defining the baseline	4
Defining the fuctional unit	5
Defining the unit for clear communication of results	6
Defining the system boundaries	7
Defining the data needs and sources	8
Calculating the carbon footprints	9
Calculating the carbon handprint	10

Table 1. A table presenting the 10 steps in the carbon handprint calculations. Grönman et al., (2019).

2.3 Tourism

Tourism is a part of globalization that started to grow in popularity in the early 1800s (O'rourle & Williamsson, 2002) and globalization includes making all the countries in the world work better together by making the movement of people and things easier among different countries (Page & Connel, 2006). Globalization also stands for new innovations that are a response to the changing consumption patterns (Page & Connel, 2006) and increased wealth among the people.

An old definition for tourism includes people moving from place a to b and their stay at one or more destination (also covering the activities performed there) (Burkart & Medlik, 1981, p.42). The destination where people travel to is outside the peoples' usual environment and the tourists do not usually stay at the specific destination too long (Burkart & Medlik, 1981, p.42). The purpose of the tourist is usually other than becoming a citizen of the new destination (Burkart & Medlik, 2981, p. 42). Page and Connel (2006) ''… define tourism as '''the movement of people, a sector of the economy or an associated set of industries [and] a broad system of interacting relationships of people, their needs [sic] to travel outside their communities and services that attempt to respond to these needs by supplying products (as cited in Chadwick, 1994, p. 65).'''

The definition has not changed much up until today, but nowadays the reasons for traveling are defined more comprehensively, but for example business travel has not always been included in the definition. A reason for this might be that in the early days, it was less common that a tourist went on a business trip, but nowadays, globalization has made traveling for business even easier and it has therefore become more common than ever.

Tourism includes 4 distinct categories that stand for different types of tourism and the following four definitions are presented by Page and Connell (2006). *International tourism* means arriving tourism, people who are non- citizens traveling to another country and departing tourism and people who are citizens of some country visiting another country. *Internal tourism* stands for people living in a specific country and

visiting that specific country. *Domestic tourism* on the other hand stands for ''international tourism plus inbound [arriving] tourism [and] *National tourism* describes ''internal tourism plus outbound [departing] tourism.'' (as stated in WTO cited in Chadwick, 1994, p. 66)

One criticism towards tourism can be that it has multiple definitions and what counts as tourism can sometimes be misleading, since what is included in definition of tourism is not always black-and-white. This means that the reason for making a trip may not be fully clear. This is agreed on by Page and Connell (2006, p. 6). Also, the time perspective is also something that is difficult to determine (the minimum and maximum time for a person to travel to be called as a tourist). To avoid this problem, a more coherent, universal definition should be developed. Also, even if tourism is recognized as a very emission sensitive industry, it cannot disappear entirely. One reason for this is that the world's population is increasingly growing, but even if there are more people that can travel in the future, it should be everyone's obligation to do it responsibly.

2.3.1 International tourism

International tourist arrivals worldwide grew by 6% in January- June in 2018 compared to the same period in 2017 (UNWTO, 2018). In 2017, the ''total international tourist arrivals were 1,366 million'' (7% increase from 2016) (UNWTO, 2018 p.2). ''The share of the arrivals was 5% for Africa, 4% for Middle East, 16% for Americans, 24% for Asia and the Pacific and 51% for Europe (UNWTO, 2018, p.2).'' Countries receiving tourist presented ''Africa (3% of the total tourists), Middle East (5%), Europe (39%), America (24%) and Asia and he Pacific (29%) (UNWTO, p. 2).'' Thailand has experienced the same percentual increase from 2016 to 2017 as Spain has, and moved from the second last place to the last place (of the top 10 list) from 2016 to 2017.

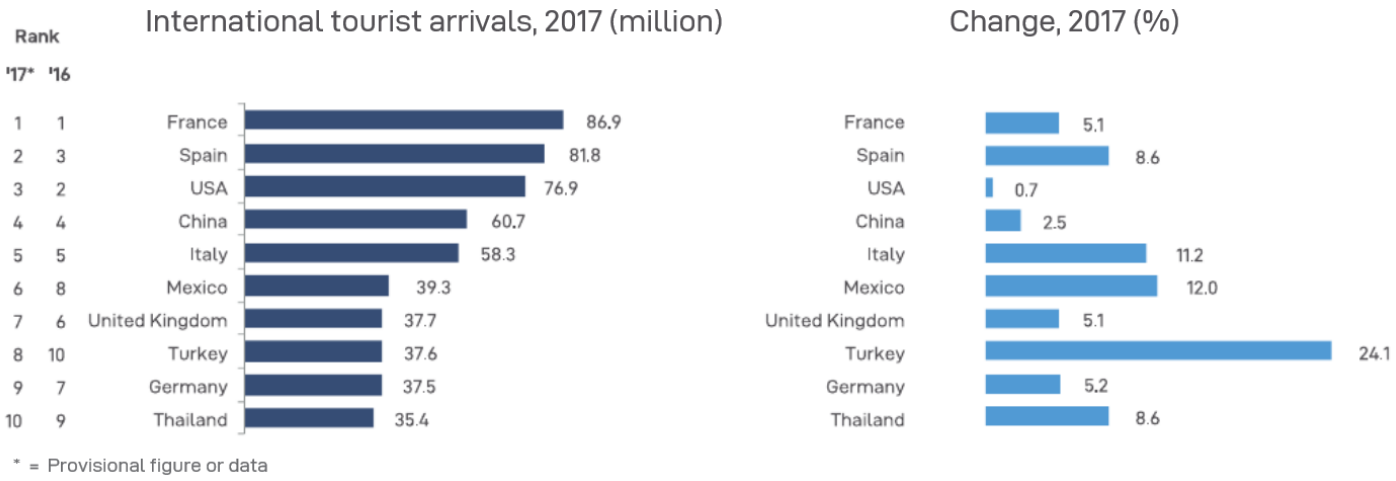
Sheth and Khushboo (2019) present top 10 countries who travel the most in 2019. The top 10 countries are Finland (7,5) United States (6,7), Sweden (6,0), Denmark (5,3), Norway (5,2), Hong Kong (4,3), New Zealand (4,3), Canada (4,1), Australia (3,8) and France (3,50) (Sheth & Khushboo, 2019). The values stand for ''total trips (average trips per person per year) (Sheth & Khushboo, 2019).''

UNWTO (2018) presents data concerning where the tourists have traveled in 2017. This becomes evident in the **Figure 2** below. In the figure, the values presenting 2016 ad 2017 are compared to each other and the difference is shown in the ''Change, 2017 (%), which shows a percentual change between these two years.'' The figure shows that for example France has been the most popular travel destination in 2016 and 2017 welcoming about 87 million tourists in 2017, which presents about 5% increase from 2016. Spain on the other hand has become the number 2 tourist destination in 2017, after having the third place in the previous year. In 2017 it has welcomed about 82 million tourists, which demonstrates about 9% increase from 2016.

In 2017, people traveled by ''rail (2%), air (57%), road (37%) and water (4%) (UNWTO, 2018, p.3). '' In that year there were also 4 main categories for the reasons

for traveling. They were ''business and professional (13%), leisure, recreation and holidays (55%), visiting friends and relatives, health religion, other (27%) and not specified (6%) (UNWTO, 2018, p.3).'' People have most commonly traveled by air for leisure, recreation and holiday purposes and the least commonly for not specified purposes, by rail.

Figure 2. A Figure presenting the top 10 countries people have travelled to in 2017. The table source is from the UNWTO (2018, p.8) document.



2.3.2 Tourism in Finland

Tourism accounted for almost 3% of the Finnish Gross Domestic Product between 2011 and 2017, creating jobs for over 140 000 people, being a valuable source of income for Finland with 15 billion Euros that same year (Ministry of Economic Affairs and Development of Finland, 2019). Tourists travel to Finland for multiple reasons, such as *sustainability* (Helsingin Sanomat, 2019a) and *quality* (Helsingin Sanomat, 2019b). Since Finland has recently adopted this approach, it is unique and attracts visitors from all over the world and can also obtain a competitive advantage from it. Also, seeking for silence could also be a valid reason for the tourists to travel to Finland, since it is something that every country does not have, and may be especially appreciated by Asians, with a quite opposite culture. Many tourists also visit Finland to experience the extreme winter in Lapland and see the Northern Lights. The main tourist groups Finland aims to attract are *the ''Nature wonder hunters, Nature explorers, Activity enthusiasts, 'Comfort seekers', City breakers and Authentic lifestyle seekers* (Business Finland, 2019a).'''

The number of tourists from abroad, who spend a night in Finland is in the rise (Työ- ja elinkeinoministeriö, 2019), having increased 12% from the previous year (Tilastokeskus, 2019a). Especially Lapland has increased in popularity as a tourist destination, by having almost 3 million overnight guests in 2017, with almost 10% increase from the year before (House of Lapland, 2019). Last year the number of international tourists has risen to almost 7% and has steadily increased in the previous years, while the tourists from the EU area are the most popular group traveling to Finland (Hel-

singin Sanomat, 2019a). Tourists from ''Holland, France and America'' have in the recent years understood Finland's uniqueness, representing the biggest international tourist groups in 2018, while still, the biggest international tourist groups are from ''Russia, Germany, Great Britain and Sweden (Työ- ja elinkeinomisteriö, 2019).'' Accommodation services continue being very popular in Finland, which is also evitable in the number of tourists, having increased to 1,5% (2018) from 2017, consisting of national (about 15,5 million) and international (6,8 million) overnight stays. (Työ- ja elinkeinoministeriö, 2019).

Finland can be divided into four distinctive travel destination areas; *Lapland* (42% increase to 0,6 million*), Coast and Archipelago* (20% increase to almost 2 million), *Lakeland* (27% increase to almost 3 million) and *Helsinki region* (14% increase to 4,3 million) (Visit Finland, 2017). These regions have an important role in attracting tourists, while having their own specialties. For example, in Lapland you can camp in a beautiful landscape and fish salmon, while in the Helsinki region there is much more history to see; old building and monuments.

The ''…sustainability, reachability and digitalization'' are challenges for the Finnish tourism in the future (Työ- ja elinkeinominieteriö, 2019). However, the situation is not black-and-white, since these can also become an opportunity. Especially the sustainability perspective is a significant aspect, because Finland can be seen as a sustainability pioneer. These aspects should be focused on, even if they may demand tremendous effort and action, because the aspects can become valuable competitive advantage for Finland in the future.

Nowadays ''Great Britain, France, Spain and Greece'' are becoming increasingly common tourist destinations for the Finns (Tilastokeskus, 2018).
These destinations are especially popular when it rains or it is winter in Finland, since Finnish people tend to escape the unfavorable weather conditions abroad. Last year the Finns made 8,3 million leisure trips abroad, while 38 million of them accounted for domestic tourism (Tilastokeskus, 2019b), which has recently become increasingly popular, especially among people who are 22-30 years old. Estonia has been in the Finns' favorite travel destination for a long time, but it has now decreased in desirability over the last year, while the southern Europe has increased in popularity (Tilastokeskus, 2019b).

2.4 Standards

There are several standards that give a direction towards plausible, environmentally sustainable action. I will only concentrate on The International Standardization Organization's standards ISO 14004, ISO 14044, and ISO14067, as well as World Business Council for Sustainable Development's Greenhouse Gas Protocol since they fit well to my research and provide adequate information. The standards give a direction for calculating the carbon footprint (and carbon handprint), while making the LCA, reporting and accounting for climate change (ghgs) easier. All the standards have specific steps that are determined to form a basis for how the calculations are made and what should be included. They include the functional unit, goal and scope of the studied

aspect, time frame and collecting, analyzing and presenting the data. The ISO 14067 standard is intended to use when dealing with carbon footprint of products, while the ISO standards 14000 and 14044 are meant ''…for the measurement of environmental impacts (Muthu, 2012, p.1066)'' using Life cycle analysis- approach. More about these standards will be discussed in the following sections.

2.4.1 The Greenhouse Gas Protocol corporate standard

The Greenhouse Gas Protocol corporate standard is a standard used by tourism companies to account for and report their ghg emissions and it is used for ensuring the company reports'' relevance, completeness, consistency, transparency and accuracy (World Resources Institute, 2015 p.8). This ensures the trustability of the reported information. Also, according to the protocol, a company shall make a 'ghg inventory' in order to familiarize itself with ghg emission produced by the company and account for the tourism company's aim (World Resources Institute, 2015). Other reasons for making the ghg inventory are that the emission threats are controlled by the company and they can find out possibilities to decrease the emissions, in addition, the tourism companies can get credit for taking part in the early stages of involvement and take part in voluntary 'reporting programs and communicating externally (World Resources Institute, 2015).' Also, involvement in ''ghg markets'' and obligatory ''reporting programs'' may serve the company's aim (GHG protocol p.11).

The report states that when determining the company's barriers, the type of a company and its operations make a big difference. The Greenhouse Gas Protocol includes finding out all the emissions (direct and indirect) and categorizing them (World Resources Institution, 2015) into scope 1,2 and 3 emissions (Sundha & Melkania, 2016) in a similar way that has been presented in the section *2.2.1* of the report, while only being obliged to publicly state the scope 1 and 2 emissions. Especially the determination of the scope 3 emissions has been widely criticized because of their complexity, but every organization shall determine them in the best possible way possible. Also, the tourism companies must decide on how broad the accounting and communicating the scope 2 emissions will be (World Resources Institution, 2015) and what they will include. These steps help a tourism company on its way of being able to work with the ghg emissions.

In accordance with the report, the ghgs shall be recorded constantly, and they need to be re-calculated if a tourism company changes by for example by uniting with another company (World Resources Institution, 2015) or makes any other crucial change in its operations. In this case, the ghg emissions should be re-calculated and both companies' previous emissions should be considered. For tourism companies to be able to calculate their ghg emissions, they need to first find out where they come from and thereafter choose a way they are calculated (World Resources Institution, 2015). After that information about the businesses' deeds need to be obtained and the ''emission factors need to be chosen (World Resources Institution, p.40).'' The final step with the calculations of ghg emissions is to actually do the math and apply the gotten data within the company- to all its units and possible facilities abroad (World Resources Institution, 2015).

The tourism companies shall also ''manage inventory quality, … account for GHG reductions, ... report GHG emissions [and verify them], and set the GHG targets (World Resources Institution, 2015, pp. 48-74).'' The reasons for managing the inventory quality may be to track how they can perform better. It is important to know where the GHG reductions can be made in order to plan on becoming more environmentally friendly and doing it right the first time. Targets and boundaries are needed to make a specific calculation and they can be re-evaluated in the end of the accounting to see if everything is done correctly.

2.4.2 ISO 14040

The ISO 14040: 2006 Environmental management-LCA-Principles and framework-standard is helpful in decision-making, selecting the right tools and getting insights on how to improve a tourism company's marketing efforts (ISO 14040; 2006) in a cradle-to-crave perspective**.**

When conducting an LCA, it is important to know why it is done and what is it exactly that an organization wants to find out. Next gathering and searching for relevant information in order to fulfill the aim of the LCA are needed (ISO 14040; 2006). This can include determining the environmental consequences of the tourism companies' products and services; for example, how big is the carbon footprint of one rental car at a tourism destination. Analyzing the inventory underlines the need for gathering more data for the previous step, in order to understand the studied product or service and how environmentally relevant it is (ISO 14040; 2006).

It is useful to compare the data to the expectations and other products and services in order to rank them. In the last phase the results of the second and third step are put together and whether the goal and scope definition have been well- thought, is analyzed. (ISO 14040; 2006). Also, adjustments are made if needed to help to get even more relevant data and serve the original purpose and decision-making. Every tourism company may determine the extensiveness and points in the analysis themselves, which has a huge impact on the final results.

As a goal for a travel industry company like a hotel, reasons for making an LCA analysis should be indicated (Is it done to improve their environmental performance by reducing their carbon footprint?) and how it will be used (ISO 14040; 2006). If it is used to make comparisons between different products like rental cars to assess which one is the most environmentally friendly. The hotel should also indicate who is it made for and if it will be published so that everyone has access to it (ISO 14040; 2006). This may depend on the sensitivity of the information from the LCA, but a responsible company who wants to show their consideration for the environment, should publish this information as well as show that they are improving. This would increase transparency and their reputation as well, when applied correctly.

The scope of an LCA study includes defining the product system (the stages during the whole life cycle) and its functions that are of interest (ISO 14040; 2006). An

airline company could measure one specific airplane, all the way from producing it and transporting the materials, to making the airplane and its use phase and possible recycling when it breaks. When calculating the emissions, it needs to be determined how they are allocated to different phases of the LCA and determine the waste they produce to be relevant and needed to make a further LCI (inventory) analysis. The airline company can ask for data from x years and based on that come up with a value that the waste they produce present, is a significant environmental harm, as well as if there is something that must be left out of the calculations. The company should rely on scientific sources and experts measuring the carbon footprint and environmental impact (ISO14040:2006). Additionally, they may appoint a 3rd party to verify the report and evaluate its transparency, while deciding on the form of collecting these data to produce a report serving the initial purpose and audience (ISO14040:2006). If the report should be published on their webpage or magazine, the language should be professional, but understandable, since not all who read the reports are experts in the reporting field (ISO14040:2006).

2.4.3 ISO 14044

The ISO 14044: 2006 Environmental management-LCA-Requirements and guidelines-standard tells more about what making an LCA requires. In order for the tourism companies to ensure full transparency of all the phases in the conducted LCA study, the tourism companies are guided to use the ISO 14044- standard. First, *the goal and scope* of the studied product or service have to be determined, *an inventory analysis (LCI)* has to be made as well as *assessing the environmental impacts (LCIA),* and *reflecting back to the results and interpreting them*, in order to make an LCA (ISO 14040, 2006; & ISO 14044, 2006).

The goal and scope of conducting an LCA are already mentioned in the section *ISO 14040*, but the data should be collected, prepared and updated, while the functional units and data processes should be related to the data (ISO 14044: 2006). Also, all the data should be put together and the first step of defining the scope and goal should be re-considered, if needed (ISO 14044: 2006). This is to make sure the results respond to the aim of the organization. Assessing the environmental impacts guides to include the choice of impact categories (to whom the LCI results are assigned for), characterization models and category indicators, classification and characterization (ISO 14044: 2006). The results should be carefully analyzed, and especially when revealed to public, the whole study should be as transparent and clear as possible, communicating all the aspect within the study as well as justifying the selection of aspects. The result of the conducted LCA should be consistent with the goal and scope.

2.4.4. ISO 14067

The ISO 14067: 2018 Ghgs-Carbon footprint of products. Requirements and guidelines for quantification and communication-standard describes the carbon footprint of a product being calculated as follows: carbon footprint (ISO 14067: 2018) minus ghg removals in the studied product (ISO 14067: 2018) as CO2 equivalents (ISO 14067: 2018) from a climate change point of view (ISO 14067: 2018). There is also a possibility to calculate a partial carbon footprint for a product. It differs from the product calculation so that instead of the studied product itself, the process(es) (ISO 14067: 2018) within a particular product (ISO 14067: 2018) are investigated based on chosen LCA stages (ISO 14067: 2018).

In the goal of a carbon footprint analysis, the reasons for making the analysis and what it will be used for must be clearly specified, as well as who it for, as well as if and how the partial- or 'full' carbon footprint will be communicated (ISO 14067: 2018). Usually the analysis can be made to find out the carbon footprint of relevant products in the tourism industry companies, like a shower, for example that has a big climate change potential. It can then be used to make corrective action and mitigate the negative effects on the climate.

The scope of the carbon footprint study should be coherent with the aim (ISO 14067: 2018). It includes; *the subject of study and its features, the functional or declared unit* [declared unit is only used in partial carbon footprint of a product, according to ISO 14067: 2018], *system boundaries, requirements for data and its quality requirements… [and] time boundaries, assumptions and allocation procedures* (ISO 14067: 2018). Also, *specific GHG emissions and removals, methods to address the issues… with specific product categories, the CFP [carbon footprint] study report, the type of critical review [if needed], and limitations of the … study* are included (ISO 14067: 2018).

The scope must be in accordance with the aim of the carbon footprint study (ISO 14067: 2018) and the system boundaries, as well as significant and insignificant aspects (cut- off criteria) shall be specified (ISO 14067: 2018). The data and data quality should involve primary or secondary data, depending on the product and the data should be transparent, comparable and up-to-date (ISO 14067: 2018).

The LCA should be used for determining the carbon footprint of products and when conducting the third phase of LCA, namely LCI, which shall be determined, based on the ISO 14044- standard (ISO 14067: 2018). Then, data must be collected, validated and determined for the declared or functional units and. Next, the LCIA shall be conducted. The phases in the reporting of ghgs of a product will be evident in the **Table 2** below.

Also, it must be found out if the data in the study is still relevant and accurate, and present possible improvements as well as in the end making a serious determination about the study and its results, if they are applicable (ISO 14067: 2018).

Lastly, the ISO14067 criticizes this standard for only focusing on climate change and leaving out other possible significant impact categories. Also, data that is up-to-date can sometimes be hard to find and its relevancy might not be fully representing the aim of the study (ISO14067: 2018.) The criticism is understandable, but concentrating fully on only one impact category, the analysis can be much deeper and in more

detail. The analysis should be made as accurately as possible, utilizing the data available and assessing possible limitations regarding the data and its sources, if needed.

A criticism for all the standards would be that even if they serve as inspiration, tourism organizations may decide to use them as they wish, if at all, and the results can never be fully accurate (Koivula et al., 2019; Rudy, Scieciu & Caracota, 2013). This is because it may not be possible to know everything and therefore, sometimes a value with a bit less accuracy must be used, the results are calculated differently everywhere (with or without using standards). To overcome this, some companies use third party verifications of their actions, which can increase the trustworthiness of the presented information by the company (Gillet, 2012).

Table 2. Factors needed in the report when communicating about the results of the carbon footprint of products. Made based on the ISO 14067 standard.

Factors needed to be included in the ghg of products- report when communicating about it:
• Functional or declared unit and reference flow
• System boundaries
• Important unit processes
• Interpreting the results
• Data collection information and its description
• Ghgs considered (and timing if necessary)
• The selected characterization factors
• The selected cut- off criteria and what has been left out
• How the allocation has been decided on
• The outcome of the uncertainty assessments and sensitivity analyses
• How electricity has been treated
• LCI outcomes
• Scope and it if has been re-evaluated
• Defining the values that have been chosen and justifying their choice
• Describing the LCA phases (when needed)
• Stating the ability of the end-of-life scenarios and alternative use affecting the study's outcome
• Timeframe for the study
• Instructions for using carbon footprint communications in a product category (or categories)

2.4.5 The carbon handprint calculation method by LUT and VTT

Lappeenranta University of Technology (LUT) and Technical Research Centre of Finland (VTT) have developed a 4- stage methodology (**Table 3**) to calculate a carbon handprint of a product that would fill the gap of positive environmental impacts not

being included in the LCA calculations in the ISO14040 & 14044 standards (Pajula et al., 2018). It is called the Carbon footprint calculation methodology by LUT and VTT. **The first stage (Table 3)** includes defining who utilizes the studied product, what can contribute to a customer's positive carbon handprint (if a company uses less materials, it will reduce the environmental harm caused in recycling phase), and help in determining another solution for comparing purposes, ''… that delivers the same functions to the customer as the product we are evaluating, that is, the handprint solution [also called as 'baseline'] (Pajula et al., 2018, p.16).'' This helps with the calculations, since otherwise the final value would not tell whether it has improved over time or not.

In the stage 2 (**Table 3**), the functional unit means 'what is being studied', and it needs to be determined to be able to deduct the handprint study (Pajula et al., 2018). It can be for example 1 liter of organic milk. Also, deciding on the system boundaries; what stages of the product's life cycle are included affect the final result greatly, which is why the chosen stages must be justified (Pajula et al., 2018). The data used in the carbon handprint study must also be up-to-date and relevant and in the case of a recognizable user of a product it should be obtained from sources, that are for this specific purpose (primary data) and in case of non-recognizable customer, average data (secondary data) which has been collected previously for some other purpose is used (Pajula et al., 2018). Primary data might be sometimes difficult to collect but dealing with known customers is usually easier than unknown customers.

The third stage (**Table 3**) includes calculating the carbon footprint in accordance with the ISO 14067 standard, that has been mentioned in the previous section *2.4.4* (Pajula et al., 2018). After that it can be determined whether a product has a positive carbon handprint. It is calculated as follows:

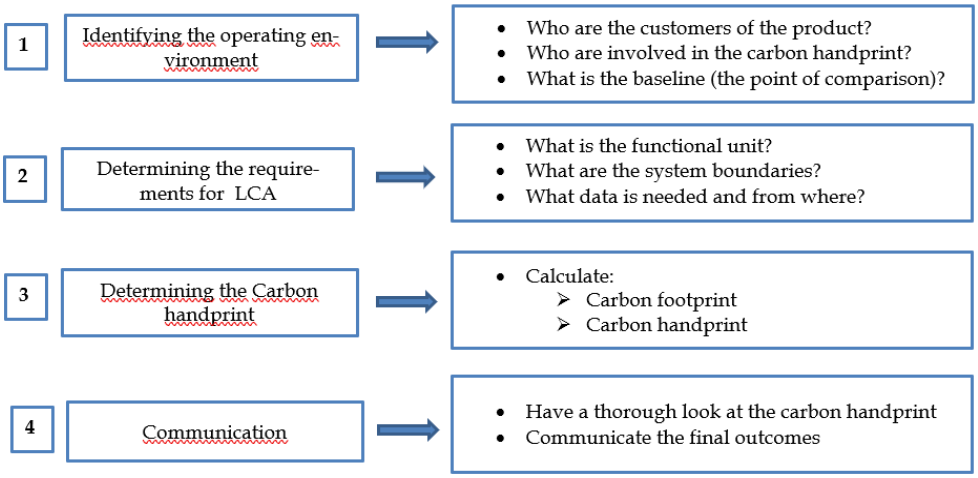
'' Carbon footprint Baseline solution - Carbon footprint Handprint solution
= Carbon handprint Product (Pajula et al., 2018 p.20). ''

This means that a carbon footprint of the new solution is subtracted from the original solution and if the result is positive, but above zero, a product may have a positive handprint.

The fourth stage (Table 3) includes communication about the final outcomes and it states that the results shall be thoroughly investigated when the results are published for the users of the product or when a competitor's similar product has been used as a form of comparison (Pajula et al., 2018). The results shall always be critically evaluated, but it is better to do it right from the beginning, without seeming unprofessional in the eyes of the consumers. The communication shall be performed in a ''appropriate…, clear…, credible… [and] transparent… (Pajula et al., 2018, p.22)'' manner. This to ensure that the report is trustworthy, and it has been done to fully serve the initial purpose.

The results can become inaccurate, if the comparison product is not the best possible, which can alter the results. This could be avoided with a careful consideration and it is not entirely a criticism towards only the methodology, but also its user company.

Table 3. A model describing the 4- stage handprint methodology. Modified from Pajula et al. (2018).



3 METHODOLOGY

3.1 Research design and approach

This study has utilized both primary and secondary data to gain deeper understanding on the themes of how carbon footprint can be measured in the tourism industry and how its carbon footprint can be reduced, as well as whether a tourism company can have a positive carbon handprint. Semi-structured interviews from 10 case companies have been conducted and data from the companies' sustainability reports and webpages are also gathered and studied.

3.1.1 Qualitative research design

This study has a qualitative nature, which helps to get more profound insights of how persons with various backgrounds apprehend phenomena, which in this case are carbon footprint and carbon handprint and their relation to tourism (Bryman & Bell, 2011, pp. 383–392, 2015 p. 727). This means that the theories have been compared to the empirical reality to find out how the different theories can be pictured together.

The qualitative approach has been chosen because of its ability to gain deeper and more descriptive data than quantitative approach could provide. According to Bryman and Bell (2011), transparency cannot be fully guaranteed (p.409). An emphasis on the analysis of the data's trustworthiness, reliability, objectivity and validity will be provided in together with limitations and further research, in the chapter *8* of the thesis. There, criticism of the study and chosen will also be presented.

3.1.2 Deductive approach

Dubois and Gadde (2012), as well as Bryman and Bell (2015, p.723) present deductive approach as choosing relevant theories and apply their concepts to reality. Based on this, the primary data; interview questions and the secondary data from the companies have been analyzed based on the theories and themes of this thesis. This approach has let the research questions to be answered and be relevant to the scientific theories so that additional light can be shed to understand and analyze the studied phenomena.

3.2 Research strategy

Research strategy describes how a phenomenon will be studied. The researcher may want to conduct an experiment to justify his hypothesis and find out if it holds true. Also, specific cases such as companies have been chosen to understand specific companies' relation to the studied phenomena. Also, a specific group of people have been be studied, (as company representatives), while their reactions and opinions have been of interest, as well as their ability to interact with the others being studied. From these few examples the case study strategy applies best to this thesis because of its nature to

gain more in-depth knowledge about tourism industry companies from specific functions (transportation, food, accommodation and activities).

A case study with interviews of 10 companies were performed to obtain more knowledge about the research topic and specific research questions. A case study can be described as being an ''…intensive study by qualitative interviewing one, or in this case, several companies (Bryman & Bell, 2011, p.78).'' Since the cases presented companies that were interviewed thoroughly, this was an accurate description and argumentation for choosing to perform case studies. The studied theories have been brought into context in the empirical world (Saunders, Lewis & Thornhill, 2015, p.184) due to the case studies' ability to be widely investigated and researched upon.

The concept is also criticized, while Yin (2003) and Gerring (2004) take opposite stands; where Yin (2003, pp.109-116) states that the results of the case studies are difficult to generalize because of the specific companies that have been studied, Gerring (2004) strongly disagrees. Additionally, the case studies have been an advantage when being able to get in-depth data from the companies to gain a more throughout picture of their business.

3.3 Data collection and analysis methodology

The data from the secondary and primary sources were analyzed and compared to the existing theories from the literature. The information gotten from the primary and secondary data were analyzed and based on that I was able to identify if the companies could have a positive carbon footprint, and in that case which or what kind of companies they were. The companies of different size and expertise were also analyzed. The companies used in this thesis were from the tourism industry with different perspectives on the responsibility of traveling. The companies that have been interviewed, have been Finnish or they have had a business unit in Finland.

The primary and secondary data that have been collected for this thesis, have been chosen based on their relevance and validity, to be able to get a bigger picture of the themes of this thesis (Bryman & Bell, 2015, pp. 428-429; Saunders et al., 2015, p. 335). This purposive sampling ensured that all the data that was presented, is valid and has to do with climate change, carbon footprint and carbon handprint.

3.3.1 Primary data

Primary data is data that has been collected for the specific purpose of being a part of this thesis (Bryman & Bell, 2015, p. 13). An advantage of primary data is that it is likely to be easier to connect to the aim of this study, since the interviewees will be held exactly about this theme, making sure the answers can be used in this study. In this thesis 10 interviews were held as the selected form of collecting primary data. The interviews were held to get more information about how the companies calculate their carbon handprint and whether it can be positive.

The aim was to find out possible gaps originating from the companies' secondary sources and fill them with information gotten from the interviews. The research

questions have been defined based on what aspects the information gap needs to be filled up. The interviewees have had the possibility to choose the language of the interviews, being either English or Finnish. Only one of the interviews was conducted in Finnish. The questions are presented in the *appendix*- section of the thesis, both in English and Finnish. The presentation of the relevant *functions* that have been used to find the best representable companies for this study have been selected based on the *theory* section of this thesis, in the research made by Koivula et al. (2019), and agreed on by Lenzen et al. (2018) where the most significant emission sources from traveling are presented, being *traveling, accommodation, food and activities*.

3.3.1.1 Interviews

The company representatives have been contacted via email, phone and LinkedIn, where they were asked to take part in an interview. The topic has been introduced to them beforehand and the interview questions as well as another page with information about the interview (why to take part in the interview and what is it for) have also been sent to the company representatives. This is referred to as the consent of an informant (Bryman & Bell, 2015, p.139). This has added validity and credibility of the answers, since the interviewee has had a greater change to include all the relevant data for the interview, instead of just relying on his memory (Saunders et al., 2015, p. 402).

The interview questions are to be found in the appendix 9.1 and 9.2. The interview framework included a few introductory questions about who the interviewees are, what their position is and how long they have been working in the company. This increased the comfortability of the interviewees and reliability of the answers, and after asking those questions, the other questions became easier to answer to (Bryman & Bell, 2011, pp. 394–399). The interviews (all but email) were approximately 30-60 minutes long, depending greatly on whether the companies had calculated their carbon footprint or not, because the question regarding this topic took usually the most time. The companies that had not calculated it before could easily skip a few questions regarding this topic and save time. Even if some of the interviews were a bit longer, the interviewees could manage to fit them well in their schedule.

The ethicality of the study and privacy of the interviews was honoured by treating all the companies and the interviewees anonymously. This was also mentioned to all of the interviewees. The anonymity of the respondents allowed the interviewees to answer the questions more freely and contributed to increased reliability of the answers.

The interviews were recorded to make the transcribing process easier and to make sure no information was missing from the actual text that is now a part of this thesis (Saunders et al., 2015, pp. 416–417). Before the interview started, a permission to record the interviews (except email) was asked to honor the interviewees' privacy. All the interviews that could be recorded, gave permission to do it. Phone and iPad were used for the recording. This increased the transparency and reliability of the interviews and concentrating fully on the interview was easier and follow- up questions to be asked if needed.

Transcribing the results was very time consuming (Bryman & Bell, 2015, p.494), but it added to the accurateness of the interview data. All interviews were done by *email, Hangouts, phone or Skype*. According to Saunders et al. (2015, p. 421), "the research methods literature has not caught up with video telephone methods, so researchers need to evaluate their own experience of access to and use of video chat apps as Skype." Most of the interviews were performed at calm and silent locations to make sure the recording would be of good quality and everyone could hear each other. This is also a way that is suggested by Bryman and Bell (2015, p. 488).

One of the interviews was done when one of the two interviewees was on her way to work, which resulted in a few situations where the interviewee's voice was not heard. This problem was overcome by asking the questions again and asking the interviewee to repeat herself.

All the interviewees were given the same interview options. This means that the interviewees could choose whether the interviewees were done using email, Hangouts, phone or Skype and they could choose one of the options that suited them best. Many interview forms were used and offered as back-up-plans if some of them would not have worked. This flexibility allowed all the interviews to be conducted in the best possible manner.

Most of the interviews were conducted over Skype, which enabled the interviewees and the interviewer to choose a location of their choice (Bryman & Bell, 2011, pp. 394–399). This resulted in increased flexibility and increased the comfortability of the interviewees and enabled them to answer more openly to the interview questions. Additionally, costs could also be saved because using the basic (not business) Skype is free and there is no need to travel to any specific place for an interview (Bryman & Bell, 2011, pp. 394–399), which also saves the environment by contributing to less emissions. The only criticism is that a bad internet connection could disturb the interview (Bryman & Bell, 2011, pp. 394–399). This problem has been present in other studies, but in this study, there were no such problems, because of the ability to be in a place with a decent Internet connection.

These advantages and disadvantages described for using Skype were also evident in the other interview forms [in phone interviews for example] (Bryman & Bell, 2015, p. 496), except email, and the factor that affected the phone interview quality was the location where the phone was used and whether people could hear each other. The disadvantage with an email interview was that the follow- up questions were more difficult to ask, and they required re-contacting person again. Also, direct answers to the questions were usually presented, not giving too much room for long, interpretive and descriptive answers.

In some interviews, *a video call* was made in order to replicate a *face-to-face interview*, as good as possible, which increased trustability between the two parties. Also, *notes were taken* during the interviews in order to be able to transcribe interview given as accurately as possible. Lastly, to further respect the interviewees, the transcripts made from their interviews were sent to the interviewees so that they could have a final look at it and correct any false information or claims.

The semi- structured interview- framework was used because of the order of the questions could be differentiated depending on the interviewee and the way he

wanted to answer the questions (Bryman & Bell, 2011, p. 479). This allowed increased adjustability for the interviewee, which could make the interview more comfortable for him. Also, this technique was a suitable choice for the interviewer, because the option of asking follow-up questions (Bryman & Bell, 2011, p. 487, 2015, p.13) to get more information about a certain topic or to make sure the answer was understood correctly. This added to the relevance and accurateness of the interview data.

Purposive sampling was used to select the relevant companies and interviewees. Bryman and Bell (2011 & 2015) describe purposive sampling as making sure that the interviewees and the companies belong to a certain criterion this study has determined and assuring that the interviewees are the best to describe their companies' perspective on the research topics and questions.

The interview was made using *open- ended interview questions*. They are used to allow the interviewee to elaborate his answers to the extent he wishes to, state additional information the interviewee has not asked about, and help the interviewee to better understand broader the image of the interview topics (Bryman & Bell, 2015, pp. 257-258). The open-ended questions also allowed the respondent to answer the questions more freely and widely (Bryman & Bell, 2015, p. 726; Saunders et al., 2015, pp. 402–417; Yin, 2003, p. 90), which could lead to significant aspects to be discovered in terms of the themes of the thesis, even if they can be more time consuming.

3.3.2 Secondary data

Secondary data is data that has been previously collected for some other purpose than this thesis (Bryman & Bell, 2011, pp. 311–332; Johnston, 2014). It was essentially crucial to make sure the secondary data completes the primary data and was relevant to the study and its topic, since otherwise it would not have brought any additional value to the thesis and only confused the reader.

It was used to complete the primary data and together they formed a coherent picture of the current situation with the carbon footprint and carbon handprint calculations (Bryman & Bell, 2011). The secondary data used in this thesis was from the companies' webpages and sustainability reports, as well as the vision of the company and its announced environmental accomplishments. The secondary data concerning the companies included in this thesis do not have page numbers to better protect the interviewees' anonymity. At the end of the thesis both primary and secondary data will be analysed (chapter 6) and compared with the theories.

3.4 Methodological criticism

The qualitative and quantitative methods have both had their own purpose of use and they have described different things, like discussed in the section *3.1.1.* Even if my interviews included numbers and had to do with calculating a carbon footprint and handprint, my aim was to understand a bigger picture and the reasons behind the calculations. This was to be able to comprehend why certain baselines have been chosen and why the calculations may have stated diverse results. Using a quantitative method

would not have supported the research aim and questions of this thesis as well as the qualitative research does, which is why the latter was chosen.

I, as the researcher of this thesis have made some methodological choices based on the facts gotten from the primary and secondary data, while putting them to the context of carbon footprint, climate change and carbon handprint. Only the relevant themes linked to the theories have been used, to prevent a massive flow of unnecessary information. Still, there could be a risk that something essential has been left out (Bryman & Bell, 2015, p.403), but to overcome this I have done my best to avoid this by having transcribed the interviews thoroughly and by having included some direct quotations from the interviewees.

If replicating this study in the future, it might be difficult to get the exact same data next time when conducting the interviews, in comparison to the information I have been collected for this thesis. One reason for this is that the environment and circumstances might change from the previous interviews. Also, the interviewer or the interviewee's attitude or feeling might affect the results (Saunders et al,. 2015, p. 156).

4 DESCRIPTION OF THE CASE COMPANIES

4.1 The selection criteria for the companies and interviewees

The case companies had to be from the tourism industry and present either accommodation, transportation, activities of food as their main business (function). Also, the companies must be from Finland, or have a business unit in Finland and be of different age and size so that comparison of the different tourism companies will be possible. The 4 functions were selected to be the basis for the interviews and the company selection was based on their essential relationship with tourism and its main emission sources and whether they had offered or thought about offering low emission services in the future.

The interviewees had to work on a managerial level or otherwise have necessary work experience and expertise (Saunders et al,. 2015, pp. 403- 407) about their company's carbon footprint and carbon handprint, as well as their relation to climate change and whether they compensate the emissions they have caused. This selection was based on ensuring the reliability and validity of the interviewees. Both the companies and interviewees were selected based on purposive sampling, choosing only the relevant representatives in terms of this study.

4.2 Companies

The 10 companies each represent one or more function. They are also of different size and phases in terms of calculating their carbon footprint and reducing emissions for example. All of those aspects mentioned above are clearly identified in the Appendix 9.3 and 9.4. The companies 5, 8 and 9 belong to the transportation function, 1, 2, 4, 5 and 10 belong to the activities function, companies 3, 6 and 7 belong to the accommodation function and companies 3, 7 and 10 belong additionally to the food function. When concerning age, company 2 is new (<5 years), companies 4,5 and 10 are medium age (5-50 years) and companies 1, 3, 6, 7, 8 and 9 are old (>50 years). Size wise, companies 3, 6, 7, 8 and 9 are big (over 1000 employees), companies 4 and 5 are medium (50-1000 employees) and companies 1, 2 and 10 are small (<50 employees).

The age of the case companies and the company size are relevant in this thesis because they can have a big impact on how far they are in the carbon footprint calculation process. Also, it may not always mean that big companies have achieved more than the smaller companies regarding the carbon footprint calculations and emission reductions. It is also interesting to compare the 4 different functions to be able to see whether there are similarities or differences between them. The results may show that companies from certain functions may have put more effort in reducing their emissions and calculating their carbon footprint than others, or the results may also show that the different functions show similar results. The comparison between these different factors can contribute to enhanced generalization of the outcomes of the interviews (Saunders et al., 2015). Also, the comparisons may provide additional perspectives that can be used analyzing the results of the primary and secondary data (section *6*).

***Company* 1** is a widely known activity provider and a festival and it has a long history of offering a wide range of musical performances in Finland, for over hundred years, (Company 1, 2019a). It is therefore an old company that offers a few thousand seats for the public (Company 1, 2019a). Coming there is quite a popular past time activity, considering all the age groups (Company 1, 2019a). It is a small company with less than 50 employees.

Company 2 is a rather new (<5 years) and small company (6 employees), and it offers a variety of fishing and hunting activities, as well as hiking options and encourages enjoying the nature (Company 2, 2019a). It wants people to gain experiences and enjoyed a cozy environment (Company 2, 2019b). Their mission is to improve the customers' life by make nature a part of their everyday life again (Company 2, 2019a). They serve various packages for B2B and B2C customers or the customers can design on their own package.

Company 3 is a big nationally operating accommodation and restaurant industry provider. It has over 1000 employees and it has been founded over 50 years ago (old). It offers accommodation services according to various customer preferences and the hotels central locations within respectable transportation reachability. (Company 1, 2019a). The company 3 operates widely in Finland and in a couple of other European countries (Company 1, 2019a). Developing their business into a more environmentally friendly one is at the heart of their operations.

Company 4 is an activity provider that offers natural services in five locations in Finland (Company 4, 2019a). It has over many decades experience in the activity field (a medium age company operating 5-50 years) (Company 4, 2019b) *during Finland's 4 seasons* and its aim is to make people enjoy nature and make them more familiar with Finland's uniqueness at the activity locations (Company 4, 2019c). It is also medium in size, having about 50-100 employees.

Company 5 is a medium age (5-50 years old) travel agency providing various kind of traveling packages including flights, cruises, city holidays including stays at hotels, and even tours and spa holidays (Company 6, 2019a). It has also medium number of employees (50-1000). The company cooperates with transportation companies and hotels in several countries paying attention to the holiday seasons and traditions of specific countries (Company 6, 2019a).

Company 6 is an old company (>50 years) that has over 1000 employees (big). It offers accommodation and food services. It additionally offers a possibility for the others to have meetings at their premises and order food there. It is a hotel chain that is widely present worldwide and has a strong presence in Finland.

Company 7 is an old accommodation company (over 50 years) that also serves food. It is a big company with over 1000 employees and it operates internationally in several countries. Company 8 can be found in several cities in Finland and its aim is to provide unique, individual accommodation experiences for the tourists (Company 8, 2019a).

Company 8 belongs to the transportation function. It is a big company (over 1000 employees) offering transportation services for individuals and other transportation companies for over 50 years (old). It operates nation-wide and serves both domestic and international customers.

Company 9 provides transportation services for the tourists. It is a big company (over 1000 employees) with almost 15 vessels and ships that transports tourists as well as their cars and other vehicles (Company 10, 2019a). It offers cruises to a few other countries. It has operated over 50 years (old).

Company 10 is an activity provider. It is a medium age company (5-50 years) and it is a small company with less than 50 employees. It has rooms that can be rented for meetings or parties. It also offers a wide range of past time activities in a form of music, plays and exhibitions (Company 10, 2019a). Last year the premises attracted a few hundred thousand visitors (Company 10, 2019b).

5 FINDINGS

5.1 Company 1

5.1.1 Primary data on Company 1

The interviewee 1 has worked in the company for 33 years altogether; as an administrative director and festival finance responsible to name a few examples. The interviewee 1 experiences climate change as a global trend, and as ''climate anxiety'', but despite this she states that the customers have not had special requests about this theme and climate change has not yet affected their choices, but it may be something that will change in the future. *''The employees acknowledge the climate change as an invisible hand that directs the way they do business; unconsciously, and this is not yet published on the company's webpage or other documents.''*

The company 1 has as its aim to produce the least emissions possible and it will renew its strategy in the upcoming fall, where a big focus on sustainability will be present. The results were discussed together with the company 1 and the results showed that the company can operate in a carbon neutral way in the future. *''The results of the project will be thoroughly analyzed during the upcoming fall when also a couple of other projects with known energy professionals will take place with topics such emissions and carbon footprint.''*

Because of the novelty in the climate change business, the company does not yet have anything to compare their results (that have to do with reducing their carbon footprint) with at this point, but the interviewee was aware of the need to re-calculate the carbon footprint from time to time, which would then also provide a possibility for comparison. *''This will be a strategic decision on how we want to calculate the carbon footprint in the future, where an increased number of tools for calculating are available. The calculations should become as usual part of the company's actions as the air we breathe.''* To increase their carbon footprint and handprint, they re-use the costumes and other material from the shows.

''We have calculated our carbon footprint together with another company specialized in this theme.'' A point of comparison does not exist, since the calculations have been based on the year 2018, which has been the first year included in the process. 4 distinct locations have been used in the calculations, including the place the festival takes place, its two offices and a storage room for the clothes and other material. ''All the relevant emission sources have been included in the calculations;'' Scope 1 includes direct emissions from the cars owned by the festival company. Scope 2 includes emissions from the energy bought for the company's own use (electricity and district heating). Scope 3 includes purchases and emissions from the value chain with credible and adequate information (for example leasing cars, transportation and distribution and waste). *''All of the scopes (in scope three, the emissions from the leasing cars, flying, using trains or ships) utilize primary data and they have been calculated in a comprehensive way.''*

Calculating the carbon footprint of the festival has been done using the Greenhouse Gas Protocol's corporate standard and a carbon footprint calculator provided

by an environmental consultation company. Some of the accurate information needed for the calculations was difficult to find and some estimates had to be used. The difficulties have been solved by reaching out to experts and the company that helped calculating the festival company's carbon footprint. The value gotten from the calculations describes the company's accurate state of business as well as possible.

''We consider *purchasing low emission services and products in the future. Examples of these could be preferring domestic train trips, increasing effort in recycling and encouraging video meetings (included in the calculations).''* Also, services and products with low emissions and a specified CO2 criterion for the purchases are examples of possible emission reductions in the future. The company 1 will be able to increase its carbon handprint by putting more effort into recycling. To also be able to increase other actors' carbon handprint, the companies could collaborate and set common emission reduction goals. Lastly, the emissions that cannot be reduced by the company's own activities will be compensated in the future with a suitable way.

5.1.2 Secondary data Company 1

Between January and May 2019, the festival has together with two other companies developed a project with an aim of finding out if the company is able to operate in a carbon neutral way. In the project the Festival's carbon footprint was determined using an emission factor platform developed by another company and the festival's abilities to decrease their emissions were also carried out. Lastly, the other company determined whether and how the emissions could be prevented. Then, the price and amount of the emission allowances to be obtained were determined. (Clonet, 2019c)

5.2 Company 2

5.2.1 Primary data on Company 2

Company 2 is a nature service provider and it has been founded just recently. The interviewee 2 works as a board member and as a shareholder, he has an active role in the company's business, especially regarding compensation and responsibility. He has worked in the company since the beginning of 2019.

According to the interviewee, the customers have not had any specific requests that have to do with climate change, but *''they much appreciate the business concept and its aim to decrease the negative effects of climate change, and especially the compensation efforts.''* The interviewee 2 states that since the company is so new, climate change has not yet affected the business, but as it is such a big trend at the moment, starting a new business has required taking it into account from the beginning and so it has also been included in the company's strategy. The main purpose of the business is to enable people to (re)connect with nature by providing different nature services that have to do with hunting, fishing and hiking, and within these the company concerns the impact

on climate having been considered along the way, making the core business as sustainable as possible. These serve as examples of the low emissions services the company offers.

There have not yet been any actual emissions, and for that reason they have not yet decreased, since the company has just recently been developed, but *''the activities will be planned in a way that creates the least possible amount of (CO2) emissions and do not harm or stress the environment too much, being sustainable.''* The interviewee 2 states an example of this including honoring the environment in which fishing takes place and fish with having the fish stock in mind, meaning not overfishing a specific water area. Also, because of the freshly started business, the company has not yet had an actual carbon footprint and has as a result not decreased it, but, according to the interviewee 2, they have already decided on solutions that will have less emissions, which have been considered in the carbon footprint calculations.

The company is also carbon neutral and the interviewee 2 tells that they have gotten help from another company specialized in calculating the carbon footprints of their activities. The interviewee 2 gave two carbon footprint calculation examples indicating what they include and exclude;

Example 1: A one-day fishing/hunting or hiking trip for a local group of five
The electricity and energy consumption are very minimal, there is no need for accommodation or buildings and a campfire powered by biogas exists at the destination. The activity specific equipment will be used multiple times and therefore they are regarded as insignificant and they are not included in the calculations. Transportation (gasoline) including preparational visits, transporting equipment, food and trips to and from the destination is included, as well as food (lunch and a snack with coffee). An average value of a CO2 scale equivalent of lunch in the carbon footprint calculations is used, which is from the Natural Resources Centre Finland's Climate lunch- project. The values gotten for food will be multiplied by the number of people present, here 5.

Example 2: A four- day trip for the management team of 8
Here again the transportation is included (gasoline), consisting of preparational visits, transporting equipment and food and trips to and from the destination. The food provided includes meat and there will be 8 meals provided for every person and a scale equivalent for a lunch including meat has been used in the calculation of the emissions, found from the Natural Resources Centre Finland. The flights within Europe, to and from the destination are also included and an emission calculator found on Finnair's website has been used for this calculation, with an example trip between Rovaniemi and Paris. In addition, OpenCO2.net has been used for finding emission factors. Also, accommodation is considered, and even if assuming that the people will spend the night at a cabin, an equivalent for an average night in a hotel has been used and multiplied by the number of people and the number of nights spent at the destination. For this, the scale equivalent for the hotel night has been gotten from another company's website, who is specialized in this topic.

The results have not been compared to another year, again, because of the newness of the business. *''Getting the right kind of values expressing the reality of the business*

has not always been easy, but to solve this problem, help and consultation from other companies has been obtained, as well as using the search engines on the internet. '' The results are as valid as they can be now, given the circumstances and availability of relevant information.

What comes to the question whether company 2 has been able to reduce their customers' carbon footprint (this forms a carbon handprint), ''*defining the alternative form of action is very challenging.*'' This is because of the uncertainty if the customers would otherwise do something else or stay at home and do nothing. Therefore, actually doing something (taking part in the company 2's activities) would not contribute to the customers' carbon footprint, but if the customers would otherwise drive a car around and race with each other, the company 2 would offer a better option that would increase the customers' carbon handprint. ''*On the other hand, the company 2 can be seen as inspiration for the people by encouraging domestic traveling. This would then lead to change of attitudes towards environmentally friendly options and lead to changed behavior; purchasing environmentally friendly services.*'' To conclude, these can increase the company's carbon handprint.

The interviewee 2 underlines the importance of compensating the emissions they cannot otherwise decrease in their business. They have a big emphasis on the compensation process, and they have made a thorough investigation of all the possible ways to compensate, choosing the best one of them and using it for compensating the emissions in the future and doubling the amount needed, to make sure that compensation has been adequate.

5.2.2 Secondary data on Company 2

The nature packages the company offers are for private as well as business customers. The company plans the packages around the year, taking advantage of Finland's four seasons and offers various fishing, hunting and nature experience activities (Company 2, 2019c & d & e & f). The private guests may purchase an already made package or customize one by themselves. The packages designed by the customers can be tailored individually by including the amount of people participating, which season, length of the visit, desired activities, food courses per day and the type accommodation, from tents to cabins (with or without running water and electricity) (Company 2, 2019g). There are also all- inclusive packages available (Company 2, 2019h).

The business customers may select from three distinct packages including creating something new, strengthening the team spirit and becoming more innovative (Company 2, 2019i). These packages may help with boosting the spirit of the workers and their ability to work together or make them create something new or extraordinary. The packages the company offers are various and there is something for everyone.

The company puts great emphasis on compensating emissions with a ''transparent way'' and comes up with activities that are carbon neutral (Company 2, 2019i). Work safety training and catering services are some examples that can be left out from this equation if the customers do not want to pay for the compensation (Company 2, 2019j). The company offsets its customers' carbon footprint (traveling to the activity

centre and going back home) (Company 2, 2019i). The company states that compensation means actions that genuinely decrease the emissions caused by the company's activities that cannot be decreased in any other way (Company 2, 2019j). From the services aimed for the local tourist groups, the service production will be compensated, and the business groups' flights to the activity centre will be compensated (Company 2, 2019j). To be able to allocate the calculations for groups or several trips at once, a rough estimate will be calculated for different kinds of activities. The value may be a bit more than it actually is, being able to assure the right amount of compensation needed (Company 2, 2019j).

The activities and the environment are utilized so that they harm the environment in the least possible way and all the waste that is generated will be recycled (Company 2, 2019i).

5.3 Company 3

5.3.1 Primary data on company 3

There were 2 interviewees present at the interview, namely interviewee 3a and 3b. The interviewee 3a works with overall sustainability and has over 10 years' experience in the position, while the interviewee 3b is responsible for the hotels' accommodation and food services, having over 6 years' experience.

''*For now, the effects of climate change show more as a discussion at the moment. The domestic (and international) travel have increased and especially the foreigners' interest in Finland and the Finnish nature have increased in the recent years, which is a great thing for us*'', according to the interviewee 3b. The experiences in nature can be seen as a positive aspect in all the negative climate discussion taking place. The customers have not yet had too many requests concerning climate change and emission reduction, but the number of suggestions and requests is slightly increasing. A few examples have been suggestions of reducing the need for cleaning the hotel rooms every day if the customer stays there for a few days and stop offering the small shampoo and conditioner bottles in the rooms. The company has offered an open form for the customers, asking ways for the company 3 to become more responsible.

The aim is to reduce the overall emissions by 60% from the year 2015 by the year 2030. This is based on energy efficiency, renewable energy and reduction of emissions from the cold room reparations. By renewing the cold rooms, the harmful f- gases become history. The refrigerants will be switched to renewable options.

According to the interviewee 3a, ''*There are no specific figures for CO2 emission factors available for the hotels, but it can be estimated that hotels have decreased their energy use by a bit less than 34% from the year 2010 onwards. This value is based on the estimated company level emissions. Also, the carbon dioxide emissions have decreased a bit less than 39% from the year 2015 onwards, mainly because of the investments in wind power.*'' The energy efficiency of the hotels has improved, investments in renewable energy have been made, also by increasing the company's own renewable energy production capacity.

The general way of doing things has become more environmentally friendly. The interviewee 3a says that *''about 55% of the hotels utilize (their company's own) wind power and one new part of a specific hotel location utilizes solar energy.''*

The company calculates the carbon footprint together as a team and they use a HCMI- calculator. Energy data is from the meter data, the data concerning laundry will be provided by the company 3's cooperation partners, and the data about leaks of refrigerants rotating in the cooling devices and premises will be provided by a yearly data collection by the maintenance companies specialized in cold rooms.

The scope 1 includes data from the leaks of refrigerants, where the information from the emission data is from authorities. Data from the companies specialized in cold rooms is also used. The scope 2 includes bought energy and data regarding it will be from the meter data. The emission factor for district heating is a Finnish average. The emission factor for electricity is also a Finnish average, but it also includes a newly made company that is responsible for the purchased energy. The scope 3 includes laundry data (the tablecloths are not included) and it comes from the partners. Also, average emission factors are used.

According to the interviewee 3a, *''the results are compared to the year 2015 and the hotels benchmark the results among each other.''* The accuracy and timeliness of the data have been some difficulties that the company 3 has encountered while calculating their carbon footprint. Some of the hotel premises are rented and a part of the rented hotel premises have their own thermometer, but since there are such huge number of premises (over 1000), accurate data can be difficult to obtain. Still, the interviewees want to keep a positive mindset and they calculate their emissions annually and have a strict 3rd party verification. Therefore, they feel confident about the carbon footprint their company stands for today.

Regarding the low emission services, the company produces, they will build the new hotel premises as energy efficient as possible. The company takes proper care of the laundry and tablecloths and washes them when necessary. According to the interviewee 3a, *''the shampoo, conditioner and shower gels are environmentally friendly and about a year ago the hotels have given up the plastic packaging for the slippers offered in every one's hotel room and switched them to paper bags.''* The company has given up unnecessary cleaning of rooms and the pens have been changed to ones that are from recycled plastic and are recyclable. In general, the company does not advertise their products and services as low emission ones, but rather focus on reducing the emissions in their own actions. However, the company may plan some low emission products or services in the future.

The company has offered free bikes for the customers to increase the company's carbon handprint. The bikes help to avoid the footprint (of a car trip) that would have otherwise taken place. According to the interviewees, ''the flight emissions of the hotels have been compensated since 2018.'' The company 3 has joined a development project that has helped the company to compensate some of their emissions. Also, other possibilities of compensating are considered and compared. According to the interviewee 3a,*''We are thinking about how to do it in practice. A suggestion could be to include a compensation fee in the hotel-room prices.''*

5.3.2 Secondary data on company 3

The company 3 has set many emission reduction targets from which a few have already been reached and from this it can be seen that climate change is a part of their strategy. The emission reduction targets include; improving energy efficiency by 30% by the year 2030, compared to 2015, having a recycling rate of 80% within the next 6 years and using their own, self-generated electricity by 80% by the next 6 years (Company 3, 2019b). Also, next year the aim is to decrease food waste by 15% (Company 3, 2019b).

When calculating the carbon footprint, the scope 1 includes the direct emissions arising from the company's self- produced heat and the cooling device leakages (Company 3, 2019b). The scope 2 includes indirect emissions from district heating and cooling purchased Company 3, 2019b). Other indirect emissions belong to the scope 3 and an example of them is the emissions arising from purchasing products or services (Company 3, 2019b).

5.4 Company 4

5.4.1 Primary data on company 4

The interviewee 4 works as an operative manager and he has worked in the position for the past 3-4 years. The company 4 is a family business and the interviewee 4 has otherwise spent there his entire life since he was a child. The company acts in 3 different geographical locations that are close to each other and the interviewee will focus on the main location with 3 distinct destinations within the area, including accommodation and a restaurant.

Climate change has had a huge effect on the business, which shows as uncertainty especially during the winter season. ''*It is hard to know in advance when the winter will begin, and this shows in a way that the customers are more reluctant to book the packages long time in advance. Last year for example, all the snow melted away already in the beginning of December.'' This has led to difficulties in generating business during the winter season, where as much as 90% of the sales are generated.''* The customers have not had any direct requests linked to climate change, but it can be seen that they are continuously looking for a more responsible business alternative.

Climate change shows in the company's strategy and they aim to increase the utilization of the 4 seasons and especially boosting the sale of the summer month, to be able to fully utilize the equipment and premises. The company 4 has not yet calculated its emissions and therefore there are no goals set for decreasing the emissions, but still, they try to minimize them every year. One example of decreasing emissions is selling reusable bottles for the customers that can be filled up with tap water. More specific goals will be set in the future.

The company aims to decrease its carbon footprint in the future and up to this point, the company does not use any disposable utensils, and has replaced them with

ones made from recyclable and recycled materials. ''*Also, the rentable snowmobiles have been renewed, having 4-stroke engines that utilize non-leaded gasoline and the company has switched to geothermal energy, decreasing the need for heating oil by a few hundred thousand liters every 12 months.*'' Additionally, the company has made a green energy electricity contract. The interviewee 4 also states that the company is involved in a Low Carbon-project, with the aim to make a Finnish national park carbon neutral.

The carbon footprint- topic has just recently become popular and the discussion about it has awakened the company's interest in the theme. ''*We have not yet calculated our carbon footprint, but it is definitely something we want to do. We are currently seeking help from another company that could help us with it.*''

The company concentrates more and more on offering activities that do not consume fuels or electricity, like walking with snowshoes, skiing, hiking, fishing and canoeing. These activities have been offered more and more each year. The aim is that all the programs would start from the hotel's premises, without a need to drive the customers to different locations.

The company has decreased its customers' carbon footprint by providing them with reusable utensils on the safari trips and using green energy. The company is planning to start planting trees that would potentially compensate for the generated emissions. Other compensation alternatives will be weighed and a suitable area for compensation for the company will be decided on. '' *First, the company wants to find out how to make their business carbon neutral by reducing emissions and then compensate the rest.*''

5.4.2 Secondary data on company 4

The popular activities offered by the company 4 have to do with being active in the nature, involving hiking with animals (Company 4, 2019d), fishing, canoeing and enjoying the nature's beauty by sleeping in a tent (Company 4, 2019e). The company offers many kinds of packages including 1 or more activities, focusing on certain time of years and local traditions around it, and trips of 4 days or even longer (Company 4, 2019f) and you can even build up your own package.

In the location there is also a hotel with more than 50 rooms, all the way from double rooms to rooms with or without a sauna, the quests may also use one at the hotel premises (Company 4, 2019f). Other accommodation options include *cottages* without running water, but with electricity, with a kitchen, sauna and a bathroom, as well as *a campsite* where you can come with a caravan or sleep under the sky, in a tent (Company 4, 2019f).

The company 4 also has a restaurant for more than 200 quests. It can offer food at more exciting locations, like outside in the wintertime (Company, 4, 2019g). The restaurant utilizes local traditions and flavors with the ability to use open fire (Company 4, 2019g).

Part of the waste is composted and the abilities to transform it to energy are explored and action is taken to produce as little waste as possible and recycle it. There is also a possibility to sleep outside, instead of sleeping in a hotel or cottage. (Company 4, 2019h) The quests are provided with charging option for their electric cars and they

save energy by avoiding unnecessary change or towels (Company 4, 2019h). When moving around in nature, it is done with care and careful consideration, harming the environment as little as possible (Company 4, 2019h).

5.5 Company 5

5.5.1 Company 5 primary data

The interviewee 5 works as a CEO of the company and acts as an entrepreneur since 4 years back. The company 5 is a family business and it has been founded in the beginning of the 1990s as a result of increased traveling among the tourists into a country very near to Finland. The company provides leisure trips and packages for tourists. It has several countries that works as the main market area in Europe. The company works together with airplanes as well as bus and ship companies.

''*Traveling is a globally significant industry, increasing in popularity and yet, it shows no sign of decreasing anytime soon [on a general level].*'' This trend has not yet been affected by climate change, one reason being the increased wealth of the tourists, but as a trend in the nearby area, the Swedes have started to use other forms or domestic transport than flying. This has contributed to a 4% decrease in domestic flights during the spring of 2019 compared with the beginning of the same year. The change of travel patterns is a sign of changed consumer behavior and considering climate change, which shows in the previous example. This has not yet happened in Finland but it a possible trend to be followed in the future. All in all, traveling has not decreased but the form in which it is done has been changed and will continue to do so in the future.

With regard to the interviewee 5's business, the customers have become more aware of the climate and this shows for example in one customer request where 4 people wanted to throw a 40th birthday party together and travel somewhere. ''*They were all from the Southern Finland and instead of choosing an exotic destination far away, they decided to travel to Estonia instead.*'' The customers also seem to choose a more sustainable destination and compare the carbon footprint of flying with that of taking a cruise. A partner that works together with company 5 has also taken climate change into account and started to make its ships more environmentally friendly.

The company has not set numerical emission reduction targets, but it works generally in a sustainable way. However, climate change can be seen in the company's strategy in a way that '' *in the future the aim is to get the carbon footprint of traveling visible and start to compensate the generated emissions by the summer of 2020.*'' The environmental impact of the office is rather small. The company has been able to reduce its carbon footprint but is unable to state by how much it has reduced and compared to what. The company puts together a traveling package and the services included in the packages are from other companies, which is why it is difficult for company 5 to control their carbon footprint. But, one way to control it is to choose who to work with. But, still the company 5 wants to be transparent and inform the tourists about the different choices they can make and the environmental impacts concerning the different traveling packages.

The interviewee 5 states that the company favors new[er] airplane types instead of older ones and it provides several hotels that have a smaller negative environmental impact in the travel packages. *''I see big opportunities ahead and underline the importance of full transparency. Believing in possibilities is what we as a company stand for. ''* One ship company that works together with company 5 has as an example managed to reduce its carbon footprint per customer from 2018 in one route.

The compensation can be done indirectly, because the company 5 does not have its own service, but it works together with other companies. *'' Still, compensation should be made possible as a whole and it could be one option in a form that a customer could check when asking for a specific package. In the form the customers would have a change to choose if they want to compensate. ''*

5.5.2 Company 5 secondary data

Company 5 puts a lot of effort in educating its future customers about the responsible ways of traveling and how to act in an environmentally friendly way at the destination. As for low emission services, the company itself aims for full traveler capacity in its buses and they prefer direct flights (Company 5, 2019b). The travel agency company works together with hotels that are environmentally responsible and have a Green Key- environmental certification (Greenkey, 2019).

5.6 Company 6

5.6.1 Primary data on company 6

The interviewee 6 is a brand manager. He also works with responsibility and standards of which he has 9 years' experience. Otherwise he has worked in the company for 15 years.

Company 6 is a franchised hotel brand in Finland operated by a Finnish hotel company and part of the international brand that is managed and developed by an international company. There are around 300 hotels of this same brand around the world, and the interviewee is responsible for the hotels in Finland.

''Climate change does not have a direct effect on the tourists' travel plans, people still travel. People do not want to give up traveling and expect others to act and change their behavior instead.'' The company 6 takes climate change into account and acts in advance to prepare for the changes required in the future. *''I see climate change as a hygiene factor, and by that, I mean that it is a necessity that needs to be acted upon.''* For that reason, acting in an environmentally friendly way today cannot necessarily provide any competitive advantage. The company 6 has changed its way of doing business and obtained the Nordic Swan eco label for seven years and has had the Green Key eco label for four years. There have not been any customer requests concerning climate change.

To decrease the company's carbon footprint the company has done a lot. *''The company has switched to LED lights, avoided heating and cooling of empty spaces, stopped*

offering bottled water and decreased its plastic usage.'' The company is at the moment trying out a Pilot project that would take plastic bottles away from the minibars. No plastic straws are used at the company 6.

The company aims to become 30% more energy efficient by the year 2030 in comparison to 2015. In addition, the aim is that 80 % of energy use is covered by renewable energy sources by the year 2025. At the moment the share of renewable energy is 75% and the aim for the future is to reach 100%.

The company 6 has showers that use less water and so it has decreased its water consumption by 10% in the recent years and it offers an option for its customers to decide not to ask the towels to be washed every day. A result of this is that the company is able to invest in a project that provides the third world countries with clean drinking water. The brand globally aims to reduce 10% of its water and waste footprint, **c**limate change has a role in the company's strategy and to mitigate emissions the company's aim is to decrease food waste by 15%, as an example. The food in the meetings is based on seasonal vegetables. The future aim for the meetings is to become vegan and utilize seasonal vegetables. The breakfast is vegan friendly, and in the future, it also aims to better utilize vegetables in season at a specific point in time. These also serve as ways the company 6 has helped to decrease its customers' carbon footprint.

Also, the purpose of the company is to find out possibilities to operate in a circular way, so that for example all the materials used in the company 6 would get a new life after the company would not need them anymore. These actions are also considered in the new projects that will take place in the future.

''It is difficult to say how much the carbon footprint of the company has decreased, because it is not easy to say what are the roles of company's own actions and changed consumer behavior. The time of the year also plays a vital role; the energy consumption is different when comparing a mild winter with extreme winter with tremendous cold.'' and the number of guests may vary from year to another. As an example of a low emission service the company has offered saving energy by turning the lights off from the rooms that are not in use.

''The company has measured its carbon handprint in 2013 as per the brand instructions and some years before it by using the Greenhouse Gas Protocol, but the company no longer measures it.'' In the year 2013 the brand company 6 cooperated with over 20 other hotel companies from all over the world, as well as the International Tourism Partnership. The carbon footprint has not been calculated after 2013 because it has proven to be too difficult. The accuracy and availability of the information cannot fully be guaranteed and the people filling out the forms about the factors contributing to the company's carbon footprint are not professionals in that specific field.

The problems with the calculations have existed all the way from deciding on the functional unit [that might require converting grams to kilograms as an example] to the uncertainty of how to report and account for the common spaces. *''Also, due to employee turnover there is no way to guarantee that the data collection is done in the same way than before.''* It is difficult to obtain data from the supply chain, for example the company who washes the towels, since it is an independent company. There has been a problem with entering measured data as well as how to allocate emissions to cellars, for example. Finally, the carbon footprint calculators do usually not consider the use

of water and food waste in the meetings and events department and excluding these in the calculations causes significant differences in the results.

''The theme of environmentally friendliness is vital in the communications and marketing of the company and it should be made easy to execute and commercialize. There is a need to change the customers' attitudes and increase the information flow regarding the environmentally friendly- theme.'' The company's aim is to offer easily accessible solutions and responsible services that correspond to the customers' need to travel, while doing it more responsibly. The company underlines the need for them to help others [the customers] to be environmentally friendly.

The emissions of the meetings and events organized in the company 6 are compensated and the meetings are carbon neutral. This is a brand promise. The company works together with a commonly known carbon offsetting organization that directs the money to mitigate the negative effects of climate change in a few different countries, especially in the 3rd world countries.

5.6.2 Secondary data on company 6

The brand company 6 offers charging stations for electric cars (Company 6, 2019c). This example shows how climate change shows in the company's strategy and how it has been able to reduce its carbon footprint. The new premises that will be build, are planned to use as little energy as possible and having as low carbon footprint as possible (Company 6, 2018d). Efficient boilers are used at the premises (Company 6, 2018d). In 2017, the company has made a project with new and advanced fuel cell technology in one city in Europe, and since then, emissions have been decreased by 600 tons per year in that location (Company 6, 2018d). To underline the importance of responsibility, company 6 has taken part in earth hour last year (Company 6, 2019a) educating others about how to be more environmentally friendly. During that time, it had shut down all the lights and electrical equipment that were not necessary (Company 6, 2019a).

The brand company's purpose is to decrease the use of water and their carbon footprint by 2022, by 10% in comparison to 2017 (Company 6, 2018d). The company 6 utilizes rainwater as much as possible and offers about 10% of all the company's grey and blackwater to be recycled at the company's premises (Company 6, 2018d). The company uses as much recycled material as possible to reduce their carbon footprint (Company 6, 2018d).

The goal of the brand company is also to ban the use of single plastics in events and meetings that take place in their premises, by 2020 (Company 6, 2018d). These also show the areas within the company contributes to the UN SDGs and especially ''Climate Action'' (Company 6, 2018d).

The carbon footprint per m2 (kgs of CO2e) has been 93.1 kgs of CO2e in 2016, in 2017 it has been 88.8 kgs CO2e and it has further decreased in the year 2018 to 82.1 kgs of CO2e (Company 6, 2018d). The carbon footprint per quest- night has been 21.4 kgs of CO2e in the years 2016 and 2017, and in the year 2018 it has decreased to 20.7 kgs of CO2e (Company 6, 2018d).

The brand company has offset over 48,000 tons of CO2 (Company 6, 2019d). The carbon offsets the company has bought, have had VSC and Gold standards (Company 6, 2018d).

5.7 Company 7

5.7.1 Company 7 primary data

The interviewee 7a has worked in the company, as a Sustainability coordinator for 3 years. The interviewee 7b has worked as a Director of Sustainable Business for 1,5 years. The company provides accommodation and dining services to serve tourism customers internationally in several locations. The company also serves as a sustainability role model.

According to the interviewee 7a, ''*We at Company 7 became conscious about the environment already in the beginning of the 1990s, way before climate change started to become a hot topic. By being one step ahead and introducing so many sustainable ideas, it [climate change] affected our business positively.*'' The ideas the company presented were also a reply to their customers desires to take climate change into account in business. An example required by the customers was increasing the amount of vegan food offered, according to the interviewee 7b. The company 7 no longer cleans the quests' rooms automatically during their stay, which is an example of a low emission service provided by the company. Also, environmentally friendly rooms have been opened, small amenities from the rooms and plastic straws have been removed to reduce plastic consumption and fair-trade coffee, as well as organic breakfasts, have been included in service. These actions the company does by keeping the climate change in mind, also serve as examples of the low emission products and services the company has offered until this point in time and will continue to offer in the future.

The company has come up with an idea of a special water bottle that encourages the tourists to fill them up with tap water instead of buying plastic water bottles. All the way from the beginning, the company has started to report environmental data and follow-up data per hotel and received eco-labels (90% of the hotels by the end of 2018). A bit later the company has started to report about its business according to the UN Global Compact, and collaborated actively with suppliers, who are forerunners in reducing carbon emissions. ''*In addition, the company 7 works greatly to with a well- known partnership that ensures that the tourism industry companies work according to the United Nations sustainable development goals and take them into account in their everyday business.*''

According to both interviewees, the company has been able to reduce its carbon footprint by using biogas instead of natural gas, using 100% renewable electricity, participating in energy efficiency programs, using LED lamps and more energy-efficient equipment in the entire company. Also, motion sensor lights, renewable electricity, and solar panels are used, while at the same time oil is not used for heating purposes.

Interviewee 7a says that ''*As a travel industry company, we calculate our carbon footprint by ourselves. We have a carbon dioxide emission factor for all the services that we use for Scope 1, 2 and 3 emissions, which we then calculate accordingly.* ''

The company also uses the Greenhouse Gas Protocol corporate standard for calculating ghg emissions. The results of the carbon footprint calculations are compared with the company's goals and compared to the past few years and the results present an accurate description of the company's situation at the moment. The interviewee 7a has not experienced any difficulties with calculating the company's carbon footprint, but the interviewee 7b says that it has not been fully problem-fee. According to the interviewee 7b, '' It is difficult to ensure that all the data is completely accurate, but we aim to solve the problem by working closely with our hotels' training and communicate how to report and why the numbers are important.''

By offering vegetarian options, the company 7 has been able to reduce its customers' carbon footprint. The interviewee 7a states that *''We recommend our customers to live at Company 7, as we from past years are working to lower the negative environmental emissions.''* The ways the company 7 has been able to reduce its customers' carbon footprint are the way the food is prepared, cooked and served. According to the interviewee 7b,'' the company 7 has collaborated with a phone app and by using it the quests can buy food that is left over from the company 7's services and at the same time reduce food waste.'' The company and nudges guests to eat more greens and so decrease their carbon footprint. Asking guests to hang up their towel are also some ways the company has been able to decrease its customers' carbon footprint.

The company is compensating for meat consumption in one of their hotels. According to the interviewee 7a, *''We better reduce our emissions instead of using more, [of them] and then compensate.''*

5.7.2 Company 7 secondary data

Company 7 collaborates actively with suppliers who are forerunners in reducing carbon emissions, which proves the fact that climate change is at the heart of the company's operations. The company is a part of International Tourist Partnership (International tourism partnership, 2019). The company 7 aims to have one of the well-known environmental certificates per one accommodation location by the end of 2018, a goal that was nearly completed by that time (Company 7, 2019b). The UN SDGs are considered in the company's everyday business, especially the one related to Climate Action. The aim of the company for next year (2019) is to be an accommodation provider that has the lowest carbon dioxide emissions (Company 7, 2019b).

Also, by next year the company aims to increase waste recycling and decrease the amount of waste (Company 7, 2019b, 2019c). The goal for using 100% renewable energy is for the year 2020, which is 3 % more from the year 2018 (Company 7, 2019b). The carbon dioxide emissions in kilograms per quest night is aimed to reach 2,3 kg in 2020 from 2.42 (2018) (Company 7, 2019b). The number of environmentally friendly and certified hotels is aimed to reach 100% in 2020, from 90% in 2018, within 12 months after opening the company or renewing it (Company 7, 2019b). The use of the customers for one day (m3 – cubic meters) should be 0,16 m3 in 2020, and thereby decrease 0.03 m3 from 2018 (Company 7, 2019b). The company's purpose is that 95% of used chemicals are certified by the year 2020, which means 14 additional certified chemicals

compared to the year 2018 (Company 7, 2019b). The goal for 2020 is to decrease the amount of waste generated by the guests overnight to 0,62 kg of waste, from the year 2018 (0,64 kg) (Company 7, 2019b). Some of the food that would have otherwise been wasted, have got a new chance by being used for making new food and donated to horses (Company 7, 2019d).

In 2018, the company 7 has managed to recycle almost 90% of the waste it has generated in comparison to the year before. The company uses almost 100% renewable energy in its premises, resulting from the use of solar panels. The showers have nowadays shower heads that make the saving of water easier, because of the decreased water pressure, which has resulted in saving 12 litres of water per minute (compared to the time without the new showerheads, contributing to 18 litres of water per minute). (Company 7, 2019b).

In the carbon footprint calculations the direct scope 1 emissions include the emissions from oil and gas combustion and the carbon footprint of the company is calculated by using the guidelines of the Greenhouse Gas Protocol (Company 7, 2019b). The (indirect) scope 2 emissions include electricity, district heating and cooling of the premises (Company 7, 2019b). The emission factors are based on the information gotten from the suppliers and represent what they have decided on (Company 7, 2019b). Market- based ways of calculating the emissions are used (Company 7, 2019b). The other scope 3 emissions company 8 includes raise from business travel, which is excluded from the scope of this thesis (Company 7, 2019b).

5.8 Company 8

5.8.1 Company 8 primary data

The interviewee 8 works as Vice President of Sustainability and Environment and has 12 years' experience from that position. He has worked in the company for 27 years. The company makes sure the tourists' trips run as smoothly as possible and are safe. According to the interviewee 8, *''The whole industry has been aware of climate change and the CO2 emissions arising from the business already for 10 years. This has made setting up targets and mechanisms to decrease the emissions possible and has made the company a forerunner.''* The industry in which the company 8 operates in, is always the one that receives environmental critique first, because of the company's easily located presence in Finland. This is the reason the company has been active from the beginning, in terms of climate change. *''The energy efficiency has been a hot topic already in the 80's and the CO2 emissions have already been involved in the discussions about 12 years ago.''* The company is aware that its biggest concerns regarding climate change and pollution re water, noise and the air quality.

The customers have not had any specific requests concerning climate change, but the environmental impact of traffic (regarding company 8) has been widely discussed and the company has affected the already forecasted images that the customers could have about the topic.

''By 2020, we had a goal to maintain Finland's traffic network in a carbon neutral way, but we reached it already in 2019.'' Responsibility, and especially environmental responsibility are underlined concepts that are used in the sustainability report. Sustainability is also a big part of the responsibility itself. *''We grow responsibly.''*

To decrease its carbon footprint, the company has taken some small steps. The renewable diesel in use at the moment has been the easiest to incorporate, now they have electricity capacity close to 1MWp (megawatts) coming from solar panels. Also, when building new premises, it is possible to make them energy efficient from the beginning and for that the company obtains a certificate. Over 10 of the premises belonging to the company 8, use tree-based biofuel for heating, which contributes to zero emissions. The whole company's network utilizes wind power and all the other emissions arising from the company 8 and its network are compensated. A point of comparison for the carbon footprint is the number of travelers and the aim is for the emission efficiency to improve per passenger.

The company calculates its carbon footprint by itself, according to an accreditation standard presenting the company 8's business and the company 8 feels that the carbon footprint they represent is accurate. *''As a company maintaining a large transportation network, we follow the national energy standards strictly.* ''For electricity and heating the company uses meters that can be read at the same locations the meters are located, or remotely. The emissions are calculated according to the accreditation standards offered to the specific business the company 8 represents. The company's scope 1 emissions include the vehicles, emergency electricity production and local thermal plants and scope 2 indirect energy (electricity and district heating). In a few locations scope 3 emissions are also calculated, but not in the most locations. The results of the carbon footprint calculations are compared to the past 3 year's average.

The calculations of the company's carbon footprint have not been fully problem-free, since some of the company's locations do not have an automatic registration of the fuel consumption of the vehicles used. The registration is however changing to become an automatic one, which solves the above-mentioned problem. Another problem has been the need for verification of the (carbon footprint) values the company obtains. *''We verify emissions according to the industry's standard and obtaining it is very time-consuming. Only rare companies verify their carbon footprint using a third party.''* A problem also becomes concerning information collected ''by hand'', because of the uncertainty whether the collected information presents a correct time period. Here it is vital to know when certain meters are to be read, because there is a difference whether the meters are read in December or January, for example. Some solutions the interviewee 9 can think of are that the information about customers and their consumption are automated, and therefore easy to get. Also, the information systems work great.

''Some low emission services the company 8 has offered for its customers are charging stations for electric cars that are present in most of the company 8's locations of which one of them has tens of charging stations.'' This works also as an example on how the company has helped its customers to reduce their carbon footprint. The infrastructure provided by the company 8 is carbon neutral, which makes the company 8's operations carbon neutral as a whole. *''The customers make the choice of how to get to the airport, but to help the customers and to be able to reduce their carbon footprint, we offer a possibility of using a*

train.'' The company has obtained Gold standard verified emission credits, because the company feels that they want to use as credible credits as possible. *''Even if it is about the future, the industry's European trade union aims for the other companies belonging to it (as well) to have net zero carbon dioxide emissions by 2050.''*

5.8.2 Company 8 secondary data

To decrease the company's carbon footprint, the company uses LED lights in its premises (Company 8, 2019a). In some of the locations bioenergy and geothermal energy are used especially, to make operating in a cold environment easier (Company 8, 2019a).

The company 8 has increased their effort to recycle the waste they produce and further transform it to heat (Company 8, 2019b). From the waste generated at the company 8 in the year 2018, over 30% of it was recycled, over 40 % of it was transformed to energy and over 20% went to landfills (Company 8, 2019b).

What comes to the accreditation standard presenting the company 8's business that is used for calculating the company's carbon footprint, the accreditation standard follows the Greenhouse Gas Protocol Corporate Accounting standard and World Business Council for Sustainable Development (Company 8, 2019c). The carbon footprints calculated for the company 8 are verified by a third party, in terms with the ISO 14064 standard (Company 8, 2019c).

5.9 Company 9

5.9.1 Primary data on company 9

"The interviewee 9 has worked as a Group Environmental Expert for a few years. The company provides transportation for people and their belongings, as well as other goods. It operates on water and lets its customers enjoy the beautiful archipelago while moving from place a to place b, which is appreciated by many.

''Company 9 as a shipping company is constantly facing different legal provisions, whether Global, Regional or Local.'' Emission related subjects which can be attributed to climate change as well the wellbeing of people, are regulated by The International Maritime Organization through International Convention for the Prevention of Pollution from Ships and especially its Annex VI Prevention of Air Pollution from Ships. Quite recently after Paris Climate Agreement the CO2 emission related subject has been adopted by IMO as well as the EU. Very specific tasks of monitoring and reporting fuel consumption related operational figures, including CO2 emissions in total and per transport work are assigned to shipping companies.

According to the interviewee 9, ''In order to comply fully with all relevant provisions company 9 has developed specific tasks and routines in order to collect and report required information.''

The customers' awareness about climate change has definitely increased. The company has received a number of enquiries concerning the CO2 emissions per passenger on specific voyages. ''Probably the number of similar enquiries will raise in the future.''

Company 9 has been working for years, in order to increase the energy efficiency of their ships hence reducing their fuel consumption and emissions (including CO2), which also shows in the company's strategy. ''There have been specific targets set for years, like reduction of fuel consumption per nautical mile. The EU and IMO have set specific targets for the whole shipping industry.'' For example, EU has stated that the CO2 emissions per transport work must be reduced by 40% by 2030 and by 70% by 2050. Meanwhile IMO has stated that the total CO2 emissions from shipping must be reduced by 50% by 2050 in absolute figures.

The company has been able to reduce its carbon footprint in the ways mentioned above. Technology develops fast and Company 9 has always been investigating different solutions in order to apply them on board of their ships. Constant upgrading of the machinery and equipment onboard is one of the ways.

''Meanwhile the accurate measurements cannot be underestimated. Just recently the company has developed a specific CO2 reduction plan in order to plan and measure the effectiveness of different technical solutions they have decided to implement throughout their fleet.''

What comes to decreasing the company's carbon footprint, the company has measured the performance of their ships for a very long time. Their main objective is to reduce fuel consumption per nautical mile and fuel consumption per passenger or CO2 emission per passenger. The interviewee states that ''over the last 10 years we have managed to reduce CO2 emissions per by 44%.''

As a travel industry company, they calculate relevant figures for determining the carbon footprint by themselves. In addition, under the EU MRV-Regulation, relevant figures are verified by a 3rd Party Organization and under IMO DCS system by Class Societies. ''As mentioned earlier fuel consumption, distance sailed number of passengers and, or cargo is considered, we only use actual, measured data.'' Comparison between different ships is extremely complicated as there are too many variables which describe the specific ship, its operational profile and for instance weather conditions. '' The problem while calculating has been that various statistical calculations and indicators can be generated but the quality of the accurate raw data is absolutely vital, and it cannot always be guaranteed.''

5.9.2 Secondary data on company 9

The company works according to several standards, for example ISO 14000 and ISO 14001 (Company 9, 2019b). This shows the company's actions towards climate change and strategy that takes the environment into account.

The company 10 recycles the waste oil originated from its business (Company 9, 2019b). The oil can thereafter be used again in heating plants after it has been cleaned (Company 9, 2019b). Metals, plastics, glass, cardboard, biowaste and problematic

waste are recycled accordingly (Company 9, 2019b). In the vessels, it is also investigated whether biowaste could be composted (Company 9, 2019b).

Company 9 has invested in energy efficiency in the year 2018 and new fleet has been obtained (Company 9, 2019c). The fuel used per passenger has been decreased by 35% from the year 2009 (Company 9, 2019c). This is a result of the ships becoming more energy efficient, which has enabled the company 9 to reduce its customers' carbon footprint. This energy efficiency (Company 9, 2019c) can also be regarded as a low emission service the company offers its customers; because of it, the service the customers' buy (transportation) produces less emissions.

5.10 Company 10

5.10.1 Primary data on company 10

The interviewee 10 works as a financial and administrative expert as well as quality manager and she has worked in the position for the past 10 years. The company 10 is a popular conference and events venue, organizing congresses, concerts and parties, as well as meetings. International interest towards the company has grown further in recent years. According to the interviewee 10, ''*The vision is to be an inspiring pioneer meeting place in Europe from morning to evening, and the mission is to create the best opportunity for success to the client and create a unique experience for the visitors.* '' Systematic monitoring of environmental impacts of the venue was started in 2008.

The climate change has affected the everyday by increasing the demand of sustainable solutions and practices. According to the interviewee 10, ''*Customers are more aware of the climate impacts of choices they have. We strive to comply with all our operations in terms of sustainable development, which our subcontractors and partners are also committed to.*'' The customers may ask more detailed information about energy consumption, amount of waste and use of renewable energy regarding the customers' own event or booking. When having competing offers, the customers appreciate companies that work in a sustainable way, have environmental management system and certificates, and the possibility to use renewable energy in the venues. The restaurant working alongside with the company uses at least 60% organic food, according to an organic program they are a part of.

Climate change is considered in the company's business and strategy by setting quality and environmental goals and reporting transparently on the progress in the company's Balanced Score Card. The emission reduction targets are reviewed annually, and additional emission reduction measures are introduced if needed. ''*As a result of renovation work and energy efficiency improvement in the building, the energy consumption by the company 10 has decreased enormously in the past 10 years even if the utilization rate of premises has increased.*''

The company 10 has not yet measured its carbon footprint but it shows great interest in measuring it (and carbon handprint) in the future and is looking for a partner that can help them the company with the calculations. ''*Still, we always provide all the necessary information to our customers if they want to calculate the carbon footprint of*

their event and guide them to find the most environmentally friendly solutions. We think that the carbon footprint can be more relevant to calculate after the renovation of the venue.''

Still, to decrease its carbon footprint the company has among other things improved the efficiency of air conditioning, changed the light bulbs to LEDs and installed solar panels on the roof of the building. Also, the windows are now more environmentally friendly than the older ones and the furniture in the premises are fixed when needed instead of always purchasing new ones.

''In terms of carbon footprint, our energy consumption has been reduced as follows; the energy consumption has decreased from 2641 MWh (2008) to 1799 MWh (2018), district heating has decreased from 5215 MWh (2008) to 2534 MWh (2018) and the water use has decreased from 9021 m3 (2008) to 2008 m3 (2018).'' Extra ordinary warm summers have strongly affected the consumption of district cooling. In 2018, 425 MWh were used, whereas 308 MWh were used in 2010.

All activities and resources are used as environmentally friendly as possible, which makes all the meetings and conferences held in the company 10 sustainable. Upon customer requests, the venues can be altered in a way that the carbon footprint arising from it would be the smallest possible. In addition, all the furniture date back to almost 70 years, showing great appreciation of the sustainable resources. The restaurant operating alongside the company 10 has a new climate conference product in place.

''Each service or product provided for the customer will be tailored, to each client separately (if needed), so that it is possible for the customer to reduce his own carbon footprint by using the Company 10 services.'' For example, using the solar power received during the meeting day can be used in in the meetings arranged by the customer, and it can be decided that only organic ingredients will be used in the meetings and the food quantity is planned to be optimized to produce as little food waste as possible. The food that is left over is offered to the clients or donated where needed.

5.10.2 Secondary data on company 10

Company 10 has a great emphasis on sustainability, and it shows in their strategy. They use an environmental management system as well as operate according to the ISO standard (Company 10, 2019c) and have organized a congress according to the Green Event's directions (Company 10, 2019d). The comp any produces renewable energy by using a solar plant located on top of their roof that can generate up to 25% of the electricity needed by the facility during a year (Company 10, 2019c). An example of emission reductions the company has been able to achieve is about 30% reduction in energy use between 2008 and 2017 Company 10, 2019d).

All the premises use ecological electricity and the heating- and air conditioning, as well as lighting are programmed individually for every room (Company 10, 2019d). The company 10's premises use the temperatures in the room depending on how many people the rooms have, and the air is also able to be recycled (Company 10, 2019d).

To reduce the company's carbon footprint the heating and air conditioning are off or at a minimal level in the rooms with no people (Company 10, 2019d). LED lamps and other energy saving lamps are used in the premises (Company 10, 2019d). The

premises have automatic water tabs, which are used to save water (Company 10, 2019d). The **restrooms** have double flush toilets and the most hand towels have been replaced with textile towels or air dryers (Company 10, 2019d).

The company 10 sorts and recycles the generated waste whenever possible (Company 10, 2019d). The landfill waste, energy waste, different sorts of paper and cardboard, biowaste, metals, and problematic waste (Company 10, 2019d). The carpets used at the premises are recycled after they no longer are used by the company 10 (Company 10, 2019d) and the material used in the company is environmentally friendly (Company 10, 2019e).

In the kitchen organic and local ingredients are preferred (Company 19, 2019c). The company 10 put constant effort in decreasing biowaste and the food they make is carefully planned to avoid unnecessary food waste (Company 10, 2019c). The restaurant has a big emphasis on ecological & local, domestic food and ingredients and in the meetings vegan and environmentally friendly options are available (My Helsinki, 2019).

6 ANALYSIS AND DISCUSSION

This section discusses the research questions in a thematic way, which means that the findings will be presented under the research questions. The results will be analyzed and discussed based on the theories presented in the *theory* section of this thesis. The analysis is based on both primary and secondary data from the Finnish tourism companies.

There is a summary of the case companies' answers based on the interview questions (Appendix 9.3). The numbers stand for different companies in the same way they have been used in this thesis until this point. An '*X*' in a box means that a specific concept is used at the company or that they do a specific thing, like calculate their carbon footprint. If there is a minus line (-), it means the opposite. The companies will be evaluated according to their age, size, whether they calculate their carbon footprint and if they have been able to reduce their customers' carbon footprint and compensate their emissions. The companies are presented in numbers inside circles in a variety of colors to make the comparison easier. The same numbering of the companies is used, as before in this thesis. This comparison will be shown in the Appendix 9.3.

6.1 How can the carbon footprint of tourism be measured in Finnish tourism companies?

6 out of the 10 companies have calculated their carbon footprints and 4 of them calculated it by themselves, while 2 of the companies bought the calculation work from the external service providers. For example, one company calculates relevant figures for determining the carbon footprint by itself as a travel industry company and another company has provided two examples of its carbon footprint calculations. The companies that calculate their carbon footprint and have clearly defined what they include in the calculations. Of those 6 companies, in total 4 companies; calculate it by themselves, while 2 companies have gotten help from another company.

One company calculates its carbon footprint internationally, but not in Finland, and 3 companies do not calculate it now but want to calculate it in the future. The companies that calculate their carbon footprint represent all ages and sizes except the medium age and size. Those companies are aware of the carbon footprint calculations and need for transparency. The companies that calculate their carbon footprints are from all functions and most of the companies that do not calculate their carbon footprint are medium size, and old. The companies that do not calculate their carbon footprint are of all sizes, old and medium age, which indicates that even if there are no medium size or medium age companies among the ones who calculate their carbon footprint, it does not mean that all the companies not calculating their carbon footprint would only be medium size and age. 3 out of 4 of the companies not calculating their carbon footprint belong, at least partly (one of the companies belongs to activities and transportation function) to the activity function and one of them belongs to accommodation function.

The companies calculating their carbon footprint by themselves are all big and old companies. This could indicate that they have more resources (money, knowledge and time) to calculate the carbon footprint internally. This is convenient for them when they can appoint certain people responsible for the calculations, who know how to do them. Two of those companies are the only ones that have gotten help to the calculation process from another company. This is presumably because they have not calculated it before and do not know how it should be done and what should be included. It is good that they have asked for help from a company specialized in this area, to make sure the calculations are done right from the beginning. The companies that calculate their carbon footprint by themselves are also from all the functions but the activity function.

One company does not calculate the carbon footprint in Finland anymore because it has proven too difficult regardless of its function, age or size. The companies that do not calculate the carbon footprint yet but want to do it in the future are mostly medium size and small, medium age and are part of the activity- as well as transportation function. Here again the size does not make a big difference, but they all represent activity function at least partly, which makes a difference, since it is more difficult for an activity company to calculate its carbon footprint than a company from the other functions. Therefore, even if two of the three companies partly represent the transportation function, it does not matter in this case, since they are both rather new to the carbon footprint topic. Some companies have even gone so far that they are already carbon neutral or want to be that in the future, which shows great respect towards the climate and natural resources and will inspire other companies to do the same.

There are 6 companies that use only primary data. They present all ages and sizes (and functions) except medium age and size. 2 companies use both primary and secondary data. It is probably a coincidence that they use both types of data, even if they are of different size and age (big and small, new and old) and present the same function. This finding is very interesting, since it could be more likely that the smaller and newer companies would have to use both types of data, because it could be the case that they would not be as likely to get access to adequate primary data in comparison to the bigger companies, but that is not the case here. The need to use both types of data could also appear in another company. Still, by using both data the 2 companies make sure they will get all the information needed.

Usually the companies that clearly identify what they include in the calculations, by defining the scope 1, 2 and 3 emissions that can be derived from the primary or secondary data. Even if the theory criticizes the scope 3 emissions because they might be difficult to calculate, some companies have managed to collect data and report them anyway

For example, one company has defined the scopes 1,2 and 3 and stated what is and what is not included in the carbon footprint calculations, as well as the primary and secondary data sources. As said in the theory, primary data should always be used and if it cannot provide all the answers, then secondary data may be used as supplementary material, which is exactly what the companies have done.

A company using only secondary data does not exist. This is because primary data is always needed, and secondary data can be used as supplementary material if there is something that cannot be found out by using the primary data.

A point of comparison, that has to do with following- up the emissions, can be missing from companies that have just now started to calculate their carbon footprint and have nothing to compare it with. This is why it is important in the future, to keep calculating the carbon footprint and keep track of the emissions so that the next year(s) there will be something to compare the next year's results with.

However, 4 companies define a clear point of comparison when calculating the carbon footprint (one of the companies is not taken into account in this part, because it does not calculate its carbon footprint in Finland). For example, one company states that they use the number of passengers as a point of comparison. The companies providing a clear point of comparison are old and big companies, presenting all but the activity function, because the activity companies have not provided a point of comparison. One reason for that might be that the activity companies have not been able to calculate it before. Even if the medium size and age companies are not presented here as providing a clear point of comparison, this is a matter of a single case, meaning that it could be as likely to have medium age and size, or small and new companies defining a clear point of comparison as well, even if it might be a bit more difficult for the new and small companies.

This shows transparency and courage from the companies' side. The companies should always provide this information when possible or inform the reason they do not have a baseline (yet), or define what they use as a baseline, to be transparent and avoid being accused of greenwashing.

Typically, the results are compared to last year, the past 3 year's average or the past years. 4 companies use the Greenhouse Gas Protocol corporate standard when calculating their carbon footprints. The represent all the functions and all but medium size or age. Here, the company function does not matter, and companies using the protocol could as well be medium age and size companies. Two companies use a carbon footprint calculator (for example one that is offered by Finnair) and other databases, while another company uses a HCMI (Hotel Carbon Emission Iniative)- calculator for the same purpose.

Here the size or age of the business does not matter, but the company is using the HCMI- calculator because it is directly developed for its business. From this it can be derived that the function this company represents (mostly accommodation but also food), is a forerunner in comparison to the other functions, because only one function specific calculator has been used by the 10 case companies. Additionally, another company uses a specific business' accreditation standard for the same reason as the previous company uses the HCMI-calculator.

The Greenhouse gas Protocol corporate standard is used in order to make the recognition and reporting of the ghg emissions easier in real life. According to the theory, it is also the reason why the standard has been developed. Also, when the companies follow the protocol year after year, the values representing ghg emissions be-

come comparable with the past years. This agreed on in the theory section that indicates that the ghg emissions change overtime and therefore the calculations should be recalculated from time to time in order to match the current situation of the company. Calculating the ghg emissions based on the Greenhouse Gas Protocol corporate standard shows that the companies care about reporting truthful, transparent information, based on scientific grounds, not just a method they have come up with themselves. Other standards have the same positive impact, but the Greenhouse Gas Protocol's corporate standard appears to be more popular.

Many different carbon footprint calculators exist, and this is evident also in the theory, saying that there are as many ways to calculate a carbon footprint than there are humans. Therefore, it is very important to state clearly which one has been used to calculate the company's ghg emissions and why it has been chosen over the other possibilities. This has also been suggested in the theory section, in order to increase transparency, which is needed in order for the customers to be able to trust the companies. For example, the emission calculator offered by Finnair is a good choice to use for calculating the flights' carbon dioxide emissions, since the calculator is developed specifically for that purpose and for airline industries. Another example is for the accommodation function; to use the HCMI- calculator, that has been specifically developed for that industry in question. The emission databases are useful in archiving different emission factors and their impact on the climate. The emission factors can then be used in calculating the company's carbon dioxide emissions.

Following specific standards should be the base of doing business. They help in calculating the carbon footprint in a transparent way, but the standards should be widened to every function presented in this thesis, so the results between companies would be more comparable. Additionally, laws and regulations should be developed for the tourism companies to make sure the carbon footprint – and also carbon handprint in the future - are calculated and reported correctly, which is not yet the case, according to the theory. In this way the carbon footprints also become more comparable with each other, which is line with the theory about the carbon footprint. This is important because at the moment, the companies do not have an obligation to follow the standards and they can freely decide not to follow them at all, which makes everyone's business more difficult.

A third-party verification is an optional way of making a company that uses it more trustworthy and transparent. Since using it is optional, companies that use it are putting extra effort in making sure their carbon footprint is calculated correctly. It makes the company customers also more confident and they are more likely to stand behind the numbers their companies present. A third-party verification is unambiguous; presenting the truth state of the company and therefore using it is highly recommended.

6.2 In which phase are the Finnish tourism companies in measuring their carbon footprints?

Some of the Finnish tourism companies are at the very beginning and have not started to calculate their carbon footprint yet (old and medium age, and all sizes). Other companies (mostly old and big companies) have already calculated their carbon footprint for some years. 2 companies have managed to reduce their carbon footprint and become carbon neutral. In total, 6 companies have reduced their carbon footprint and 3 of the 10 companies do not calculate their carbon footprint at the moment but want to calculate it in the future, as mentioned earlier.

The awareness of the calculations as a trend shows in the companies that have not yet calculated their carbon footprint and they want to underline the fact that they want to calculate it in the future. A few of the companies that have not calculated the carbon footprint yet, have said that they are looking for a company to cooperate with that can help with the calculations. Even if some companies have calculated their carbon footprints, the process has not been fully problem-free, which is also the reason for some companies not having calculated their carbon footprints.

All of those companies that have had difficulties, have somehow solved the problems they have experienced during the calculating process, except two companies. One company has obtained a 3rd party verification to solve the problems they have had with calculating the carbon footprint and to be able to trust the results the company stands for today. 5 out of 10 companies trust the carbon footprint values presenting their company, and one company did not answer this question. Companies of all functions, old and new, big and small can have problems with calculating a carbon footprint.

The problems one of the companies has experienced have been present from the beginning, having to do with the functional unit, unit conversions, uncertainty of reporting and accounting for common spaces. As the theory points out, there are many ways to calculate a company's carbon footprint, which might be an additional reason why it can prove so difficult- there are too many options, or it is not clear which option is the best. Also, it is difficult for the company to get information from the suppliers, entering the measured data and how to allocate emissions for cellars, as an example. Also, according to the company's interviewee, '''*… due to employee turnover there is no way to guarantee that the data collection is done in the same way as before.* ''' This is something that should be solved by giving clear instructions to everybody involved. Also, the new employees responsible for the data collection should be trained accordingly.

All the companies that calculate their carbon footprint think the value accurately describes the company today. This might be because some of the companies have gotten help from other companies specialized in carbon footprint calculation. Additionally, some companies have used a 3rd party verification, which increases the validity as an independent, impartial entity. This becomes evident in the theory section as well and 3rd party verifications are on their way of becoming more popular.

The reason for some companies not calculating their carbon footprint, can be the lack of information, unclear concepts, or the actual calculations may not be understood, even if the definition of the carbon footprint have been aimed to make as clear

as possible, in the theory. Additionally, leaving this information out, or not responding to the question whether there have been some problems with the calculations, may demonstrate that there have been some problems with the calculations and therefore everything is not published. There is also a possibility that something is left unsaid, which could be solved by adding transparency and publishing all the relevant information, making it available for everyone. This was the companies could also show how they are engaging in the changing world with a lot of pressure on being environmentally friendly.

Calculating the carbon footprint is not always problem free and it requires a lot of work. One reason for the difficulty might be that there are no rules, but basically guidelines, which may be followed if a company wishes to do so. This is also in line with the theory that states the steps needed to calculate a carbon footprint and following the standards is rather voluntary. That might be one reason bigger companies are in general more likely to calculate the carbon footprint by themselves; they have resources like money and power, and if they do not have the expertise, they can pay someone to do it.

One suggestion to make the calculations easier, could be to develop a platform made for tourism companies, even for different functions and function combinations and all information all from what to include in the calculations to what kind of data to use. The platform could also serve as an emission database companies could use in their calculations. All the relevant information would be collected there so that the data would be in one place, to increase convenience. Also, the values and would be updated regularly, to provide truthful, accurate information. One existing example is OpenCO2.net, a platform that Clonet has developed. The platform includes an extensive emissions database and carbon footprint and carbon handprint calculators. In order to better serve the companies of this thesis, the platform will be developed further, by collecting more tourism industry-specific emissions factors to be included in the emissions database of the service. In a couple of weeks new emission factors relating to, for example hotel nights in different countries will be included in the database.

6.3 What kind of measures do Finnish tourism companies use to reduce their carbon footprints?

There are several measures the Finnish tourism companies use to reduce their carbon footprints. They have to do with strategy, emission reduction targets, actions taken to reduce the emissions and compensation. Developing a strategy and setting emission reduction targets are the basis for reducing the emissions and compensating them. All of those topics mentioned above will be further explained in the following sections.

6.3.1 Strategy

The data shows that 6 of the 10 companies admit that climate change has had an effect on their business and half of the companies say that the customers have had special requests concerning climate change. For example, one company says that''*…by being*

one step ahead and introducing so many sustainable ideas, it [climate change] affected our business positively.'' It also gave an example of their customers requiring more vegetarian food to be offered at the restaurants. The climate change shows in 9 out of 10 companies' strategy. The company that has not yet had climate change in its strategy, has cooperated with another company that has helped them to calculate their carbon footprint, which enables it to include it in its upcoming strategy. For example, one of the companies has not set numerical emission reduction targets, but it works generally in a sustainable way. However, climate change can be seen in the company's strategy in a way that'*'' in the future the aim is to get the carbon footprint of traveling visible and start to compensate the generated emissions by the summer of 2020.'''*

Most of the companies that have been affected by climate change are big companies, but it has also been presented at one small and one medium size company. The companies affected by climate change are old and medium age companies. The companies that have been affected by climate change belong to the food and action-, action-, accommodation- and lastly to transportation function.

Companies that have had special requests from their customers that concern climate change are small, medium and big companies. The companies are medium age and old. Companies receiving special requests are from accommodation and food function, transportation and activity function, transportation function and activity and transportation function.

From the results of the primary and secondary data it can be seen that also customer requests concerning climate change are present in all functions, ages (all but new companies) and sizes of companies. The reason for the new company not receiving any customer requests yet can be that it has very recently joined the business world, which is understandable.

The customer requests concerning climate change might exist because the customers have also become more aware of the need for sustainability and the concept of climate change, which could be the result of the latest IPCC report as included in the theory, and how it affects the companies they purchase from or the specific functions they utilize. Here again the new companies can start fresh and take an example from the bigger companies and ''do it right from the beginning, '' by starting off with thinking sustainability ahead. The customer requests have proven to be fruitful, since the primary and secondary data show examples of how the companies have changed their businesses into more environmentally friendly ones as a result.

One company said that they have had customer requests concerning climate change and the company should offer more environmentally friendly food. This could be an example of stakeholder (here customer) pressure that has led the company to become more environmentally friendly. This is in line with the theory that describes the contradiction that even if the customers feel like they cannot affect the companies and their actions, they indeed, have a lot of power. The customers' power becomes evident when the companies start to act according to the customers' will, which indicates that the customers can change the way companies do business. If the customers do not like the way the companies behave, they can decide not to buy their services.

Companies that show climate change in their strategy are small, medium size and big. There is one company that does not have climate change in its strategy at the moment. In this case the age, function or size does not matter, because the climate change has just not affected the company yet, but this may change in the future.

The climate change shows also in the companies' strategies that have not yet set emission reduction targets. The reason for one of the companies not having emission reduction targets is that is has not calculated the base level of its emissions yet. The emission reduction targets are more difficult to set for the other company, because it can only affect the generated emissions in an *indirect* way. Therefore, it is not fully responsible for the generated emissions, since the emissions are caused by the partners it works with. A solution for this could be that it could set up some boundaries on how much its partners can pollute. This would mean that the company would have the possibility to work with more environmentally friendly companies in the future or demand the current partners to decrease their own emissions.

Climate change; having it in the strategy, and doing business with regards to the limits set by it, should concern all companies; old companies should rethink their ways of doing business and maybe even change their business model to a more environmentally friendly one, while the recently established companies can begin straight away from constructing their business in a climate friendly way, which is a lot easier. From this it can be derived that the companies take good example from others and start to act in an environmentally way as well, which is in line with the theory, also acting as a competitor pressure to act and stay within the game. If this was not the case, there could be just a few companies that would be environmentally friendly.

6.3.2 Emission reduction targets

8 of 10 companies have set emission reduction targets and so there are 2 companies that have not set emission reduction targets yet, while all the other companies have. The companies that have set emission reduction targets are all but medium age and size companies, presenting all the 4 functions. The size or age of the companies is not relevant in the comparison of having or not having set emission reduction targets, since the companies that have not set the targets yet, could as well be medium age or medium size companies. What is interesting here however, is that the two companies that have not set the emission reduction targets belong to the activity function. It is understandable that the activity function proves to be a more difficult function in terms of setting emission reduction targets, because they tend to include more variables that need to be considered. Also, at least one of the companies can only indirectly affect the emissions, by deciding who to work with, so that can also be a valid reason for not having set the emission reduction targets yet.

However, one of the companies that has not set emission reduction targets yet, is planning to reduce them in the future. The emission reductions show that the companies are willing to become more environmentally friendly. When the companies act according to the targets that shows commitment in becoming environmentally friendlier. All the emission reduction targets show commitment to sustainability and trying

to mitigate climate change and as presented in the *theory* section, the European Union has set an aim to decrease the ghg emissions by 20% before the year 2020. This part of the theory section shows that such a powerful entity as the European Union can even create pressure for the companies to start plan reducing their emissions as well as doing it in real life. The aim has been successful, since so many companies have started to decrease their ghg emissions after the 20% reduction aim.

6.3.3 Actions taken to reduce the emissions

All but two companies have been able to reduce their carbon footprint, as stated before. They are of different ages; both are small, and they represent the activity function. Here the only relevant comparison can be made in terms of the age of the companies. Of these two companies, one of them is aiming to do it more in the future, while the topic becomes more relevant in their business than it is now, while the other company has not had any emissions yet, because of its young age.

To reduce the carbon footprint of tourism, Finnish tourism companies have improved their energy efficiency, made investments in green, renewable energy (wind power, solar energy, solar panels) and switched to LED-lights. They also recycle and reduce waste, decrease the use of plastic and disposable utensils. Finally, they make environmentally friendlier choices regarding the vehicles. The measures for reducing carbon footprint used by the Finnish tourism companies are in line with the theory. They serve as examples of switching to renewable energy, avoiding plastic, disposables and excess packaging, as well as recycling, which are mentioned in the *theory* section of this thesis.

The companies do not shed too much light into their motives for reducing their carbon footprints, but some of the reasons could be cost savings, energy efficiency, being able to conduct business and differentiate oneself from the competitors, as the *theory* suggests. Additional reason why the companies want to be environmentally friendlier than before might be because they want to make their brand more profitable and appear as an attractive and responsible workplace.

The answers from the primary and secondary data show that the companies are in general aware of climate change and the newest IPCC report and its content, because some of the companies have started to change their behavior, regardless of the company size. Every one of these companies affected by climate change operate in such business areas that climate change has a big effect on them and the other way around, which is shown in the theory section where every business is related to climate change within the function(s) in which they belong to, being the traveling's 3 biggest emission sources and a significant emission source from humans. For example, one of the companies belongs to the activities- function, which means that everything they do (organize the performances; the premises, the business travel of the performers and the other staff and materials) have to do with climate change and they have to do everything as environmentally friendly as they can. One example of this was introduced by one of the companies, where its interviewee said that they reuse their materials. The companies represented by the certain functions should pay attention to the specific functions

they belong to and rethink their business in a way that assures the company's ability to do business regardless of the threat of climate change.

6.3.4 Compensation

Compensation serves as another option for a tourism company to reduce its carbon footprint. The tourism companies can reduce their emissions first as much as they can and then compensate the rest. However, some companies seem to be more interested in compensation as a fast option. 4 companies already compensate their emissions, while 4 other companies consider compensating in the future. Two companies did not answer the question. For example, one of the companies is participating in a compensation project and it is actively looking for and comparing other ways to compensate. On the other hand, another company underlines the importance of compensating the emissions they cannot reduce themselves and it is active in looking for the best possible way to compensate, and even doubling the monetary amount of compensation to play safe and avoid the stamp of greenwashing.

The companies that already compensate are all big companies and companies that consider compensating in the future are small and medium size companies. The two companies that did not respond were big and small. The companies that have already compensated their emissions are all old companies and the companies considering doing it in the future are an old and a new company. The two companies that did not respond to the questions were old and medium age. The companies that have already compensated, represent all the functions and the other two companies willing to compensate in the future are from the activities function. The two companies from the transportation- and transportation and activities function did not respond.

Here the age of the companies does not matter, since one of the companies has proven that even if it is a new company, it can put great emphasis on the compensation perspective already from the beginning. Still, it is easier for the newer companies to start compensating their emissions than older companies, because the new companies can launch carbon neutral services from the beginning after seeing how others have dealt with compensation. Overseeing older companies' trials may provide successful, since if they fail, the newer companies can wait with their move and do it when they have seen a solution that works. The small companies do not have as much money as the big ones, as stated before, so it is smart to be patient and learn from others that have the resources to find out the best alternatives; what works and what does not.

The results show that the activity companies have not yet compensated their emissions but want to do it in the future. It might be because it is harder for them to calculate their emissions in the first place because they are usually more complex than the other functions, for example accommodation function, that concentrate solely on providing accommodation services. This is because the activity companies usually consider the food, transportation and accommodation as well, as shown in one of the companies' example calculations that can be found in the company's *primary data* section.

Two of the companies did not respond to the question about compensation, which may indicate that they have not done it or have not planned to do so even in the future. It can also mean that they have not decided on whether they want to step into the compensation game or not. This was not a matter of function, age or size but rather a matter of the expertise of the companies, which shoved that there is still something can be done and considered in the future.

Regarding the theme of compensation, the way it is done as well as the way it is utilized matters greatly. If it is the only method used, and own emission reductions are not done, then the company is not working in an ethical way and shows a bad example for others. This is supported by the *theory* section of this thesis. In that case the companies doing so can also be accused of greenwashing; misleading consumers, because it shows that they want to *seem* environmentally friendly and act to reduce their emissions, while they do not actually do anything about it. To avoid this, it should be made sure the companies know what compensation means and how it should be used in an ethical way. Additionally, it could be decided that the companies that only compensate their emissions instead of reducing them by themselves could not obtain a compensation certificate.

On the other hand, companies that can prove to have decreased their emissions on their own and then having compensated the remaining emissions that cannot be decreased by the company itself, could obtain a compensation certificate, that could be used in marketing. The certificate would have to be renewed every year and state the amount of emissions the companies have generated in total and clearly define how much of the emissions has been reduced by the company itself and how much of them have been compensated. These kinds of clear rules would also help the consumer to track down possible greenwashing and unethical companies, since as the theory points out, greenwashing means shifting the attention away from what is really happening – which could in this case be avoided. The *theory* section mentions transparency with regard to compensation. Transparency could even be as important as the compensation itself, because if there is no proof of compensation and the way it has been done, it is not worth it to compensate at all. It is important to show how the companies have compensated their emissions and in which way. This shows credibility and expertise.

The companies involved in this thesis have proved to have decreased their emissions and most of the companies have used compensation as an additional step, or planned to do so in the future, which shows ethical behavior. One good example is one of the companies that has taken the sustainability aspect as the basis of its business from the beginning and they show that they are very aware of the ways to compensate and how it should be used. Some other companies show this consideration of the different compensation methods as well. One of the companies overcompensates is emissions to make sure they compensate more than they need to. This might be because the emission calculations and the number of emission reduction units produced by the offset projects may not be fully exact.

6.4 Is it possible for the Finnish travel industry services to have a positive carbon handprint?

It is evident that 9 out of 10 companies have offered low emission products or services. The companies that already have offered low emission services or products are of all ages, sizes and represent all the four functions. This indicated that the age, size or function do not matter in this case.

The company not belonging to the other 9 companies, is considering offering them in the future. That company says that ''We consider purchasing low emission services and products in the future'', while another company states that it concentrates more and more on offering activities that do not consume fuels or electricity, as an example. The age, size or function of the one company not having offered low emission services yet does not matter here, but the reason it considers to offer them in the future is that its strategy will be renewed and it aims to include climate change in it, on a bigger scale than up to this point.

This shows that all the companies are aware that they need to start offering environmentally friendlier products and services [this is in line with the theory, being a trend that a big part of companies follow and show willingness to become more environmentally friendly], which 90% of the companies have already done.

According to the findings, all the interviewed companies were able to reduce their customers' carbon footprint, and so form a carbon handprint and the age, size or function of the company did not have any impact on this matter. This shows that any company can create a carbon handprint by developing more climate-friendly services than its competitors. One of the companies prefers new[er] airplane types instead of older ones and it provides several environmentally friendlier hotels in its travel packages as an example of being able to form a carbon handprint.

This is true, even if defining the baseline is very difficult, which is also agreed on in the *theory* section. Also, determining a carbon handprint is more difficult than determining a carbon footprint. The carbon handprint can have a different value in different markets because of, for example, *different emission factors of the electricity production*. It is also important to note that as a company, decreasing its own emissions does not create a carbon footprint. Only when the customers are able to decrease their carbon footprint, by using the products and services offered by the company, a carbon handprint can be created. The companies have showed to have understood this, which is also in line with the *theory* section.

The results show that the companies have been aware of the concept of carbon handprint and they have been able to reduce their customers' carbon footprint in creating positive benefits that would not have occurred otherwise and by avoiding footprints that would otherwise have been formed. This shows great planning and underlines the companies' goodwill. These findings are also in line with the theory of carbon handprint and its definition presented in the *theory* section.

The travel industry companies can offer products that have a positive carbon handprint in comparison to a typical travel service, but still, a lot of work needs to be done, to be able to define carbon handprints of services provided by tourism industry companies. Most of the case companies have calculated their company's emissions,

and some of them have even calculated the carbon footprint of a single service (for example, emissions of a single hotel night). This shows that these companies have a good possibility to take the next step and calculate the carbon handprints of their products and services, which can be used in marketing purposes, to show the company's efforts in becoming more sustainable. Taking these aspects into consideration, still, the Finnish travel/tourism companies can have a positive handprint. This result applies to all companies regardless of their age, size or the function(s).

If the companies would not have acknowledged the need for climate friendlier alternatives, they would be in big trouble and they would need to act quickly. This is because the business world of today and especially in the future, should have a basic requirement for sustainability, and companies not doing enough would not get a license to do business- as the theory also points out, or they would have to make some big strategy changes and investments with a hectic schedule. But it is better to be aware of the trends and act accordingly, already when the competitors and the markets are changing. Here transparency is very important, the companies have to be able to show all the good they do and not be afraid of admitting that they have not received their goal yet. It is important to show that you as a company are on the way to sustainability or have reached it already.

Regarding compensation, the big companies are a few steps ahead, but the small companies prove to show some interest and action in compensation, and they have a fair chance to compensate even more in the future. The medium size and age companies should also stay awake, in order to not lose the markets to the more active companies.

7 LIMITATIONS AND FUTURE RESEARCH

This thesis was limited to the geographical boundaries, being Finnish companies or companies with a business unit in Finland. This thesis did not include business travel in the definition of tourism, to make the study a bit more precise. In the future, the business travel could be included, to shed light on how big its share of the tourism related emissions is. A suggestion for future research could also be to have different geographical boundaries and make the next study a bit more international.

A similar study could be conducted in the future, by concentrating on one of the four functions or having a better representability of the different functions than in this thesis. A suggestion would be to have companies that only represent one function, to make the study more generalizable and deeper. If a company with several functions would be chosen for future study, its main business function could be decided to be a part of the study. Also, in the future research, the companies could be more evenly distributed regarding size.

Since tourism is just one emission sensitive industry in the world, another suggestion for the future research could be to study another relevant industry; fashion industry with a similar study than this one. Another suggestion could be to look even deeper into the subjects of compensation and climate change that provided very interesting findings in the analysis section of this thesis.

7.1 Trustworthiness of the research

The aim of this thesis is to be as trustworthy as possible. It means that the reader should be able to believe in the entire study and its results. To increase the overall trustworthiness, the interview questions were made and sent in beforehand to the interviewees, to guarantee as accurate answers as possible. The goal of this thesis was to be as trustworthy as possible stood as a base for this whole thesis and it could be increased by reliability, validity and objectivity, which will be described in more detail in the following sections. Still, this thesis is about forerunners and therefore the results presented in this thesis may not fully represent the Finnish tourism industry as a whole.

7.1.1 Reliability

The reliability of the study attempts to describe the possibility of someone else making the exact same research and data gathering than this study in order to get similar results (Bryman & Bell, 2011, p.49, 2015, pp. 49-50 & 640). However, this could prove challenging because if the interviews were to be done again, the information gotten from them would be similar, but some information could be missing from the previously conducted interview. This is because the interviewees may not remember everything exactly like they did the first time, as well as depending on when the interview would be hold again, the results might differ. To be able to present data at this time, which is as reliable as possible, the interviews were recorded to be able to present the

respondents' answers as accurately as possible and providing a possibility to go back to the interview and make sure that the answers are understood correctly, without lacking any vital information.

7.1.2 Validity

The validity concept means generalizability (external validity) of the results and whether the aim of the thesis has been fulfilled with the collected data that has been up-to-date and relevant for the study, also called as ''internal validity (Björklund & Paulsson, 2014, pp. 66-67; Bryman & Bell, 2011, p. 400, 2015, pp. 50-51).'' The generalizability refers to how easy the results of this study can be said to present the tourism industry or a specific function. Here, collecting data from more than one company representing a specific function had a noticeable positive impact, as a result, making the generalization of the results easier in Finland. But then again, to increase the relevance of this study, more company respondents would be needed from all the functional areas - including also other companies than those who are already the forerunners in climate awareness. The data for this study has been carefully chosen to present the themes of the research and provide answers to the research questions of this thesis.

7.1.3 Objectivity

The objectivity of this study could be ensured by constantly going back to the study to correct any possible mistakes or lack of information. Also, all the interviews were held in a similar matter and no company or industry is treated in a different way. By a thorough description and argumentation of all the choices that have been made in the thesis (Björklund & Paulsson, 2014, pp. 66-68; Bryman & Bell, 2015, p. 52), objectivity is reached. The objectivity is be included in terms of the selected theories, geographical boundaries, criteria for choosing the companies and interviewees, functions and research methodology, as well as the whole thesis. It is also important to have implemented it throughout the whole thesis process.

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9 APPENDIX

Here the interview questions are presented (8.1 & 8.2). All the interviewees were asked these same questions. Languages used in the interviews were Finnish and English.

9.1 Interview questions in English

NO	Questions
1	May this interview be recorded?
2	May your/your company's name be used in the thesis?
3	Who are you and what is your position in your company?
4	How long have you had this position?
5	How has climate change affected your business and how does it show in your company's actions? • Have the customers started to have specific requests that have to do with climate change, what kind of?
6	Does climate change show in your strategy and have you set targets for decreasing emissions, what kind of?
7	Has your company been able to reduce its carbon footprint? If yes, • What has the company done? • By how much has it decreased and compared to what?
8	As a travel/ tourism industry company, how do you calculate your carbon footprint? • Do you calculate it by yourself or have you gotten help from someone? • How do you calculate it and what do you include in your calculations? • What kind of data do you use? • What do you compare your results with? • Have you experienced problems while calculating? • How have you overcome these difficulties? • Do you think it is an accurate description of the company's activities at the moment?
9	Has your company offered some low emission services/products that are better for the environment, or is it thinking about offering them in the future? What are they?
10	Has your company helped their customers to reduce their carbon footprint, how?
11	Have you thought of compensating your company's emissions or have you done it already?

9.2 Interview questions in Finnish

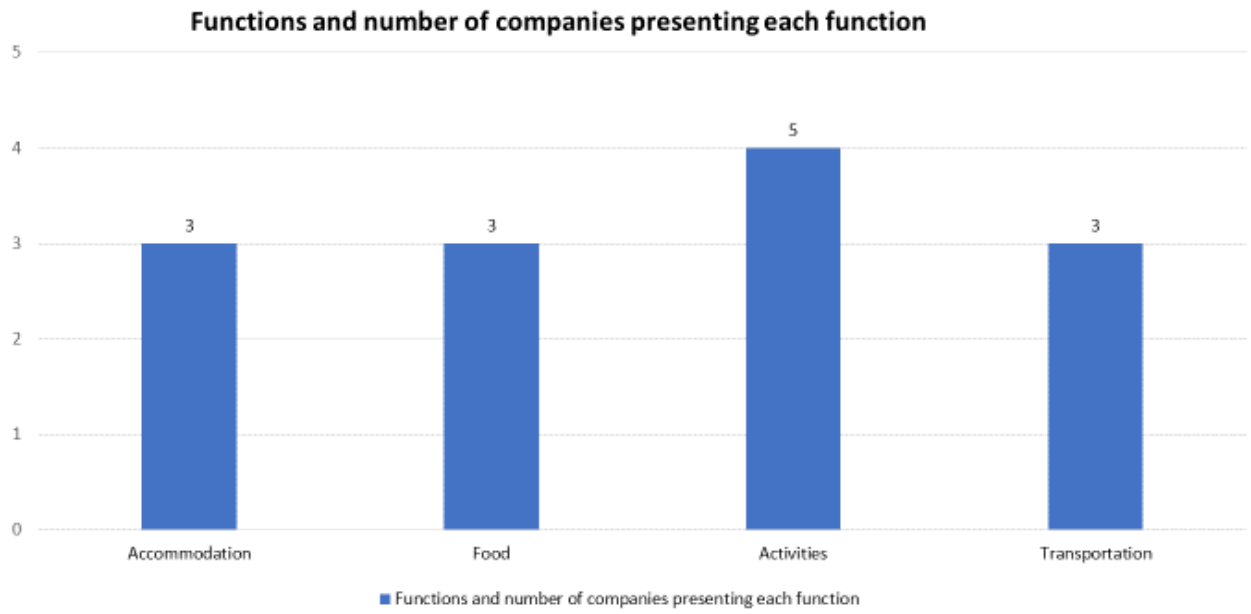
NO	Kysymykset
1	Saako tämän haastatelun nauhoittaa?
2	Saako teidän/ yrityksenne nimeä käyttää gradussa?
3	Kuka olette ja mikä on asemanne tässä yrityksessä?
4	Kauanko olette työskennelleet tässä asemassa?
5	Miten ilmastonmuutos on vaikuttanut bisnekseenne ja miten se näkyy yrityksenne toiminnassa? • Onko asiakkaillanne ollut jotain erikoispyyntöjä, jotka liittyvät ilmastonmuutokseen, minkälaisia?
6	Näkyykö ilmastonmuutos strategiassanne ja oletteko asettaneet päästövähennystavoitteita, millaisia?
7	Onko yrityksenne onnistunut pienentämään hiilijalanjälkeään? Jos vastaus on kyllä, • Mitä yrityksenne on tehnyt? • Paljonko se on pienentynyt ja mihin verrattuna?
8	Miten laskette hiilijalanjälkenne matkailu-/turismiyrityksenä? • Lasketteko sen itse vai oletteko saanut apua siihen? • Miten laskette sen ja mitä sisällytätte laskennassa? • Millaista dataa käytätte? • Mihin vertaatte tuloksia? • Onko laskennassa ilmennyt ongelmia? • Miten olette ratkaisseet ne ongelmat? • Edustavatko saamanne luvut mielestänne täsmällisesti yrityksenne nykytilannetta?
9	Onko yrityksenne tarjonnut vähäpäästöisiä tuotteita/ palveluita, jotka ovat ympäristöystävällisempiä, tai harkinnut niiden tarjoamista tulevaisuudessa? Mitä ne ovat?
10	Onko yrityksenne auttanut vähentämään asiakkaidensa hiilijalanjälkeä, miten?
11	Oletteko ajatelleet kompensoivanne yrityksenne päästöjä, oletteko tehnyt jo niin?

9.3 A summary of interview answers

Concept	Case Company									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Climate change / IPCC										
Climate change has impacted the company's business	-	-	-	x	-	x	x	x	x	x
Customers have had special requests concerning climate change	-	-	x	-	x	-	x	-	x	x
The climate change shows in the company's strategy	-	x	x	x	x	x	x	x	x	x
The company has set emissions reduction targets	x	x	x	-	-	x	x	x	x	x
Carbon footprint										
The company has been able to reduce its carbon footprint	-	-	x	x	x	x	x	x	x	x
Calculating the carbon footprint as a tourism company & standards										
The company calculates the carbon footprint	x	x	x	-	-	-	x	x	x	-
The company calculates the carbon footprint by itself (as a company)	-	-	x	-	-	-	x	x	x	-
The company has defined what it includes and does not include in the calculations	x	x	x	-	-	-	x	x	x	-
The company uses primary data	x	x	x	-	-	-	x	x	x	-
The company uses secondary data	-	x	-	-	-	-	x	-	-	-
A baseline is used	-	-	x	-	-	-	x	x	x	-
There have been problems in the calculations	x	x	x	-	-	x	x	x	x	-
The company has been able to overcome the difficulties in calculating the carbon footprint somehow	x	x	x	-	-	-	x	x	-	-
The numbers present the company accurately at the moment	x	x	x	-	-	-	x	x		-
No answer for the presentability									x	
Climate change/ Sustainability										

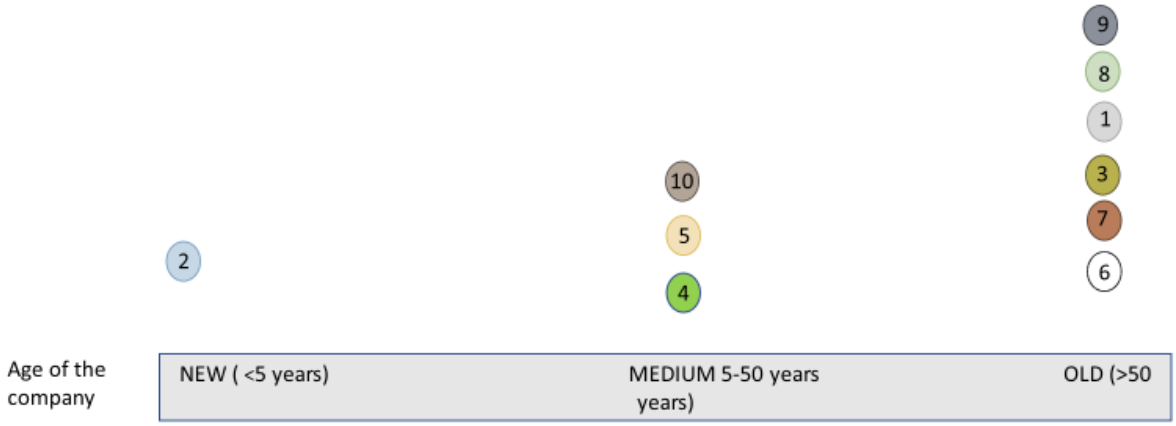
The company **has** offered low emission products or services	-	x	x	x	x	x	x	x	x	x
The company **has not yet offered low emission products or services** but is considering doing it **in the future**	x	-	-	-	-	-	-	-	-	-
Carbon handprint										
The company has been able to reduce its customers' carbon footprint	x	x	x	x	x	x	x	x	x	x
Compensation										
The company **has** compensated its emissions	-	-	x	-	-	x	x	x	-	-
The company **has not** compensated **yet,** but considers doing so **in the future**	x	x	-	x	x	-	-	-		
No answer									x	x

9.4 A company comparison based on different factors



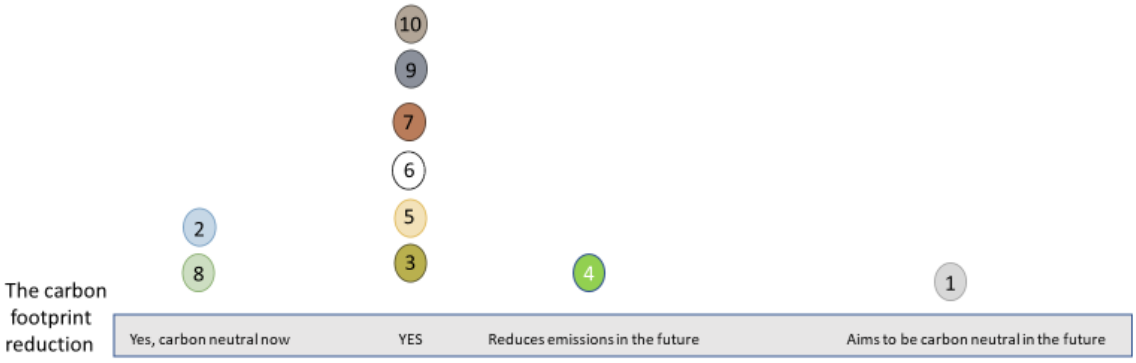
Accommodation: Companies 3, 6 and 7
Food: Companies 3, 7 and 10
Activities: Companies 1, 2, 4, 5 and 10
Transportation: Companies 5, 8 and 9

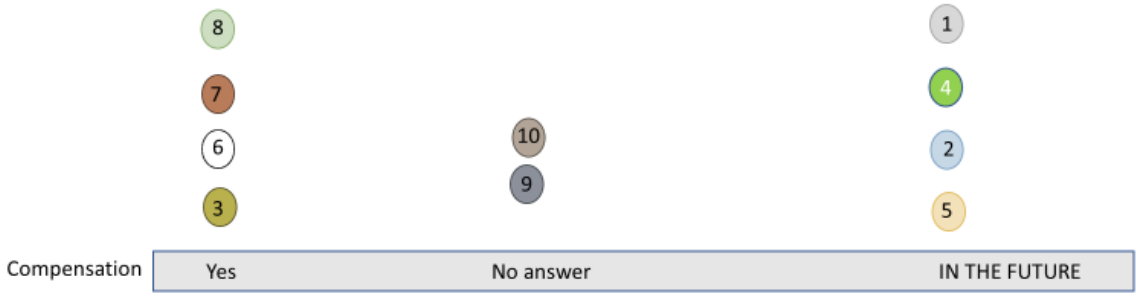
* **Note:** there are altogether 10 case companies and some of them belong to multiple functions at the same time.

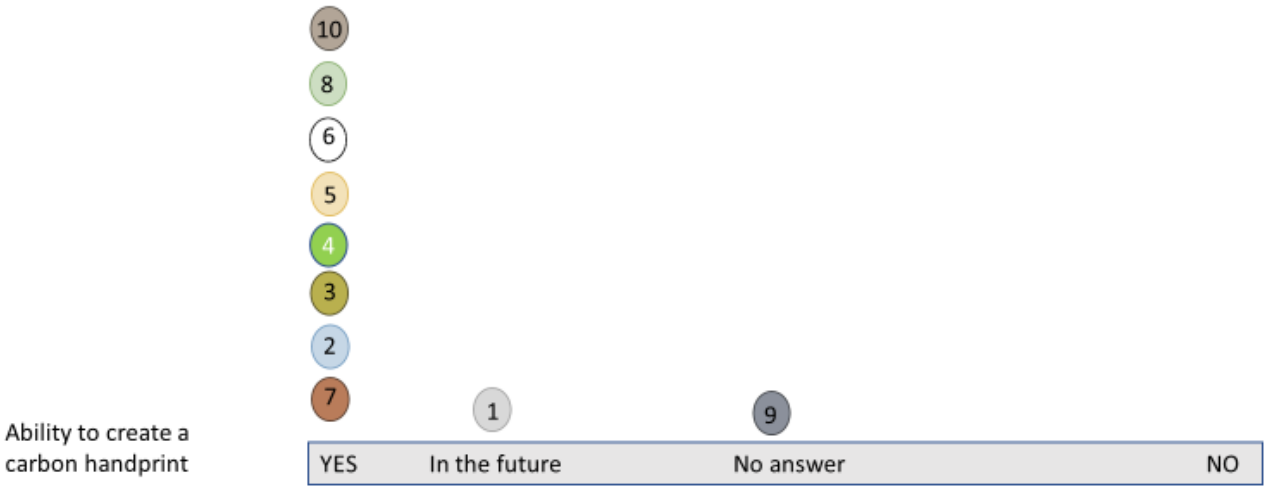



Size of the company
BIG (>1000 employees)
MEDIUM (50-1000 employees)
SMALL (<50 employees)
6
7
3
9
8
4
5
10
1
2


Calculating the carbon footprint
YES
Internationally yes, but not in Finland
No, but wants to calculate it in the future
NO
9
7
8
3
2
1
6
10
5
4


The carbon footprint reduction
Yes, carbon neutral now
YES
Reduces emissions in the future
Aims to be carbon neutral in the future
2
8
10
9
7
6
5
3
4
1


8
7
6
3
10
9
1
4
2
5
Compensation
Yes
No answer
IN THE FUTURE


10
8
6
5
4
3
2
7
1
9
Ability to create a carbon handprint
YES
In the future
No answer
NO