



# Willingness of Tourists to Reduce Travel Related Carbon Emissions Through Optimized Voluntary Carbon Offsetting. A Study among Tourist to the Island of Hawaii, USA.

MASTER THESIS

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## MASTER THESIS

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<sup>1</sup> DIACRITICALS: The author recognizes the use of diacritical markings of the (modern) Hawaiian language including the `okina [`] or glottal stop and the kahakō [ō] or macron (e.g., in place names of Hawai`i such as Lāna`i). However, these markings have been omitted throughout the document to ensure compatibility via interfaces. Although the author recognizes the importance of using these markings to preserve the language and culture of Hawaii (adapted from [www.hawaiiitourismauthority.org](http://www.hawaiiitourismauthority.org)).

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## Abbreviations

AR	Assessment Report
CDM	Clean Development Mechanism
DBEDT	Department of Business, Economic Development and Tourism
EC	European Commission
ETS	Emission Trading System
GDP	Gross Domestic Product
GFN	Global Footprint Network
GHG	Greenhouse Gas
HCEI	Hawaii Clean Energy Initiative
HTA	Hawaii Tourism Authority
ICAO	International Civil Aviation Organization
ICCT	International Council on Clean Transportation
IPCC	Intergovernmental Panel on Climate Change
KMO	Kaiser-Meyer-Olkin
PEB	Pro-Environmental Behavior
SEO	State Energy Office
TPB	Theory of Planned Behavior
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organization
VCO	Voluntary Carbon Offset
WTP	Willingness to Pay

## Abstract

The fast growing tourism sector often has a profound impact on the local environment and contributes to global climate change. Long-haul air travel consumes vast amounts of fuel and through that heavily impacts the ecological footprint of tourists. However, aviation industry strategy papers and international agreements are already addressing this issue. Outlining a new path, they clearly state that the industry will have to transition into a low carbon future. This transition will be achievable through an increase in renewable energy consumption in the accommodation sector and for ground transportation services. Airlines and consumers of long distance destinations however, will need to find other ways to reduce their emissions. An available approach is voluntary carbon offset programs that allow businesses and customers to mitigate their emissions by choice. Despite a rapidly growing market, the emissions mitigated using this approach are still not at a level to significantly reduce global emissions. Over the years, a number of studies targeted a variety of factors influencing consumer's decision to participate in these measures. Therefore, this study was aimed to look at the mitigation program itself and the way it is presented to the consumer. The study surveyed 399 tourists to the Island of Hawaii at two different locations from October through November, 2016. The questionnaire included two booking experiments of varying content. It was found that convenient accessibility to the mitigation program was of greatest importance to increase participation. If the option to offset emissions was highly accessible, 93.7% of tourists participated in offsetting their emissions. Among them, a willingness to pay of \$17.72 per ton of CO<sub>2</sub> was found leading to an average payment of \$41.80 or 5.9% of the ticket price per flight. Information on the concept of mitigation was also found to be beneficial but of lower importance than access. A large number of tourists chose to offset emissions even without having any information available when the option was highly accessible. Reported knowledge on the topic of climate change and younger age were also found to be influencing factors leading to higher participation. In contrast, pro-environmental behavior (PEB) was not found to have significant impact on the decision to offset. Thus, voluntary carbon offsets have great potential to mitigate travel-related emissions from tourism if consumers are granted convenient access and sufficient information on these measures, independent from PEB.

# 1 Introduction

Tourists often have a large impact on the environment and climate change (Fischer 2014, UNWTO 2011, Goessling 2002). Furthermore, it is widely agreed that the travel decision (deciding on a destination) is the single most important sustainability aspect of a vacation. This is particularly true in the case of intercontinental or international air-travel, since it represents the largest impact on a tourist's ecological footprint<sup>2</sup> (Fischer 2014, Simmons and Frampton 2003, Goessling, Hansson et al. 2002).

Travel-related Greenhouse Gas (GHG) emissions<sup>3</sup>, generated from these travel habits will require mitigation in the future if compliance with the 2015 Paris Climate Agreement<sup>4</sup> is being pursued by the global community. In accordance to this goal, Bailis, Broekhoff and Lee (2016) describe that a carbon net zero growth is anticipated by the International Civil Aviation Organization (ICAO) for the aviation sector after 2020. It is found that this can be achieved even if high environmental and sustainable development goals are to be fulfilled. To reach this goal however, it is explained that the sector will need to offset large amounts of emissions. One possibility to offset emissions already today are voluntary carbon offsets (VCO). However, these services have not yet reached their full potential. Therefore, this project implemented a survey among visitors to the Island of Hawaii. Findings can be used to derive conclusions for an optimization of existing voluntary mitigation opportunities to increase participation.

Mitigation of the released GHGs is of particular importance for remote destinations like islands (i. e. Hawaii) because they imply carbon intensive ways of traveling (i. e. airplane or cruise ship) that contribute the major share to the tourist's energy consumption (Gössling 2002).

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<sup>2</sup> The ecological footprint is a concept designed by the Global Footprint Network (GFN). The concept measures global supply or bio capacity (i. e. forests, pastures, arable land, ...) and demand (ecological footprint categories are: energy, settlement, timber and paper, food and fiber, seafood). Both measures are expressed in a unified unit called "global hectares" and through this made comparable. GFN. 2016. Global Footprint Network.

<sup>3</sup> The most important GHG are: Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Halocarbons, Nitrous oxide (N<sub>2</sub>O) IPCC. 2013. Summary for policymakers. In: Climate change 2013: The physical science basis. Contribution of working group I to the fifth assessment report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

<sup>4</sup> The "Paris Agreement" was adopted at the UN Climate Conference in Paris (COP21), December 2015. The agreement is available at: [http://unfccc.int/paris\\_agreement/items/9444.php](http://unfccc.int/paris_agreement/items/9444.php)

## 2 Study Purpose

Major stakeholders of the tourism industry are generally aware of the threat climate change poses to their industry. However, literature shows that overall carbon footprint reduction measures are often weak and/or voluntary, fall short on information, are not transparent and/or lack the required momentum or commitment to change quickly (Scott and Becken 2010, Weaver, D. 2012). An explanation for this behavior can be found in Becken (2010) where tourism related emissions were not perceived as causes of global warming in a survey among tourist experts. This described lack of personal/sectoral responsibility for emissions was also found by Gössling et al. (2009). The overall development pattern of awareness combined with little action and rising resource consumption can be found in many parts throughout the world like Asia, Australia or Europe and among various players in the tourism sector (Choi and Ritchie 2014, Trawöger, L. 2014, Tiller and Schott 2013, McKercher et al. 2010, Becken, S. 2005).

With emission reduction efforts focusing on large emitters (i. e. power plants for energy production) there is currently no legally binding emission reduction goal specifically for the tourism industry in effect. Without a legal framework, emission reduction from the tourism sector would require an initiative from the industry, the tourist and local governments. However, there “seems to be a strong reluctance within the tourism industry to accept the idea of a future with less air transport” (Gössling et al. 2010, p. 126). Even though, transportation accounts for 80% of the sectors emissions (UNWTO 2011). It is furthermore postulated, that if changes are not made, governments will have to take this role, introducing fair pricing or emission trading systems.

With the outlook of further increasing air traffic and a lack of regulatory interventions to reduce emissions, this study is aimed to find ways to optimize VCO opportunities for tourists by conducting a survey among visitors to the Island of Hawaii<sup>5</sup>. The Hawaiian Islands represent a destination facing almost all direct and indirect climate related challenges that the tourism industry will have to cope with in the future. Results of this study will help to understand concerned consumer demands to increase participation in mitigation programs. These findings will help to better prepare destinations and the transportation sector for change and

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<sup>5</sup> The Island of Hawaii is the largest and southernmost Island within the State of Hawaii, USA.

to funnel future investments (i. e. adaptation, mitigation, decarbonization) towards the needed reduction of the tourism industry's overall ecological footprint (Scott, Hall and Gössling 2016b).

## 2.1 [Tourism and Climate Change](#)

In 1997, it was estimated that the tourism's share of the State of Hawaii's total demand for energy and fuel was at 60% (Tabatchnaia-Tamirisa et al. 1997). Globally, tourism related air-travel emissions account for 4 to 5 % of total GHG emissions (UNWTO 2011). Although this number seems small, there is "strong evidence that a minority of the world's population causes the majority of the negative effects associated with tourism and travel" (Gössling 2002, p. 299). Thus, very few contribute a comparably large share to climate change.

Assessment Reports (AR) by the Intergovernmental Panel on Climate Change (IPCC) provide the public, governments and the tourism industry with science based information on this issue. In 2014, the fifth set of ARs was published and left no doubt that, "Human influence on the climate system is clear." (IPCC 2014a, p. 2). Thus, through the emission of GHGs from economic and population growth, the earth is warming. This will increase the likelihood of severe impacts on the natural world on which our societies and economies depend on and as of the most recent published AR, globally, emissions are still rising (IPCC 2014a). This development is of importance because the tourism industry is seen as a sector particularly sensitive to the impacts of climate change, some of which are already felt (Scott et al. 2016a, UNWTO 2007). This vulnerability of the tourism sector is even larger in regions that heavily rely on tourism as an income source and/or where tourism depends on existing natural preconditions (i. e. sufficient snow cover for winter sport, intact coral reefs and coast lines or biodiversity) (UNWTO 2011, Hoegh-Guldberg, O., et al. 2007, Elsasser and Bürki 2002).

Therefore, reducing the impact of climate change is in the very own interest of the tourism industry as stated in the "Davos Declaration<sup>6</sup>" of 2007 and concluded by Gössling (2002) in his assessment of global environmental consequences of tourism. The Davos conference

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<sup>6</sup> The Davos Declaration is the tourism sector's response to tackle climate change. It was agreed on at the 2<sup>nd</sup> International Conference on Climate Change and Tourism on October 3<sup>rd</sup> 2007 in Davos, Switzerland.

furthermore agreed that GHG emissions from transportation and accommodation will require mitigation measures to reduce contributions from the tourism sector.

Despite this need however, until today, carbon mitigation<sup>7</sup> (or offsetting) for major types of transportation remains largely voluntary and requires the tourists active decision to compensate. There are only few exceptions for example the Europe's Emission Trading System (ETS) which covers emissions from intra-European flights since 2012 and is expected to also cover international flights by 2020 (EC 2013). Nevertheless, voluntary offset programs are offered by a number of airlines (i. e. AirCanada, Lufthansa, Quantas, SAS, United and Virgin Airlines). Also major ground transportation providers have become more sensitive to low carbon transportation solutions (i. e. Hertz – Green Traveler Collection). Others provide emission calculators or plant trees to offset carbon emissions (i. e. Enterprise's 50 million tree pledge) and release sustainability reports<sup>8</sup>.

Besides the transportation sector of tourism, increasing action to reduce its carbon footprint can also be seen in the lodging industry<sup>9</sup>. Becken (2005) summarizes a study among resorts in Fiji, that operators are aware of climate change and take adaptive measures. However, Grosbois and Fennell (2011) found in their analysis of the world's 150 largest hotel groups, that carbon footprint reporting is still scarce, calculations aren't transparent and difficult to compare. Furthermore, reducing GHG emissions is a result of action to decrease energy costs and not to reduce the impact of climate change.

Besides efforts undertaken of the tourism industry itself, the tourist has great potential to influence their impact on climate change as well. Gössling et al. (2012) even postulated that the tourist has "the largest adaptive capacity of elements within the tourism system" due to

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<sup>7</sup> Carbon mitigation is described as manmade efforts to reduce the sources (less emissions) or enhance the sinks of greenhouse gases (additional uptake) IPCC. 2014b. Summary for policymakers. In Climate change 2014: Mitigation of climate change. Contribution of working group III to the fifth assessment report of the Intergovernmental Panel on Climate Change [Edenhofer O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eikemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)] Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA..

<sup>8</sup> Sustainability reports of large car rental companies include i. e. Enterprise

(<http://www.drivingfutures.com/sustainability-report/>), Hertz

([https://www.hertz.com/rentacar/misc/index.jsp?targetPage=Hertz\\_Sustainability.jsp](https://www.hertz.com/rentacar/misc/index.jsp?targetPage=Hertz_Sustainability.jsp))

<sup>9</sup> An example is the Hotel Energy Solutions E-toolkit ([http://www.hes-unwto.org/hes\\_root\\_asp/index.asp?LangID=1](http://www.hes-unwto.org/hes_root_asp/index.asp?LangID=1)) which helps the lodging industry to assess energy use, find solutions to cut costs and reduce emissions.

their freedom in deciding on a destination, type of transportation or timing. Given the outlook of continuing growth in the international – and often intercontinental - travel sector (UNWTO 2015), the transportation sector will remain the center of potential energy savings as stated by Becken, Simmons and Frampton (2003). Lacking low-carbon alternatives for intercontinental travel, VCO will remain an important mitigation measure in the future, even though this approach is currently only followed by a small number of people.

Research towards effective mitigation pathways is already undertaken and a recent study (Scott et al. 2016a) found that a combination of emission reduction measures compared with external offset strategies pose an economically viable approach to reduce the footprint of tourism. In an earlier study, Sgouridis, Bonnefoy and Hansman (2011) concluded that a multifaceted approach including mitigation as well as technological and operational improvements are necessary to transition the air-transport industry into a carbon constrained world. However, action and leadership of the involved stakeholders are critical to reach these goals.

## 2.2 [The Case of the Island of Hawaii](#)

Located more than 3,600 km from the nearest land mass, the Hawaiian Islands form the most isolated Archipelago in the world.

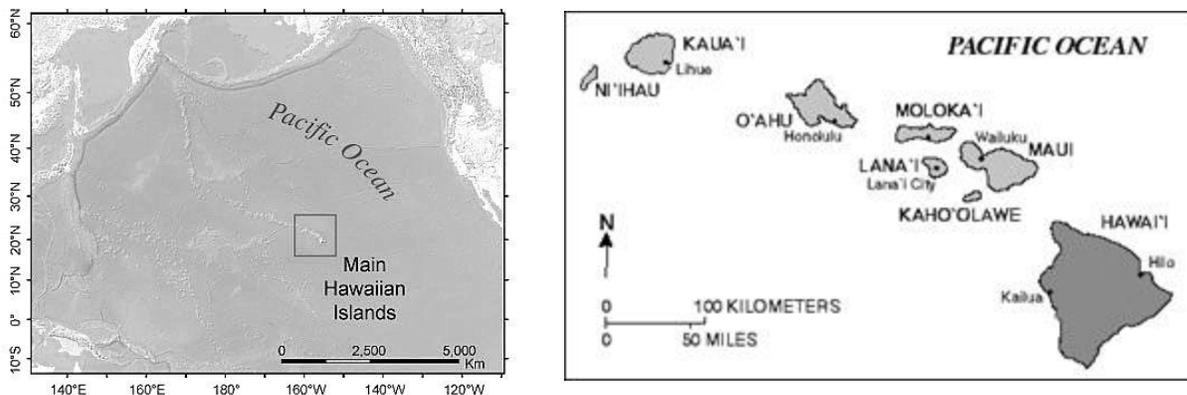


Figure 1: (Left) Location of the Hawaiian Islands in the Pacific Ocean (USGS). (Right) Map of the Hawaiian Islands with the Island of Hawaii (darker) (USGS).

In 2014, the tourist sector contributed 19.3% of the total GDP to the State of Hawaii's economy (DBEDT 2014). This contribution was made by over 8 million visitors of which more than 98.5% arrived by air (HTA 2014). The study site itself, the Island of Hawaii, welcomed

almost 1.5 million visitors in 2014 with a population of only 185,079 in 2010 (Census Bureau 2010). All of these tourists travelled at least five hours by airplane<sup>10</sup> before reaching their destination leading to a large contribution of GHG emissions that fuel climate change. Additionally, a high number of inter-island flights along with ground transportation make Hawaii's transportation sector account for two-thirds of its total oil consumption (DBEDT and SEO 2015).

To address the high emissions from fossil fuels within the State of Hawaii, the "Hawaii Clean Energy Initiative"<sup>11</sup> has been launched. The initiative's overall goal is to achieve 100% renewable energy (in electricity) by 2045. Since accommodation facilities are powered by electricity, this part of the tourism sector will also be ran on 100% renewable energy by 2045. Thus, this existing commitment is a major step forward for this industry to reduce emissions from energy consumption. Nevertheless, it is also of importance to implement efficiency measures because inaction of the accommodation industry itself can be perceived as climate inaction leading to reputational risks (Scott et al. 2016a).

In addition to its focus on clean electricity, the Clean Energy Initiative contracted the International Council on Clean Transportation in 2014/2015 to elaborate a transportation analysis covering air, ground and marine transportation. A number of tactics to reduce oil dependency were developed including increased vehicle efficiency, increasing the number of electric vehicles, financial support for aircraft renewal and winglet retrofits and fuel efficiency based landing charges. However, the reports make clear that reduction in consumption of fossil fuels is likely achievable in ground transportation, whereas aviation will see less change. This is due to policymaking outside the state level or anticipated impacts to the tourism industry through i. e. taxes (DBEDT and SEO 2015). Thus, with a significantly reduced dependency on fossil fuel for aviation not in sight, mitigation will be key to reduce net carbon emissions from tourism related transportation on Hawaii.

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<sup>10</sup> Closest destinations outside the State of Hawaii are the large cities on the U.S. West Coast with 5+ hours of travel time. Hawaii residents, traveling interisland are the only exception and a minority.

<sup>11</sup> See <http://www.hawaii-clean-energy-initiative.org/>

Besides measures to reduce emissions, the government of the State of Hawaii is already preparing for a changing climate and has launched a climate adaptation portal<sup>12</sup>. Furthermore, an Interagency Climate Adaptation Committee was established and is commissioned to prepare a statewide “Sea Level Rise Vulnerability Assessment and Adaptation Report” until the end of 2017. Besides planning and preparing for the future, a comprehensive report by the University of Hawaii Sea Grant Program summarizes projected impacts that climate change will cause to the State Hawaii and serves as a comprehensive pool of information (Eversole et al. 2014).

The future outlook of the economy’s important tourism sector is described in the recently released five-year strategic plan of the Hawaii Tourism Authority (statewide). This document mentions directly related weather effects (i. e. sea level rise, extreme weather events) from climate change as a threat within the situation assessment. However, no indirect effects of climate change, as discussed above are mentioned in this plan showing a low level of awareness that these effects can pose to the tourism sector. Sectoral emission reductions are also not discussed in the released strategy paper (HTA 2016b). In the case of Hawaii Island/County of Hawaii, the “Tourism Strategic Plan 2006-2015”, does not mention climate change. The website also does not clarify if a new version will be released soon.

Thus, the State as well as the Island of Hawaii show similar results about the status of the tourism sector as found in the literature and is therefore, seen as an ideal place to study this discrepancies. Further reasons supporting the Island of Hawaii as a study site are:

- Diversity. Hawaii is visited by a mix of visitors from all over the world with majorities from North America and Asia (HTA 2014). Regions which are key to fight climate change due to high emissions and large population/economies (Brouwer, Brander and Van Beukering 2008).
- Remoteness. Hawaii Island is part of the most isolated Archipelago in the world, resulting in long distance traveling (5+ hours) for all visitors.

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<sup>12</sup> State of Hawaii Climate Adaptation Portal: [www.climateadaptaion.hawaii.gov](http://www.climateadaptaion.hawaii.gov)

- Image as “Paradise”. The Island of Hawaii welcomes visitors with an overwhelming repertoire of natural tropical attractions, represents a high-value destination and attracts wealthy tourists for which a (monetary) mitigation contribution would be affordable.
- Potential. The Island of Hawaii combines a tropical premium destination with the living standards of the United States including financial resources. These resources are a viable factor to initiate emission reductions, implement incentives and cope with investments necessary to move towards a sustainable future tourism industry.
- Vulnerability. Island ecosystems, such as the Hawaiian Archipelago are threatened by climate change through severe weather events and sea-level rise (Anderson et al. 2015). Island economies which heavily depend on tourism are particularly sensitive to climatic changes.

### 2.3 [Existing Voluntary Carbon Offsetting Measures](#)

With insufficient momentum to address change to the business-as-usual by the industry, the role of the tourists becomes more important to achieve emission reductions in this sector. Several studies have been conducted to describe how tourists react to hypothetical and actual policy changes or describing behavior patterns. Becken (2009) found that a tax on air travel was mostly accepted compared to VCO and a per capital carbon budget. Furthermore, respondents felt higher responsibility in mitigating every day emissions than those leisure related and it is described that the freedom of travel is highly valued with only little acceptance for restrictions. Societal changes are suggested as most promising to reduce air-travel contribution to global warming. Recently, Gössling et al. (2012) explored demand responses to current aviation mitigation policies and suggested only a little effect on the international tourism demand due to higher costs. This low price sensitivity is also found by Hsu, Tsai and Wu (2009) with other factors such as personal reasons, safety or unique sightseeing experiences, which are found as more important to Taiwan travelers. Furthermore, less active tourists show higher willingness to change travel behavior than regular travelers (McKercher et al. 2010). Additionally, ethical concerns are raised by, Dhanda and Hartman (2011) who describe the carbon market will lead to the situation that individuals, countries or governments with financial resources will be able to continue to “play” whereas,

less well-off individuals need to cope with far more challenges. Hence, these issues need to be addressed by offset providers and a redistribution mechanism has to be implemented.

Regarding overall airline passengers, not specifically to tourists, Choi and Ritchie (2014) found numbers ranging from 1% to 10% participating in offset measures between 2007 and 2012. Furthermore, it was found that the majority of travelers did not know about such options or were not interested. Although, this number has been seen to increase if information on VCO is provided and communications about the purpose and reason for offset projects is improved (Gössling et al. 2009, Hooper, P., et al. 2008). These findings align with criticism regarding complexity, transparency levels and lacking standardization which is commonly found. Even though participation in VCO is small, they provide insight towards the demand regarding offset strategies. Studies targeting regular travelers and tourists willingness to pay (WTP) found values between \$20<sup>13</sup> and \$42 varying between studies, but also between places of residence with highest values in Europe and lowest in Asia (Choi and Ritchie 2014, Lu and Shon 2012, Brouwer, R., et al. 2008). As determining reasons behind these monetary contributions, aspects such as moral responsibility, concerns about the environment and future generations as well as threats from disasters are summarized by Choi and Ritchie (2014). Availability of alternative transportation modes also seems to lead to higher WTP. Carbon taxes were found to be accepted by 70% to 80% of passengers (Gössling et al. 2009).

Existing publicly available VCO programs can usually be used to mitigate travel related carbon emissions. Although mostly, these offset opportunities are difficult to find for the tourist and require the visit of an external website besides the booking homepage. In response to this unsatisfying situation, Frew and Winter (2008) suggest that airlines have to become more ambitious in offering offset measures. It was found in their study on Australian airlines, that only four of the 59 airlines with domestic and/ or international service offer these schemes on their homepage. Although improvement is likely in the meantime, the prominence of these programs is still expected to be minor. However, survey participants reported offset options from a number of airlines i. e. through the use of their collected miles. Thus, the customer will not have an additional expense to offset the flight, even though miles have a perceived

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<sup>13</sup> If not described different, \$-values are in US Dollar

monetary value to the customer. Despite the issue of convenient access to the offset providers, a growing number of providers<sup>14</sup> can be found. Credible providers usually apply the following three steps:

1. Determine Emissions. In order to determine emissions, international standards exist to guide emission calculators on how to measure carbon footprints. Among those are the “GHG-Protocol”<sup>15</sup> or the “ISO 14064-1”<sup>16</sup>. Emission calculators can be found on the websites of the offset providers.
2. Reduce Emissions. As a second step, offset providers give guidance on how to reduce avoidable emissions. In the case of the Hawaiian tourist, this could be unnecessary layovers resulting in multiple flights instead of a more efficient direct travel route. Tourists could also select their carrier by their fuel efficiency rating instead of the ticket price.
3. Offset Unavoidable Emissions. Emissions which cannot be reduced are offset through different approaches. The offset process itself should follow internationally acknowledged standards for quality assurance, some examples include the “Gold Standard”<sup>17</sup> or the “Clean Development Mechanism” (CDM)<sup>18</sup> and others.

A comprehensive comparison of available offset standards can be found in Kollmuss, Zink and Polycarp (2008). However, it is not mandatory within the voluntary carbon offset market to follow these standards, neither for calculating emissions, nor for the mitigation project itself. Nevertheless, they are applied by some. On the one hand this can create opportunity for small scale projects which before could not afford the administration costs of i. e. a CDM project. On the other hand, this creates a gray space for low quality projects due its lack of quality control (Kollmuss et al. 2008). Therefore, by participating in the voluntary market, it is in the interest of the off setter (individual or business) to get informed about the quality of the

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<sup>14</sup> A comprehensive overview and comparison of 117 providers can be found at Dhanda, K. K. & L. P. Hartman (2011) The ethics of carbon neutrality: A critical examination of voluntary carbon offset providers. *Journal of Business Ethics*, 100, 119-149.

<sup>15</sup> The GHG-protocol was developed by the World Resources Institute (WRI) and the World Business council on Sustainable Development (WBCSD). See: <http://www.ghgprotocol.org/>

<sup>16</sup> ISO 14064 is an international standard developed by the International Standardization Organization (ISO). See: [http://www.iso.org/iso/catalogue\\_detail?csnumber=38381](http://www.iso.org/iso/catalogue_detail?csnumber=38381)

<sup>17</sup> The Gold Standard was established by WWF and other NGOs in 2003. See: [www.goldstandard.org](http://www.goldstandard.org)

<sup>18</sup> The Clean Development Mechanism (CDM) was developed by the UNFCCC. See: <https://cdm.unfccc.int>

purchased product. However, it can be difficult for the consumer to determine between high and low quality offset measures.

As a result of lacking standardization, Dhanda and Hartman (2011) found in their examination of offset providers large price differences with costs ranging from a few cents up to \$35 per ton of mitigated CO<sub>2</sub>. These variations lead to mitigation fees ranging from \$48 to \$267 for the same flight using different emission calculators. Financially, the entire voluntary offset market was at 700 million US\$ in 2008 undergoing rapid growth (doubling compared to 2007).

An approach to provide consumers clearer information on these measures are carbon labels as part of the larger field of ecolabels. However, even though carbon labels are already widely used, Gössling and Buckley (2016, p. 1) found “significant shortcomings both from theoretical perspective of communications analysis and from the practical perspective of tourist understanding and action” in their analysis of carbon labels in the tourism sector.

### 3 Research Hypotheses

This project aims to find solutions to the challenges VCO programs are facing (i. e. low participation rate). Because a number of studies already examined the willingness to offset with regards to personal constraints of air-travelers (tourist, frequent flyer, socio-economic level, see Chapter 2.1, 2.3) this study will mostly focus on the offset program itself and its accessibility to increase participation in combination with pro-environmental behavior (PEB). Thus, the project was targeted to test the following hypotheses:

- Increasing accessibility of the mitigation option will lead to greater participation.
- Accessibility of mitigation opportunities is of higher importance to increase participation than level of information.
- Tourists with a high level of pro-environmental behavior are more likely to offset emissions.

## 4 Theory of Planned Behavior and Environmental Predisposition

The relevant behavior within this study is a result of travel-related energy consumption caused by the decision to visit a remote destination. This unsustainable behavior could be seen as a result of a past “Dominant Social Paradigm” as described by Dunlap and vanLiere (1978). To foster behavioral change, acknowledging the environmental impact of the decision is important to act accordingly. It is necessary to understand which factors have greatest influence of steering this decision and on which beliefs they are based as well as their interdependencies.

Within this study aspects based on The Theory of Planned Behavior (TPB) (Ajzen 2002, Ajzen 1991) was chosen to determine the environmental predisposition of survey participants (see Figure 2). The TPB is among the most widely used theories and is suited to describe environmental behavior as outlined by Steg and Vlek (2009).

In a recent study, de Leeuw et al. (2015) identified key beliefs that shape environmental behavior of high school students which were adapted for this research. Similar to earlier studies the group found that education or knowledge is seen as of importance. However, it is

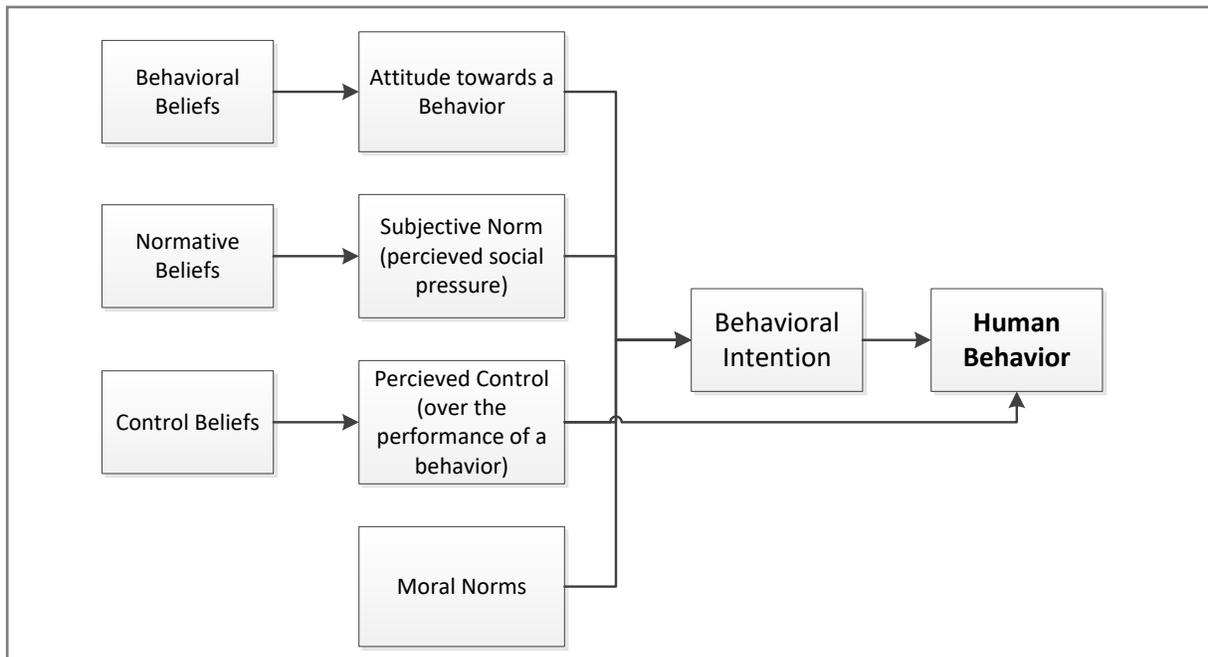


Figure 2: Model of the applied Theory of Planned Behavior (TPB) adopted from de Leeuw, Valois et al. (2015)

postulated that knowledge on its own does not lead to a change in lifestyle, nor that accurate information is of essential importance. Behavior shaped by multiple determinants was also found by Kollmuss and Agyeman (2002) as well as Stern (2000). Furthermore, it is explained by Kollmuss and Agyeman (2002) that changing behavior is very difficult. This holds true even if a behavioral change is associated with advantages (i. e. economic self-interest approach).

Following the TPB, de Leeuw et al. (2015) put emphasis on the identification of key beliefs that influence PEB. They postulate that only a change of selected, subjective beliefs which influence the intention leading to the targeted behavior has the potential to change behavior. These beliefs themselves are shaped by background factors. This study follows a promising suggestion of the study among high school students by de Leeuw et al. (2015) and therefore, considers sex and emphatic concern as personal traits. It is explained through numerous other studies that emphatic (young) individuals show greater affinity to PEB. According to the description of the TPB in the same article, the model used in this project will be extended to the “Moral Norm” as an additional factor influencing the intention. The extensions towards moral norms can also be justified through findings by Stern (2000) or Dahlstrand and Biel (1997). However, moral and educational approaches have a low efficacy if applied solely because they miss to include the other aspects (Gardener and Stern 1996, McKenzie-Mohr 2011).

In the analysis of their study, de Leeuw et al. (2015) found that the perceived behavioral control was of particular importance. Hence, an environment in which performance is seen as successful is created to trigger behavioral change (i. e. through the removal of (perceived) barriers). The following factors were identified as of particular importance:

- Availability of tools to enable someone to perform a certain action.
- Affordability of a product that is associated with PEB.
- Availability of understandable eco-information.
- Presence of guidelines for PEB according to the level of knowledge of target group.

Behavioral beliefs with effects on attitude were found as less important than control beliefs. However, it is stated that this can be due to already positive attitude towards PEB. For the

optimization of the VCO measures, the beliefs towards attitude will be implemented. Regarding the subjective norms, de Leeuw et al. (2015) found that actual commitment was of higher importance than verbal commitment. Behaviors of parents and the family were found to be most important for adolescents. It is concluded that norm-based interventions therefore should focus on the behavior of important others (i. e. partner, family, friends). Sex was not found to pose significant differences in actual commitment. Emphatic concern however, has significant influence on behavioral, control and normative beliefs. Described factors were adopted in the survey to determine how VCO opportunities have to be designed to attract as many tourists as possible.

## 5 [Methods](#)

The aim of this project was to determine requirements of air travelers (in this case tourists to the Island of Hawaii) towards VCO programs with a specific focus on accessibility/convenience and provided information/quality. With the help of these findings, products can be designed that meet the expectations of tourists (consumers) to increase offset participation as a contribution of the tourism sector to aid in tackling climate change. To accomplish this aim, the project follows recommendations from Steg and Vlek (2009) who postulated four steps for encouraging PEB which, in the case of tourists of this study, is the consideration of mitigating travel-related emissions. The four steps are:

1. Identification of the target behavior.

In the case of this project, the decision to offset emissions for a carbon intensive vacation requiring long distance air travel.

2. Examination of

- a) Main factors underlying this behavior and

- b) Existing participation patterns of mitigation programs. Findings regarding offset programs and their shortcomings (i. e. perceived barriers) as well as problems regarding participation were considered to design a visitor survey.

3. Design and Application of interventions.

This part is represented by the findings of the survey and discussed in the results. Recommendations are given to adapt VCO products.

4. Evaluation of effects.

A simple evaluation of findings is projected in the discussion/conclusion.

### 5.1 [Survey Development and Mitigation Experiment](#)

Due to the survey of this study including a booking experiment, a survey design using freely available software for simple question-answer surveys was not suitable for this project. Thus,

the survey was designed using Microsoft® Power Point® 2013 and Adobe® Acrobat® Professional 9.5.

Power Point® was used to design and provide the visual content of the survey including texts, pictures and other elements i.e. boxes. The program was chosen because it allows a sufficient level of visual creativity (in this case to imitate homepages for the booking experiments) while also providing the option to involve hyperlinks within a document. These hyperlinks were used to provide navigation buttons in the form of arrows (“next page” and “previous page”). Another form of navigation were boxes containing different choices. These boxes could be selected in order to move forward to the corresponding page of the answer found in the box. By using these links, participants did not have to use the mouse wheel or arrows of the keyboard, but instead could solely rely on links to navigate through the survey. This technique provided easy to understand navigation – similar to familiar online experiences - for every participant and allowed the use of several different pathways through the document, depending on the links used during the survey. After the structure was designed in Power Point®, the actual survey fields (“text field” for open answer, “check boxes”, “radio buttons” and/or “combo box tool”), were introduced using the form editing tool of Adobe® Acrobat® Professional 9.5. Each field was named individually and values were allocated to ease data export and analysis. Examples of a page showing content from Power Point® and content from Adobe® Acrobat® Professional can also be found in Figure 3. A simplified structural scheme of the survey and its parts can be found in Figure 4.

Do you agree with or oppose the following statements regarding climate change?					
	strongly oppose	oppose	neither	agree	fully agree
Climate change is a threat to social stability in the world (i.e. through induced droughts, food and water shortage).	<input type="radio"/>				
Climate change is a threat to the world's economy (i.e. through damages from extreme weather events).	<input type="radio"/>				
Climate change is a threat to the environment and biodiversity (i.e. changing habitats, changing conditions).	<input type="radio"/>				
Climate change is a threat to your national security (i.e. sea-level rise, climate refugees, increasing likelihood of conflicts).	<input type="radio"/>				

Figure 3: (Left) Content from Power Point®. (Right) Same page with content from Adobe® Acrobat® added.

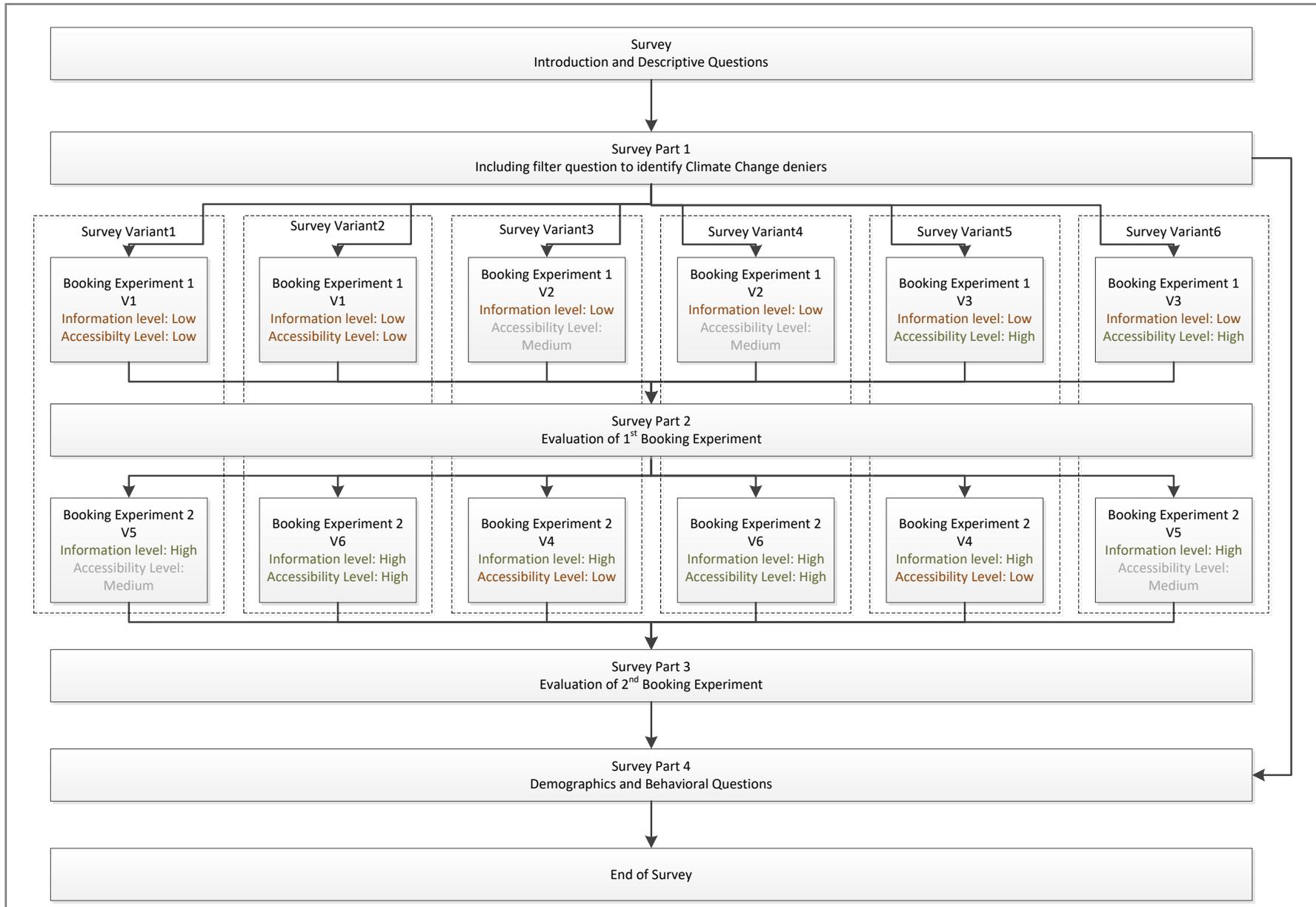


Figure 4: Simplified survey structure with its different parts and combinations.

The survey consists of several parts to gain information on aspects of:

1. General predisposition towards PEB using aspects of TPB
2. Demographic information
3. Two mitigation experiments in which tourists were asked to book two hypothetical flights. The experiments varied in their accessibility (prominence of the mitigation offer on the booking page) and the amount of information provided for offsetting emissions (ranging from basic to detailed information with a possibility for personalization).

The combination of levels on accessibility (three levels) and information (two levels) resulted in six different surveys (Var1, Var2, Var3, Var4, Var5, Var6) of which the part on TPB and demographics remain unchanged whereas the mitigation experiment changes (see also Figure 4). Furthermore, a filter question was included within the first part of the survey to identify climate change deniers. They were then forwarded to the demographic questions (the last part of the survey).

After the survey development was finished, the survey was sent to be pretested within all geographical regions available in the experiment. A random variant of the six survey variants was sent to two people of each geographical region of the booking experiment. At least one person responded for each region and remarks were taken into consideration for the final versions of the survey.

All variants of the survey, including the mitigation experiment and instructions can be found on a DVD in the appendix. The actual surveys are not included in the appendix. If this is an electronic copy of the text, the surveys can be requested by email from: [mjs@posteo.org](mailto:mjs@posteo.org)

To ensure representativeness of the sample, two datasets (age and gender) of the survey were compared to the means of the official numbers released by the Hawaii Tourism Authority (HTA), in their annual visitor research reports<sup>19</sup> including the years 2011-2015 (gender) and 2013-2015 (age).

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<sup>19</sup> The Annual Visitor Research Reports can be found on the website of HTA at: <http://www.hawaiitourismauthority.org/research/reports/annual-visitor-research/>

### 5.1.1 General Predisposition Towards Pro-Environmental Behavior Utilizing the Theory of Planned Behavior (TPB)

These parts of the survey were intended to describe the participant's predisposition towards PEB in order to determine if – and at which level - it influences the decision to offset emissions. Questions concerning this aspect within the survey were designed to represent the factors of the TPB. However, since the main focus of this research is only partly on determining ones environmental behavior and their influence on VCO, only a basic set of questions within the survey was dedicated towards the TPB.

The following factors of the TPB, according to Ajzen (2002) and Ajzen (2016), were covered in the survey (see also Figure 2):

- Behavioral Beliefs. Beliefs about consequences of the behavior itself. Within this part questions were asked to understand the attitude towards the behavior.
- Normative Beliefs. These are beliefs about the expectancy of other people (or other parts of the social environment) towards somebody to perform a certain behavior.
- Control Beliefs. Here factors are considered that influence someone's beliefs towards the performance of a behavior.
- Moral Norms. The common framework of the TPB was extended to the Moral Norms because it seems relevant to include such factors for the topic of climate change. If justified, the extension towards these additional factors are appropriate (de Leeuw et al. 2015).

Questions regarding beliefs and norms are analyzed in Chapter 6.4. Within the survey, answers given by participants were assigned numeric values between 1 (very low) and 5 (very high). Pro-environmental behavior was assigned high value. On questions with multiple answers concerning one factor of the TPB factor analyses were computed to reduce variables describing similar underlying components. Scales were verified by calculating Cronbach's Alpha. From there, factors were derived for further analysis (Kendall's tau-b Correlation, Pearson's Chi<sup>2</sup> test) with regards to the offsetting behavior as shown in the experiments.

### 5.1.2 Demographic Information

Questions on the demographic information consist of aspects found in other studies to have influence on PEB. At the same time, demographic information was important to describe the sample and determine representativeness.

### 5.1.3 Mitigation Experiment

The mitigation experiment represents the core of the survey. Each participant was asked to complete two simplified booking process that were designed especially for this purpose. There were six different surveys variants (Var1 - Var6) that combined a certain level of accessibility (low, medium or high) towards the mitigation program as well as either minimal information or detailed information on the mitigation program. In a first step, participants were asked to choose a geographic region from where they are visiting Hawaii. Options given were:

- North America (USA, Canada, Mexico)
- Japan
- Asia (without Japan)
- South America and Caribbean (South of Mexico)
- South Pacific, Australia and New Zealand
- Africa
- Europe

For each of these geographic regions one airport was chosen as a common starting point from which emission were calculated either non-stop or with one stop for long distances. Emissions were calculated using the emissions calculator of the “atmosfair” website<sup>20</sup> and include contrails and ozone formation which generates higher emission numbers in calculators that only consider burned fuel. For all flights a fuel efficient aircraft (B767-400) was chosen and offset prices calculated (all emissions and offset prices were calculated on August 22<sup>nd</sup>, 2016). Then were transferred 1:1 into the mitigation experiment. Besides a geographic location, participants could select their preferred way of traveling. Given options were Economy, Business or First Class. These two choices (location and class) resulted in simplified, but somewhat accurate emission calculations that represent their real life emissions. Flight prices were drawn from Google Flights<sup>21</sup> on August, 22<sup>nd</sup> 2016. See Table 1.

Table 1: Ticket price, emission amount and offset costs used in booking experiments

Visitor Origin	Destination	Travel Class	Ticket Price US\$	CO <sub>2</sub> emitted (kg)	Offset Price US\$ (50%   100%)
North America (DEN)	Kona, HI (KOA)	Economy	600	1903	22   44
		Business	800	3569	42   83
		1st Class	1400	4758	55   110
Japan (HND)	Kona, HI (KOA)	Economy	1100	2401	28   56
		Business	2400	4502	52   104
		1st Class	9000	6003	70   139
Asia (PEK)	Kona, HI (KOA)	Economy	1700	3188	37   74
		Business	4300	5978	69   138
		1st Class	8000	7971	92   184
South America (GIG), via DFW	Kona, HI (KOA)	Economy	1400	5125	60   119
		Business	4300	9609	111   222
		1st Class	10200	12812	148   296
South Pacific/Australia (BNE)	Kona, HI (KOA)	Economy	1100	2840	33   66
		Business	3600	5326	62   123
		1st Class	8000	7101	82   164
Africa (ABV), via JFK	Kona, HI (KOA)	Economy	2700	6498	76   151
		Business	6500	12184	141   281
		1st Class	14000	16245	187   374
Europe (FRA) via ATL	Kona, HI (KOA)	Economy	1200	5250	61   122
		Business	3900	9844	114   227
		1st Class	7000	13125	151   302

<sup>20</sup> <https://www.atmosfair.de/en/kompensieren/flug> Atmosfair is a german offset provider with high reputation (see Dhanda, K. K. & L. P. Hartman (2011) The ethics of carbon neutrality: A critical examination of voluntary carbon offset providers. *Journal of Business Ethics*, 100, 119-149.)

<sup>21</sup> <https://www.google.com/flights/?f=0>

When choosing their flight during the process, participants could decide between three offset options (0%, 50% or 100%). However, the booking processes varied in the ease to find the offset option as well as in the amount of information provided on the offset. Access and information levels are as follows:

Low Accessibility: The main booking page only included the airline ticket price. A link to the mitigation option was visible on the booking page, but shown in a corner and in smaller font. The link lead to another page containing options to offset the chosen flight. If offsetting was wanted, the link had to be found and actively chosen.

Medium Accessibility: The main booking page included options to book only the airline ticket as well as all three levels of mitigation (0%, 50% 100%) including dollar prices separately for each option and class. No extra step (i.e. visiting another page) was necessary in order to book the mitigation option.

High Accessibility: The booking page contained options that are a sum of the ticket and the mitigation option. A link was shown in same size font leading to a page on which a ticket could be booked without offsetting the flight, but this path has to be actively chosen. It was not explained on the main page which part of the price stems from the ticket and which part came from the mitigation option.

Basic Information: This option was available for all three levels of accessibility and contained information on the amount of CO<sub>2</sub> equivalent GHG produced by the flight that would be mitigated. A number of projects were mentioned that could be financed by this contribution through the partner organization which was named. The information was accessible through a link on the side of the booking page. The link was displayed in smaller font.

Detailed Information: This option was available for all three levels of accessibility and contained all information of the basic version (amount of GHG mitigated and name of organization). Though in this version the link led the customer to the website of the mitigation organization. There they could find further information on how emissions are calculated (international standard) and that mitigation projects are certified by a third party following strict standards. In addition, the customer could find a graph that put the

emissions of the flight into perspective to other activities to better understand the impact. Furthermore, mitigation projects could be chosen (reforestation, renewable energy, efficiency or equal distribution). The detailed information was accessible through either one link (one variant) or two links (two variants) from the booking page. Links were located conveniently so that it could be easily seen. After choosing the mitigation, the customer was led back to the booking page to complete the process.

The combination of three accesses and two information levels lead to six different versions of the booking experiment. Two of these versions were then combined to one survey variant. See Figure 4.

#### 5.1.4 Open Answer Questions

The open answer questions were part of the booking evaluation and only reached if the participant found the mitigation option during booking process. After the first booking experiment, tourists were asked three questions in which they could describe their reasoning to either mitigate or not. After the second booking experiment, tourists were asked to compare the both experiments and describe positive and negative aspects in their opinion. To analyze the open answers, groups were formed for each question, depending on the range of answers provided. With these groups, a range of opinions can be structured and summarized to identify tendencies as described by the participants.

## 5.2 Sampling Technique

A random set of 400 numbers ranging from values 1 (for survey variant1) to 6 (for survey variant6) were generated on October 14<sup>th</sup>, 2016 on [www.random.com](http://www.random.com). Afterwards, 400 files were produced with survey variants 1 to 6 according to the random integer. Survey variants were provided to participants according to the order generated by [www.random.com](http://www.random.com). Each variant contained two booking experiments.

Sampling was undertaken at two different locations on the Island of Hawaii (Figure 5) from October 14<sup>th</sup> – November 30<sup>th</sup>, 2016. Population size for the study were all tourists arriving by air to the Island of Hawaii. Thus, the original approach was to survey tourists at the two major airports to minimize bias. However, due to security concerns by the airport administration,

this plan did not materialize. Therefore, surveying locations were relocated to two different sites. The first location was at Hapuna Beach State Recreation Area on the northern Kona coast. This site was selected to cover the northern part of the island because it is one of the most highly frequented beach parks. The necessary research permit was granted by the Department of Land and Natural Resources, Division of State Parks. Sampling was undertaken by approaching tourists that walked by the survey site, which was a picnic table in the grass area behind the beach. A total number of 165 tourists were surveyed in 16 days.

The second study location was at the Visitor Center of Hawaii Volcanoes National Park (HAVO). This site was selected because HAVO is one of the most visited tourist attractions in the State of Hawaii and has more annual visitors than tourists coming to the Island of Hawaii. This large number of visitors ensures the smallest possible bias in sample selection since almost every tourist visiting Hawaii Island also visits HAVO. The scientific research and collecting permit was issued by Hawaii Volcanoes National Park. Sampling was undertaken by approaching tourists at the outside information area of the Park's main visitor center. A table was set up at a bench where participants could fill out the survey. A total number of 234 tourists were sampled in 18 days.

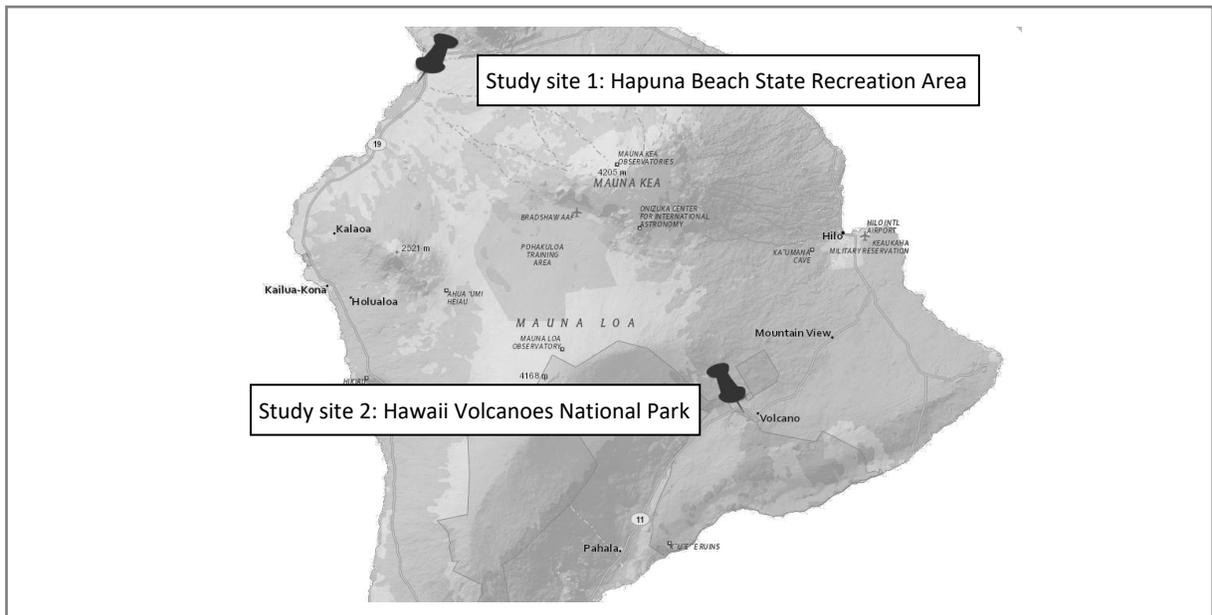


Figure 5: Study site location on the Island of Hawaii, Hawaii, USA. (Hawaii Statewide GIS Program)

Tourists were approached at both study sites by asking if they were interested in participating in a survey on tourism. Tourism is seen as a non-controversial topic compared to emission mitigation or climate change and was therefore better suited to lead to an unbiased sample.

No additional information was provided on the content of the survey until tourists either agreed to participate or refused. Afterwards, participants were offered a project description that often lead to further discussions. Tourists filled out the survey by themselves on one of the two provided laptops. Guidance was given if requested, however it was emphasized to leave the participant by themselves while filling out the survey to provide privacy. After completing the survey, the document was saved. Detailed metadata on data collection is shown below in Table 2.

*Table 2: Data collection metadata for both study sites (Hapuna Beach State Recreation Area n=165, Hawaii Volcanoes National Park n=234) between October 17<sup>th</sup> 2016 and November 30<sup>th</sup> 2016.*

<b>Day</b>	<b>Location</b>	<b>Date</b>	<b>Surveys filled</b>
1	Hapuna Beach State Recreation Area	10/17/2016	9
2	Hapuna Beach State Recreation Area	10/18/2016	12
3	Hapuna Beach State Recreation Area	10/19/2016	11
4	Hapuna Beach State Recreation Area	10/20/2016	13
5	Hapuna Beach State Recreation Area	10/21/2016	10
6	Hapuna Beach State Recreation Area	10/22/2016	11
7	Hapuna Beach State Recreation Area	10/23/2016	9
8	Hapuna Beach State Recreation Area	10/24/2016	10
9	Hapuna Beach State Recreation Area	10/26/2016	9
10	Hapuna Beach State Recreation Area	10/27/2016	11
11	Hapuna Beach State Recreation Area	10/28/2016	13
12	Hapuna Beach State Recreation Area	10/29/2016	10
13	Hapuna Beach State Recreation Area	10/30/2016	6
14	Hapuna Beach State Recreation Area	10/31/2016	10
15	Hapuna Beach State Recreation Area	11/01/2016	12
16	Hapuna Beach State Recreation Area	11/02/2016	9
17	Hawaii Volcanoes National Park	11/09/2016	13
18	Hawaii Volcanoes National Park	11/11/2016	15
19	Hawaii Volcanoes National Park	11/10/2016	13
20	Hawaii Volcanoes National Park	11/12/2016	7
21	Hawaii Volcanoes National Park	11/13/2016	15
22	Hawaii Volcanoes National Park	11/14/2016	13
23	Hawaii Volcanoes National Park	11/15/2016	16
24	Hawaii Volcanoes National Park	11/17/2016	10
25	Hawaii Volcanoes National Park	11/18/2016	13
26	Hawaii Volcanoes National Park	11/19/2016	3
27	Hawaii Volcanoes National Park	11/20/2016	18
28	Hawaii Volcanoes National Park	11/21/2016	15
29	Hawaii Volcanoes National Park	11/22/2016	19
30	Hawaii Volcanoes National Park	11/23/2016	19
31	Hawaii Volcanoes National Park	11/24/2016	12
32	Hawaii Volcanoes National Park	11/28/2016	14
33	Hawaii Volcanoes National Park	11/29/2016	9
34	Hawaii Volcanoes National Park	11/30/2016	9

### 5.3 Statistical Analyses

To ease analyzing survey findings, answers of the questionnaire were assigned numerical values. Given answers within Likert Scales of the survey received values from 1 (i.e. strongly oppose, very low, not important at all) to 5 (i.e. fully agree, very high, very important). For questions targeting TPB, high values were assigned to answers that reflected PEB. Descriptive and inferential analyses were computed using Microsoft® Excel® 2013, IBM® SPSS® V24 and the Statistical Calculator from StatPac, Inc®. Shapiro-Wilk tests were computed to determine normal distribution of variables. A one-sample t-test was performed to determine whether there were significant differences between survey (sample) and official data (entire population) in age. A two sample t-test between percent's was performed to test the representativeness of the gender sample. For the evaluation of the non-parametric booking experiment data, Kruskal-Wallis test was performed to determine differences in offsetting levels with respect to the varying access levels for both booking experiments. Consecutive Mann-Whitney U tests were calculated to determine differences in between the levels with adjusted significance levels depending on the number of tests run. A Wilcoxon signed rank test was calculated to compare the two booking experiments. Factor analysis were calculated on questions describing factors of the TPB to reduce the numbers of independent variables and to determine underlying components influencing answers. The reliability of scales was verified by computing Cronbach's Alpha values. In order to determine correlations between the expressed PEB and shown mitigation behavior, Kendall's tau-b and Pearson's Chi<sup>2</sup> test were performed. Significance was accepted if P value was equal or less 0.05. Cronbach's Alpha was considered sufficient for scale reliability if greater than 0.700.

## 6 Results

A total of 399 visitors to Hawaii Island were surveyed from October 14<sup>th</sup> to November 30<sup>th</sup> 2016. Two of the survey files were found to be corrupted and could not be used for data analysis. The remaining 397 datasets were finished by the participants and were evaluated regarding the postulated hypothesis.

### 6.1 Description of Sample

#### 6.1.1 Representativeness of Sample

Gender and Age: Gender distribution of the sample was representative to the overall tourist population visiting Hawaii when compared to HTA reports (t-test,  $p=0.782$ ) showing a slightly larger number of females than males. The HTA data does not provide the “other” choice that was given in the survey, but only male and female. It is assumed that gender distribution of tourists does not vary between the State in total and the Island of Hawaii itself (Figure 6).

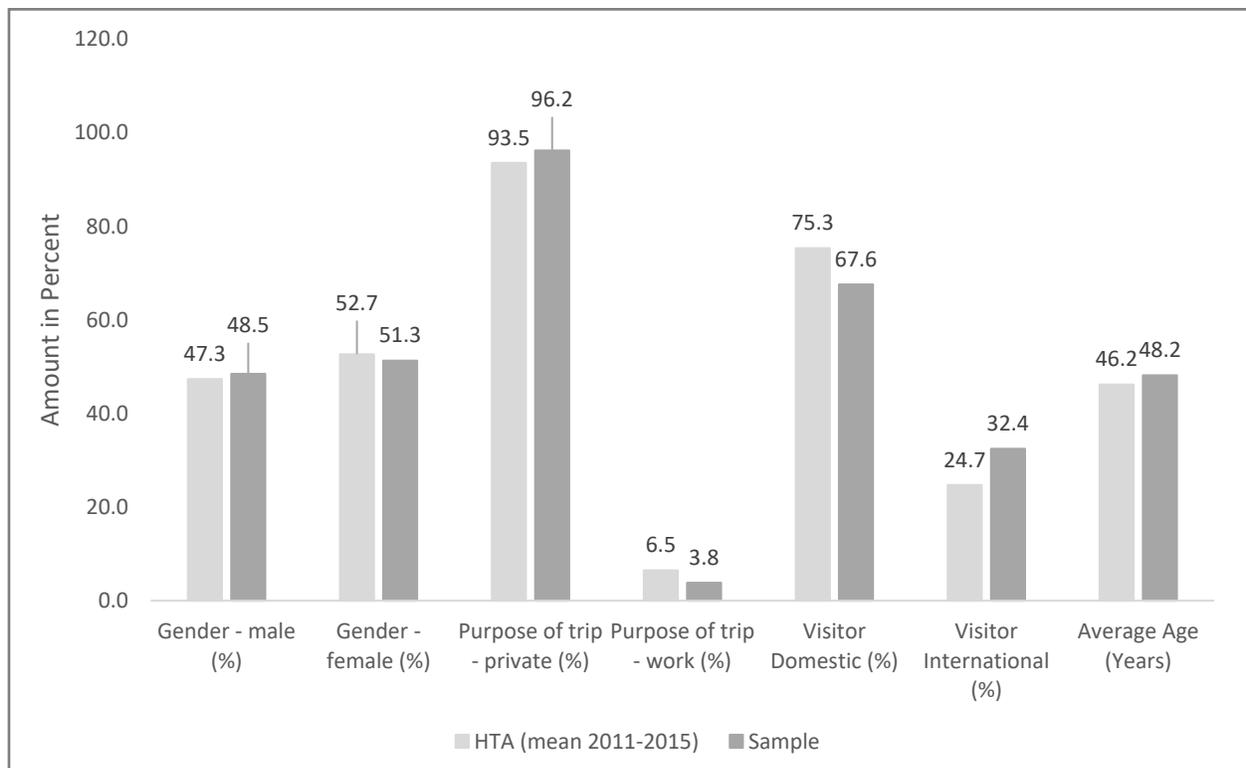


Figure 6: Comparison of HTA (2011 – 2015) and survey data (Oct – Nov 2016) or put behind Sample in the graph for gender, purpose of trip, visitor origin and age.

Average age of the sample was not representative (t-test,  $p=0.040$ ). The average age of survey participants was 46.2 years (min. 17, max. 81,  $n=359$ ) and thus slightly younger when compared to the average age (48 years) of tourists as provided by HTA between 2013 and 2015. Age classes of the sample is shown in Figure 7.

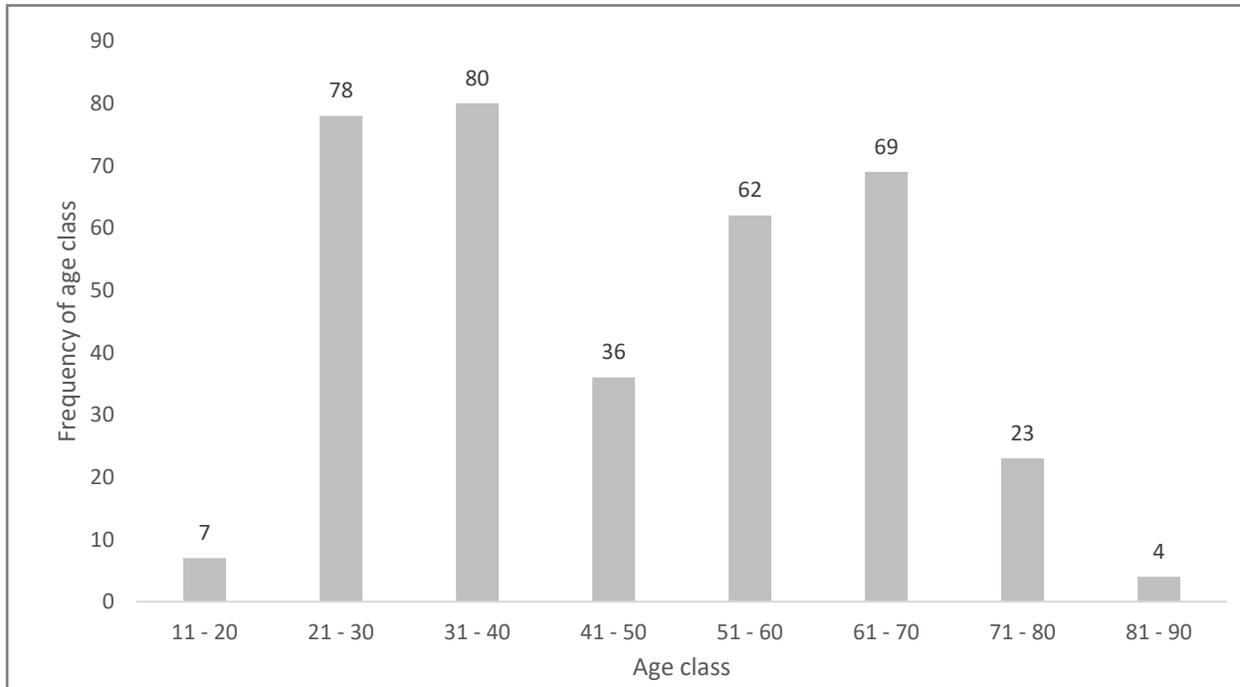


Figure 7: Frequency of age classes among survey participants

**Purpose of trip and duration:** Regarding the purpose of the trip, 97% ( $n=377$ ) participants selected “private” as the primary reason for their visit, whereas 3% ( $n=15$ ) selected “work”. This compares to a distribution of 94% private and 6% work related visitors provided by the numbers of HTA between the years 2011 to 2015 ( $n=6376810$ ) (Figure 7). When asked about the length of their stay, visitors reported a mean of 13.3 days (SD 13.8,  $n=387$ ). Range varied from 1 to 181 days.

**Country of residence:** Visitors were asked about their country of residence (Figure 8). Visitors sampled originated from 22 different countries ( $n=374$ ) and covered all given geographical regions. However, the distribution shows that Asian visitors (specifically Japanese) and domestic visitors are underrepresented in the survey when compared to HTA data. Of the survey participants, roughly 2/3 visited Hawaii from within the United States of America, whereas 1/3 participants were international visitors. These numbers compare to averages of

75% domestic and 25% international visitors between the years 2011 to 2015 according to HTA.

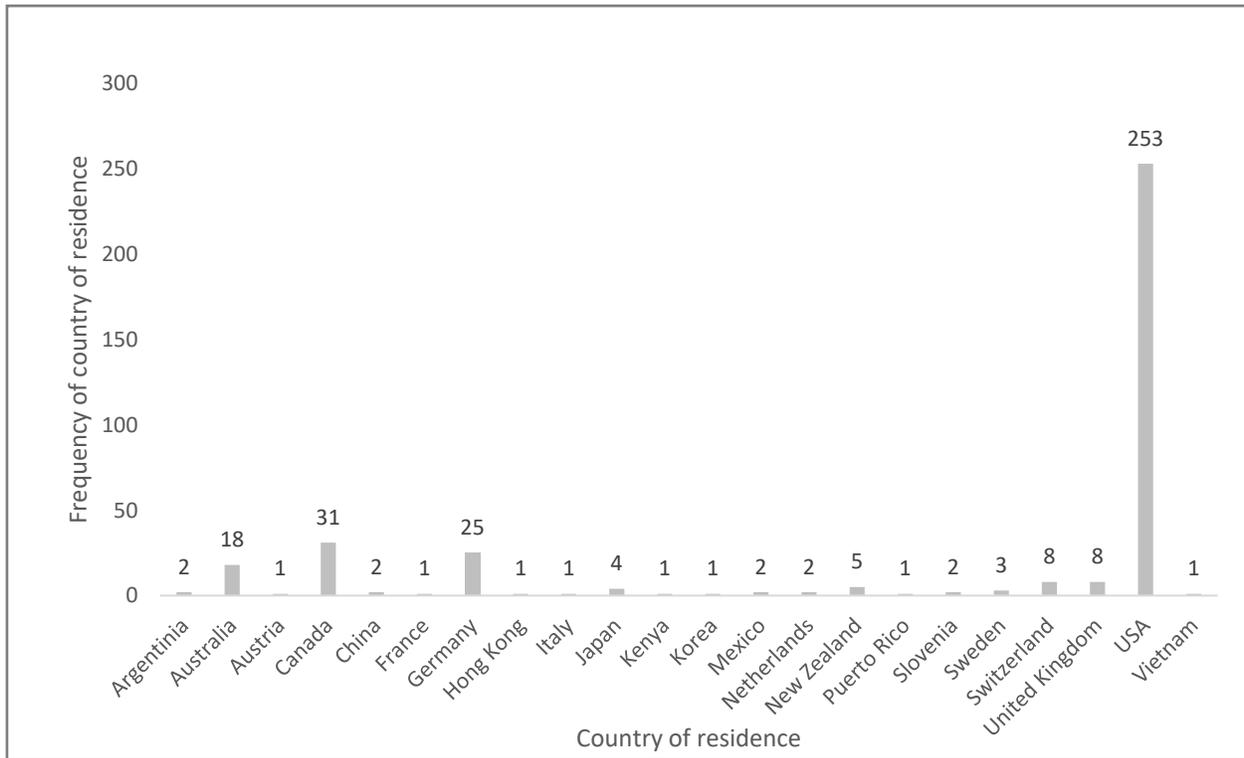


Figure 8: Frequencies of the survey participant’s country of residence.

**Reason for choosing Hawaii:** Visitors were asked to determine the importance of different aspects for choosing Hawaii as their destination on a Likert-Scale. Least important was recommendations of friends/family, closely followed by the price of vacation indicating a low price sensitivity of Hawaii tourists. Rated “important” to visitors were outstanding attractions, activity possibilities and destination of choice.

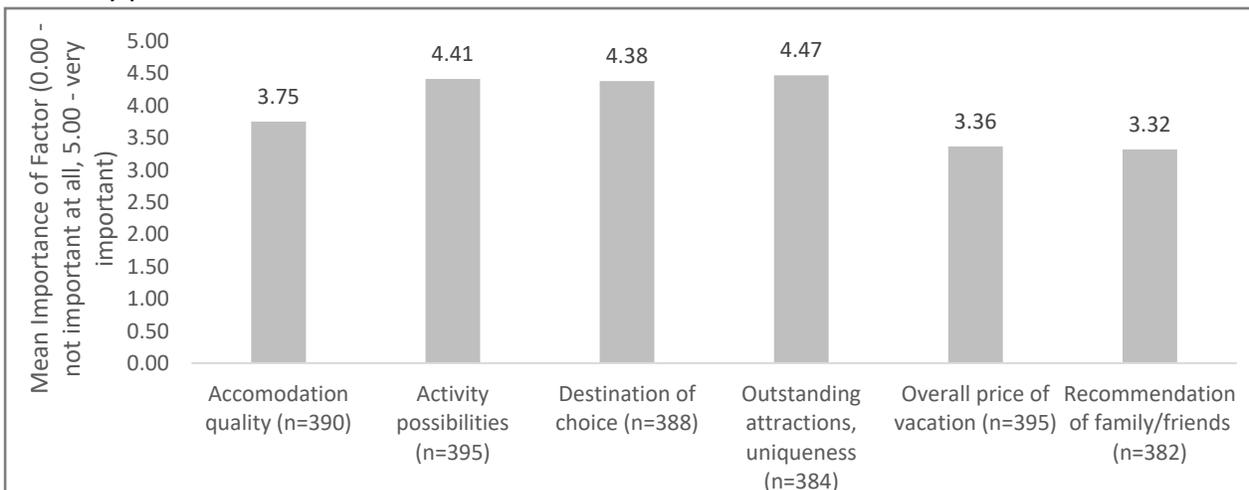


Figure 9: Mean importance of reasons for choosing Hawaii as a vacation destination.

### 6.1.2 Education

Education level among participants was very high with 88.5% (n=348) recording a college degree (bachelor, master or doctorate) compared to 11.5% (n=45) stating an education level lower than college (secondary school, high school). Interestingly, there was the same number of third level higher education participants (n=45) recorded as non-college educated (n=45) (Figure 10).

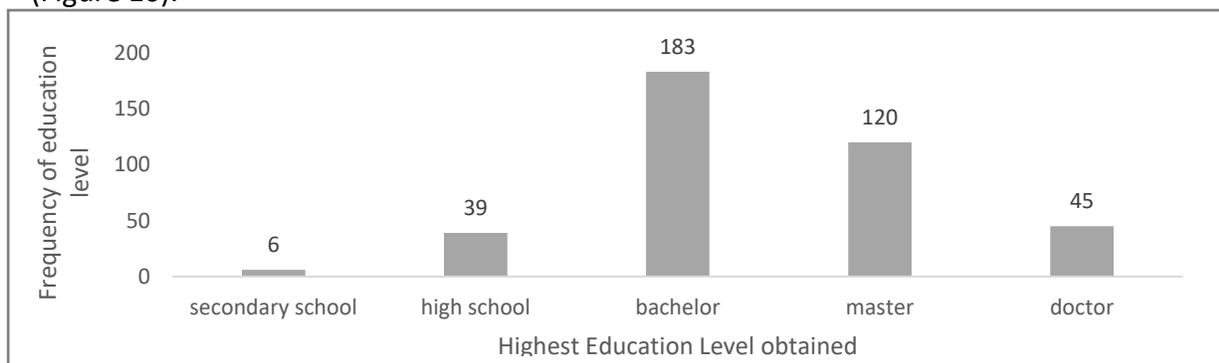


Figure 10: Frequencies of highest education level obtained by survey participants.

### 6.1.3 Knowledge and Perception of Climate Change

When asked about their knowledge on climate change, participants reported a mean knowledge of 3.5 (sufficient – high) (n=392) on a Likert Scale ranging from very low (1) to very high (5). College-educated visitors reported a significantly higher knowledge (Mann-Whitney U Test,  $p=0.023$ ) on climate change than non-college educated tourists.

After a few introductory questions, participants were asked if they think that mankind is causing climate change or not. This question was answered by 382 participants. Of them, 87.2% (n=333) stated that mankind is changing the climate, whereas 4.7% (n=18) selected that mankind is not changing the climate and 8.1% (n=31) participants were “not sure” what to think about climate change. No significant difference (Mann-Whitney U Test,  $p=0.463$ ) could be determined between “climate change believers” and “climate change deniers”, based on college and non-college educated visitors. However, average age of participants stating that mankind is changing the climate was 45 years (n=307), whereas average age of those stating that mankind is not changing the climate was 60 years (n=15). Thus, visitors not believing in climate change were found to be significantly older (t-test,  $p=0.001$ ) than visitors that believe in manmade climate change (See Figure 11).

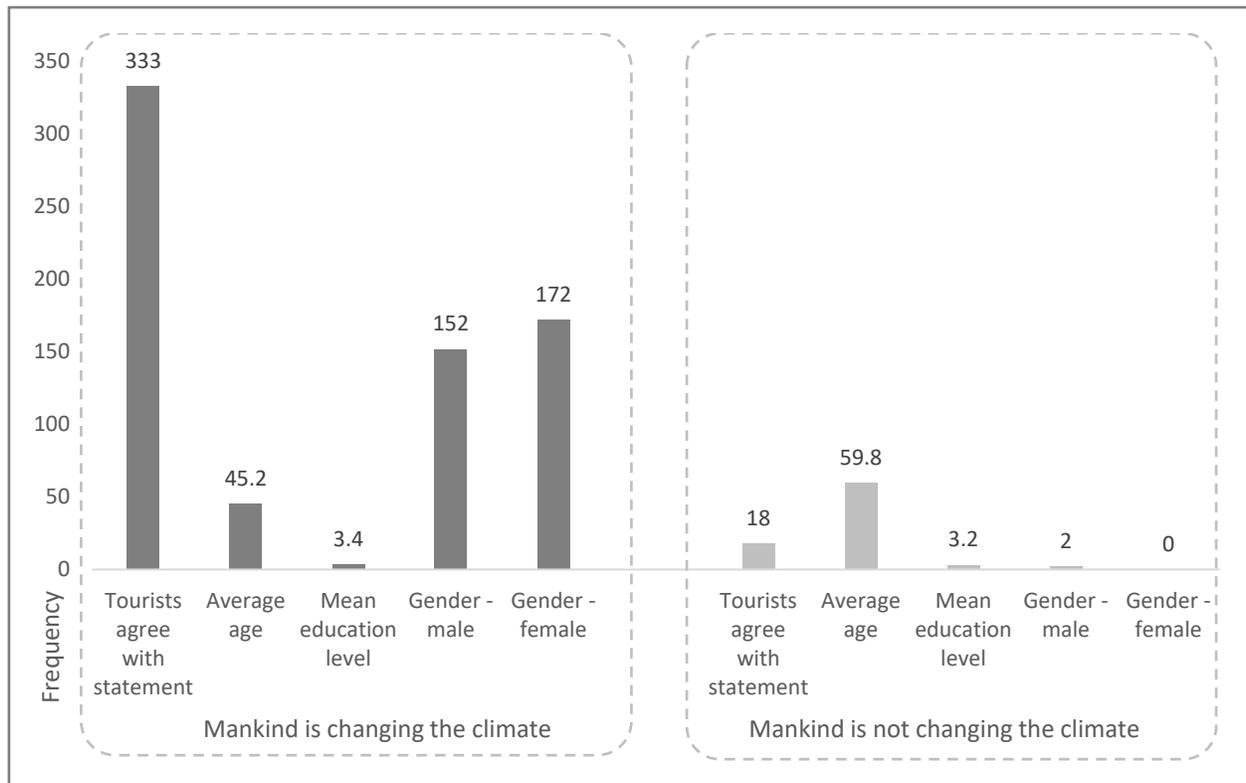


Figure 11: Comparison of average age (years) and mean education level among participants believing in man-made climate change and those who don't. Education level ranges from 1 (secondary school) to 5 (doctorate). Gender number does not match overall number of category because not every participant was willing to provide gender information.

Participants that don't agree with man-made climate change were forwarded to the demographic questions at the end of the survey. Participants who were "not sure what to think of climate change" were asked if they want to continue the survey or go to the demographic part after explaining why participation in the survey would be advantageous for the study. All participants that chose the option "mankind is changing the climate" went on to the next section in which they were asked about their opinion on climate change and if they had already heard of carbon mitigation before going to the booking/mitigation experiment (see chapter 6.3). An example of the survey for the geographic region of North America and its structure can be found in chapter 10.1.

#### 6.1.4 Previous Experience with Mitigation Programs

To better understand if participants are familiar with the concept of carbon mitigation and to learn about their experience, tourists were asked where they had heard about carbon mitigation before. In total, 80.4% (n=319) had heard of carbon mitigation before. Most of them through media (i.e. TV, internet, newspaper) (n=254) followed by work/colleagues (n=109), friends/family (n=102), other (n=64) or during booking a flight (n=29). Within the question, “if they had participated in mitigation programs before”, participants were asked to choose which kind of mitigation they had done and how large their last contribution was. Here, 77 tourists selected that they had “offset emissions” before or that they participated in

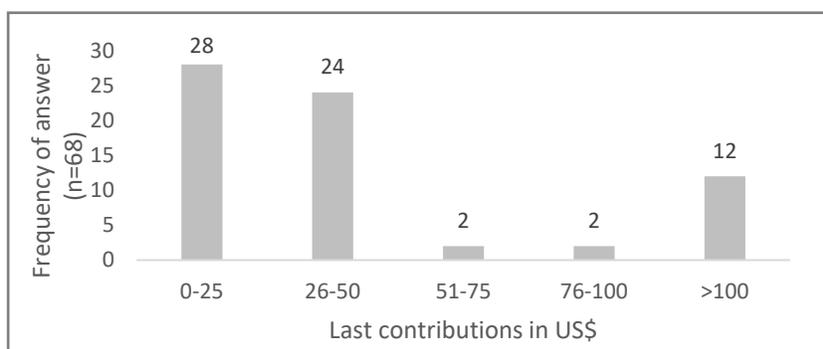


Figure 12: Stated amount of last offset contribution as remembered by participants.

“other” measures (i.e. installed solar panels). Work related emissions were offset by 29 participants and flights were mitigated by 16 tourists. Tourists were also asked about their last contribution (see Figure 12).

#### 6.2 Environmental Predisposition and the Theory of Planned Behavior (TPB)

In order to determine the environmental predisposition of participants and to analyze if beliefs according to the TPB influence the willingness of tourists to offset emissions, a set of questions applying the concept of TPB were included in the questionnaire. Measured results of the variables on the behavior of tourists are explained below. Correlations between the mitigation behavior shown by tourists and measured pro-environmental behavior, are explained in Chapter 6.4.

##### a) Perceived Threat of Climate Change (Behavioral Beliefs)

To better understand how climate change is perceived, tourists were asked to agree or oppose four statements on a Likert-Scale ranging from strongly oppose (1) to fully agree (5). The statements asked if participants perceive climate change as a threat to the:

- World’s economy (i.e. through damages from extreme weather)
- Environment and Biodiversity (i.e. through changing habitats and conditions)
- Social Stability (i.e. through droughts, food and water shortage)
- National Security (i.e. sea-level rise, climate refugees, increased likelihood of conflicts)

Answers showed that the threat to environment and biodiversity was the largest group with an average of 4.6 (fully agree). National security was seen as least threatened by climate change with a mean value of 4.1. See Figure 13. A factor analysis was performed to derive the number of underlying factors influencing answers. It was found that the Bartlett-Test ( $\chi^2(6)=779, p<0.001$ ) and Kaiser-Meyer-Olkin Measure of Sampling Adequacy ( $KMO=0.807$ ) lead to one common factor explaining 73% of variance. Afterwards, the Cronbach’s Alpha value was calculated at 0.866 showing high reliability of the scale. It can therefore be concluded that climate change is commonly perceived as a threat by tourists to the Island of Hawaii.

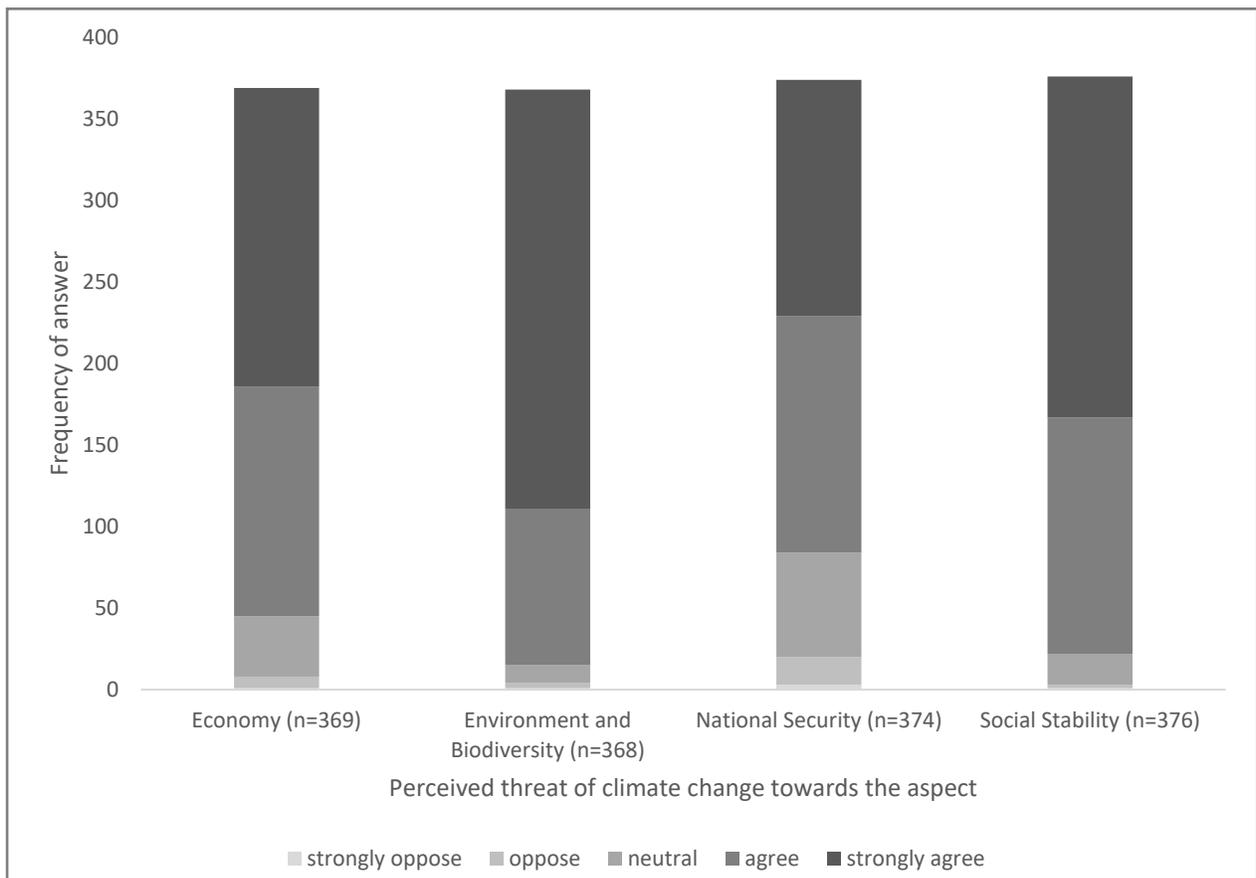


Figure 13: Perceived threat of climate change.

b) Importance of Climate Change to Society (Subjective Norm)

After assessing the perceived threat of the issue, participants were asked to provide their opinion on the importance that climate change has on different groups of their national society (Figure 14). A factor analysis was calculated to understand the number of underlying factors influencing the answers. The Bartlett-Test ( $\chi^2(10)=545, p<0.001$ ) and Kaiser-Meyer-Olkin Measure of Sampling Adequacy ( $KMO=0.805$ ) lead to two factor's explaining 73% of variance combined. On the one hand climate change is seen as important among established institutions and individuals. On the other hand, it is seen as important to informal institutions and organizations. Cronbach's Alpha value was calculated at 0.795 indicating sufficient scale reliability. Participants perceive that climate change has most importance to grassroots organizations/civil society with an average of 4.3. Least importance of climate change was allocated to businesses at an average of 3.5. Results suggest there is an overall strong feeling of importance with emphasis on rather informal action (i.e. through grass root or non-governmental organizations) as well as an "institutional importance" in which the individual is incorporated.

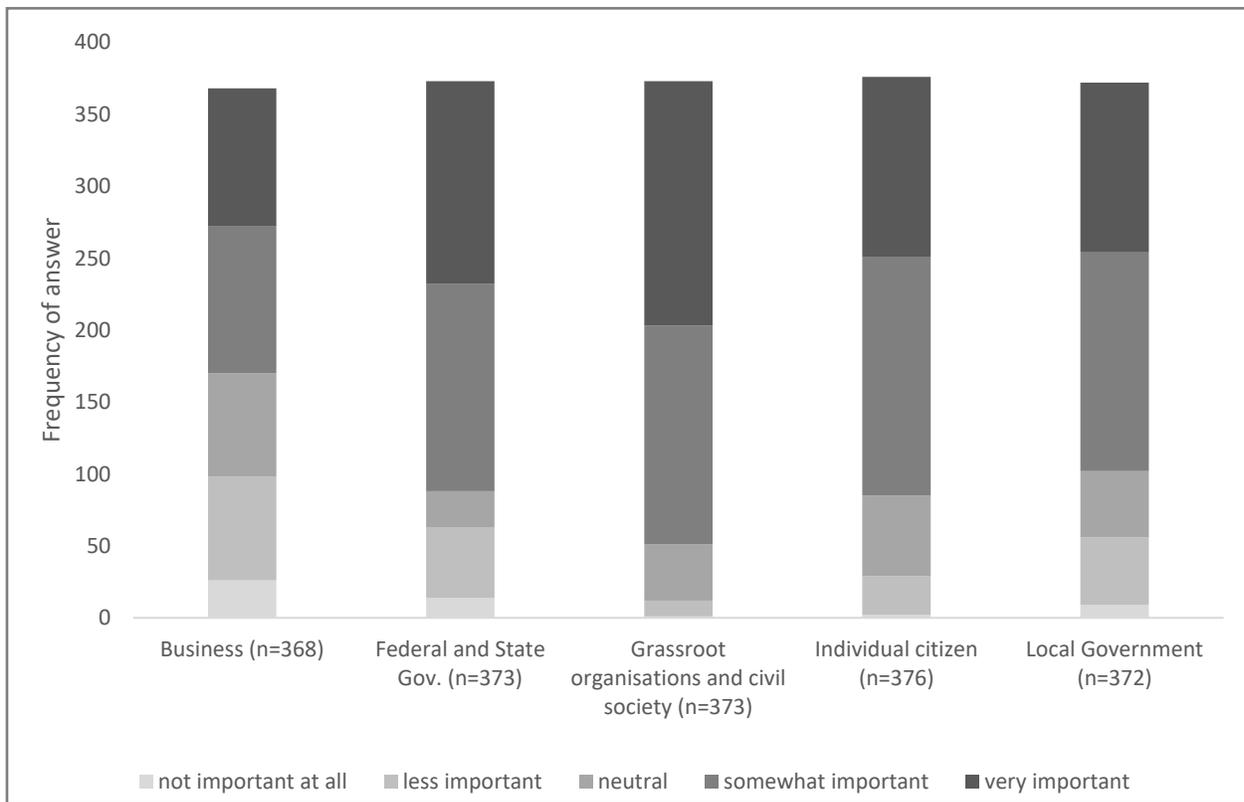


Figure 14: Importance of Climate Change towards different groups of the national society.

c) Distribution of Responsibility to Mitigate (Subjective Norm)

On a five point Likert-Scale, participants could assign “no”, “little”, “some”, “most” or “full” responsibility to the following parties:

- Provider of a service (i.e. an airline)
- Provider of a product (i.e. a manufacturer)
- Consumer of a product or service (which would be themselves)
- Government (regional or national scale)
- United Nations (international scale)

Overall, 93.0% selected either “some”, “most” or “full” responsibility whereas 7.0% selected “no” or “little” responsibility indicating a generally high understanding for the need to mitigate emissions. On average, highest responsibility was allocated to regional and national government at 4.0. Least responsibility was given to the consumer itself which represents the tourist itself at 3.6, see Figure 15.

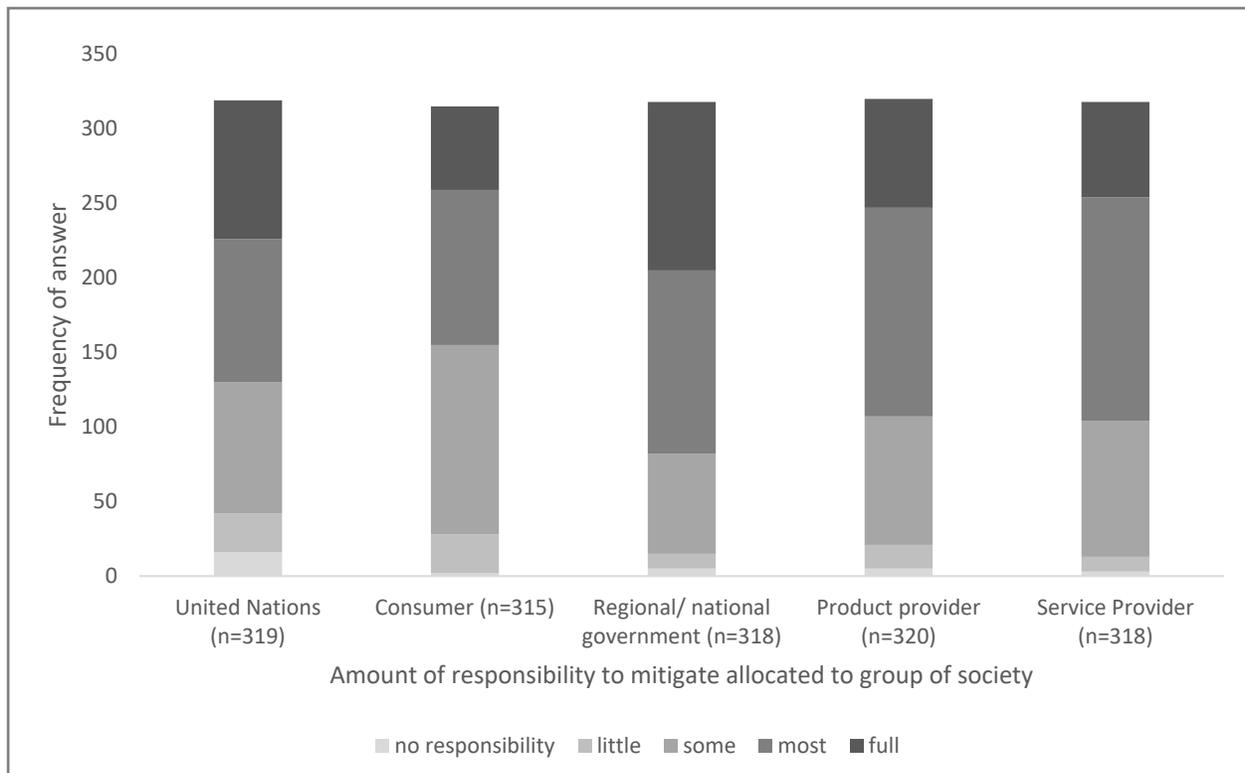


Figure 15: Assigned responsibility to mitigate emissions to different groups of the society.

For a better understanding of the underlying reasons, a factor analysis was performed. The Bartlett's Test of Sphericity ( $\chi^2(10)=638$ ,  $p<0.001$ ) and the KMO Measure ( $KMO=0.727$ ) lead to two components explaining a cumulative variance of 76%. A distinction between institutional responsibility (regional, national as well as international) and societal responsibility was found within the rotated component matrix. Reliability of the scale was verified by a Cronbach's Alpha value of 0.811. It can therefore be concluded that tourists on the one hand assign responsibility to institutions (i.e. through regulation) and on the other hand to other actors within the society.

d) Expressed Environmental Behavior (Moral Norm, Behavioral Beliefs)

Participants were asked to agree or oppose three statements regarding environmental behavior on a 5 point Likert-Scale (Figure 16). Questions were asked about moral obligation of each individual, the responsibility towards future generations and responsible behavior of individuals to reduce and stop environmental damage. A factor analysis was computed among the three answers. The Bartlett's Test of Sphericity ( $\chi^2(3)=302$ ,  $p<0.001$ ) and the KMO Measure ( $KMO=0.699$ ) lead to two components explaining a cumulative variance of 86%. The two components can be described as the responsibility towards future generations and an obligation of the individual not to cause harm to the environment based on moral reasoning. The reliability of the results was verified by Cronbach's Alpha at 0.77. Results show that tourists acknowledge a need for pro-environmental behavior with respect to responsibility and moral reasons.

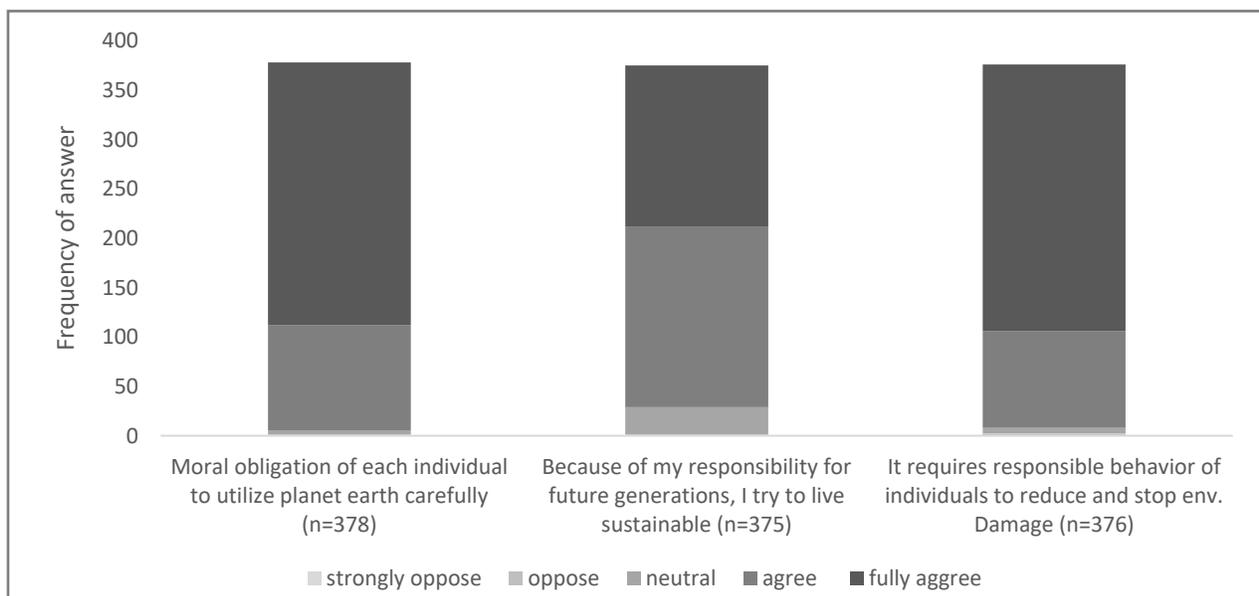


Figure 16: Influence of the individual's responsibility and moral reasoning regarding environmental behavior.

e) Stated Environmental Behavior (Control Beliefs)

Tourists were asked about their recycling and conservation practices on resources, water and electricity both at home and at work/school/university. Participants could choose on a 5 step Likert-Scale ranging from never (1) to always (5) as well as not available (0). Overall, recycling at home was rated highest with a mean of 4.5 (most of the time – always). Lowest rating received the option of conserving water at work with a mean of 3.3. A factor analysis was performed to derive underlying factors of these variables. Together, the Bartlett’s Test of Sphericity ( $\text{Chi}^2(28)=1617$ ,  $p<0.001$ ) and the KMO Measure ( $\text{KMO}=0.770$ ) lead to three components explaining a cumulative variance of 79%. Components can be described as a conscious behavior at work as well as home while “recycling at home” received its own category because of its high values (see Figure 17). Reliability was tested using Cronbach’s Alpha at 0.852. Thus, data shows that tourists seem to have distinguished work/ private behaviors.

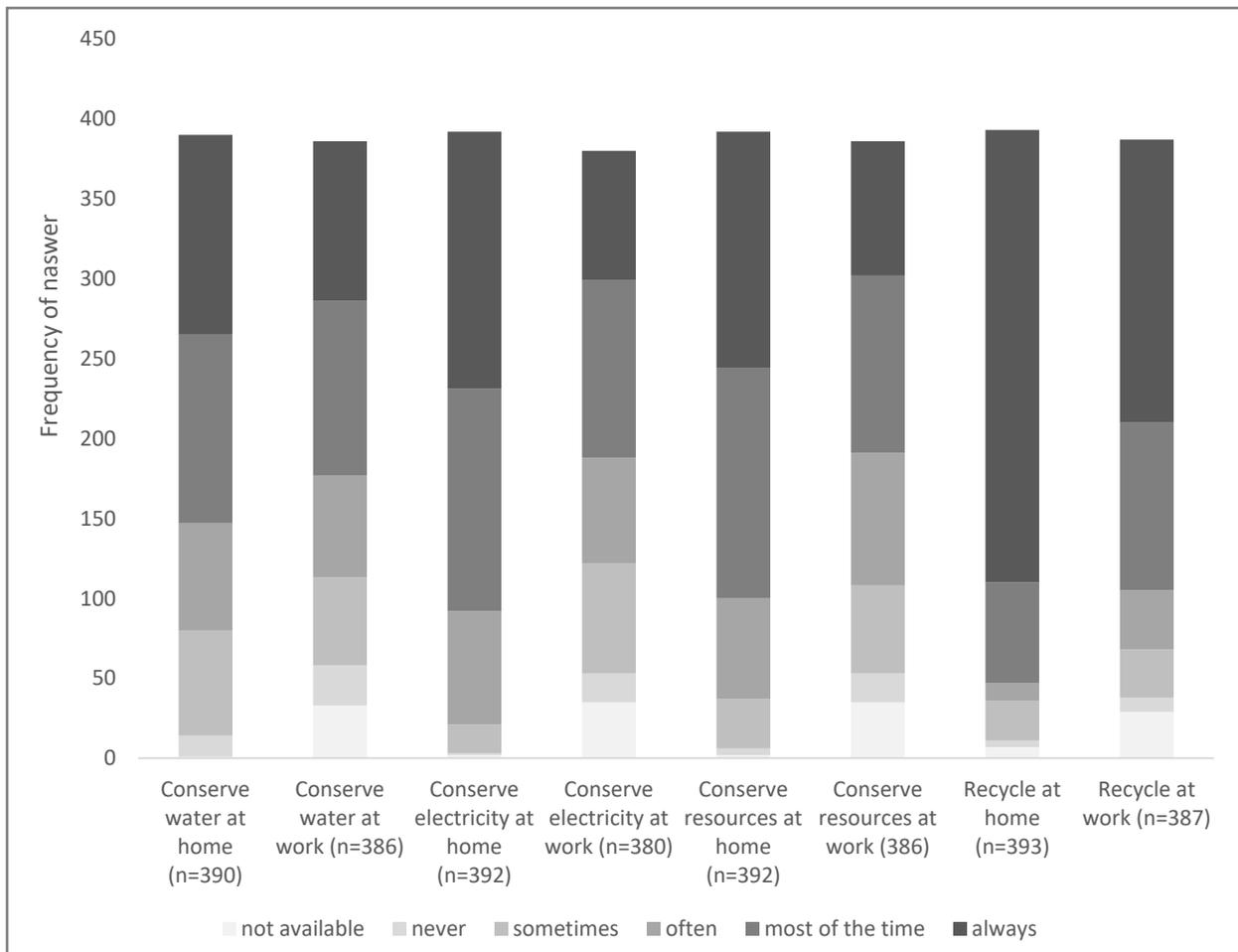


Figure 17: Stated recycling and resource conservation habits

In addition to the recycling and conservation habits, tourists were asked to answer questions on their mobility habits with a differentiation into work and private life for four different modes of transportation. Answers were given using a nine step Likert-Scale ranging from “not at all” (0) to daily (8). Because high values are considered as pro-environmental behavior, scales for car and airplane usage were reversed. The factor analysis and Cronbach’s Alpha showed that airplane usage is caused by separate reasons and is being treated as its own group. The remaining six variables can be reduced into two describing individual motorized mobility (car) and public transportation/unmotorized mobility (walk/bike). The three groups are explained by the Bartlett’s Test of Sphericity ( $\chi^2(15)=637, p<0.001$ ) and the KMO Measure (KMO=0.745) explaining a cumulative variance of 66%. The scale’s reliability is verified by Cronbach’s Alpha at 0.785.

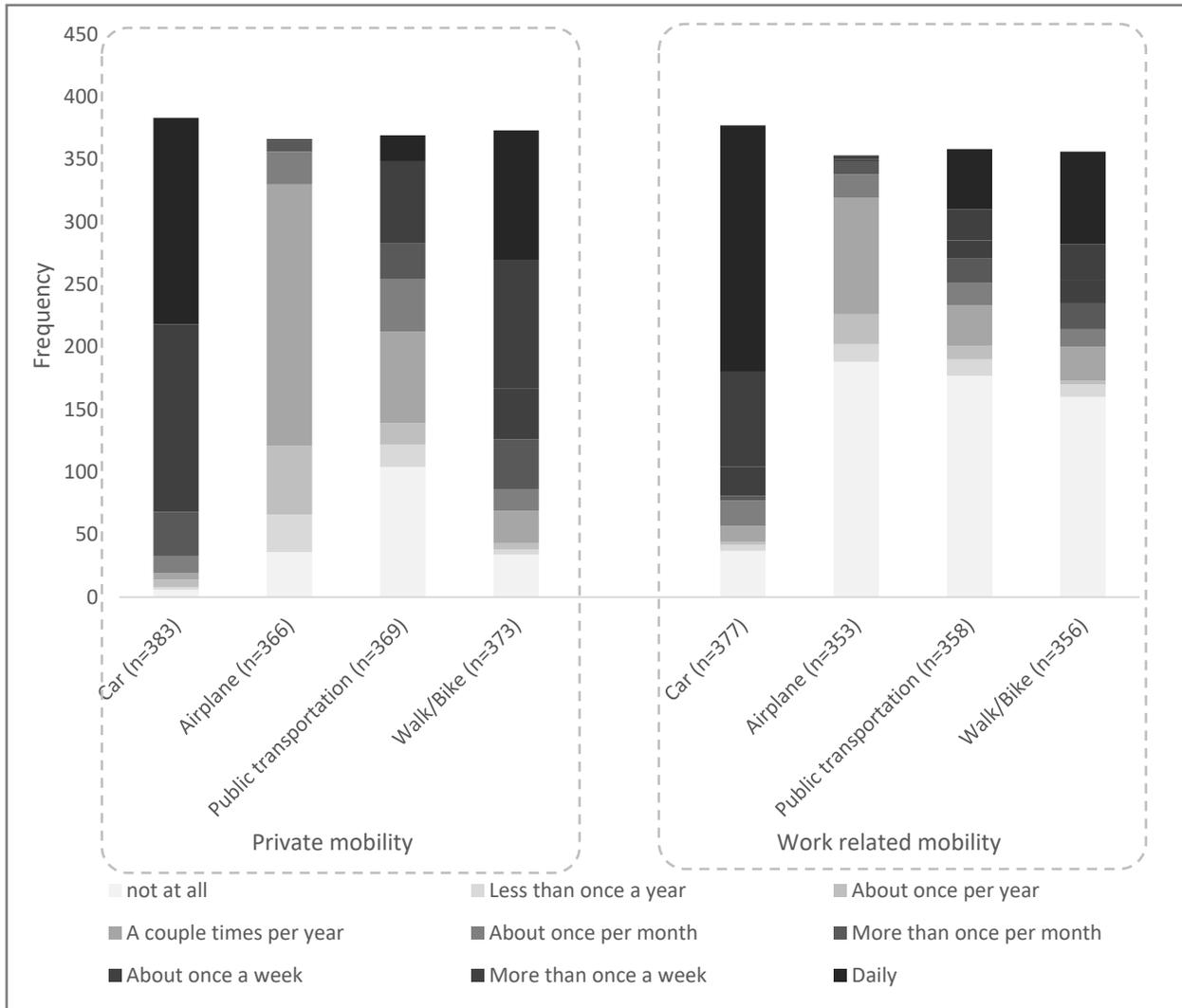


Figure 18: Comparison of private and work related mobility.

### 6.3 Booking/ Mitigation Experiment

The mitigation experiment consisted of two simplified online booking procedures for each participant. Altogether survey participants booked 746 flights during the booking experiments of which 448 or 60% were either fully or partially offset.

With all survey variants combined, visitors spent on average \$809.70 (n=746) on airplane tickets and \$28.25 or 3.4% (n=746) of the ticket price on offsetting. If only booking versions are considered in which tourists had low access (V1, V4) to the mitigation option, tourists spent only \$3.64 or 0.4% (n=247) on offsetting their emissions. However, if visitors were granted high access (V3, V6) the spending increased to an average of \$41.80 or 5.9% (n=255) of the ticket price. Differences within the willingness to offset flights based on the access level towards the mitigation option are shown in Figure 19. A summary of the booking experiment data is shown in Table 3.

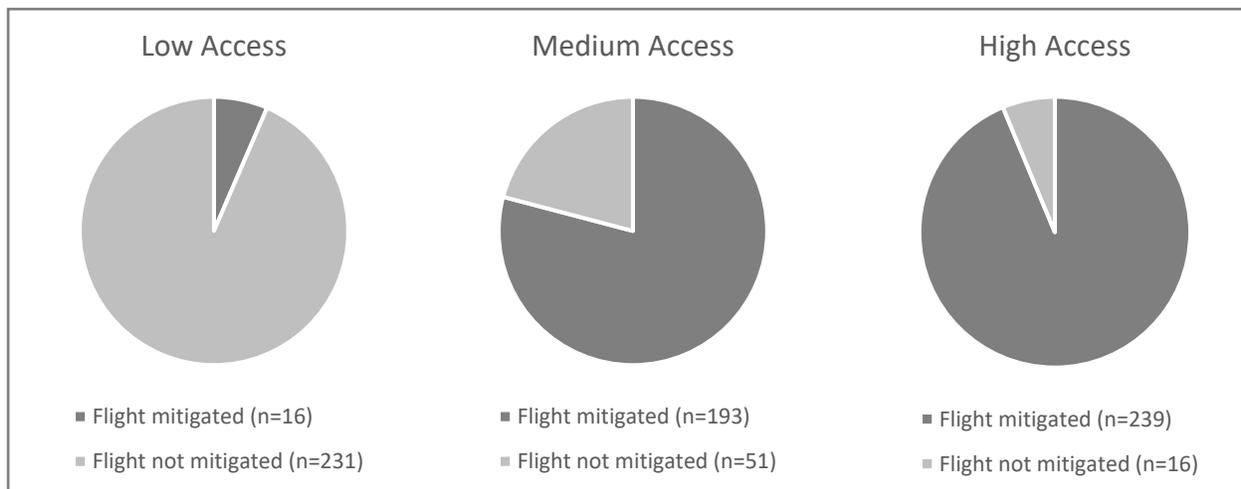


Figure 19: Frequencies of flights booked without and including mitigation based on the access level towards the offset option. The data shows numbers from both booking experiments and mitigated flights included offset levels of 50% and 100%.

- 1<sup>st</sup> Booking Experiment

Data of the first booking experiment showed significant differences (Kruskal-Wallis Test,  $\chi^2(2) = 218, p < 0.001$ ) with increasing means indicating that higher access levels lead to a higher willingness to offset. Applying three consecutive Mann-Whitney Tests found a combined significance between all combinations of access level (low  $\leftrightarrow$  medium ( $p < 0.001$ ), low  $\leftrightarrow$  high ( $p < 0.001$ ), medium  $\leftrightarrow$  high ( $p < 0.001$ )) still under the threshold of 0.05. A total of 374 flights were booked within this experiment. Therefore, it can be concluded that the access

level towards the mitigation option has significant positive impact on the willingness of tourists to participate in such a measure.

- 2<sup>nd</sup> Booking Experiment

The same procedure was applied to the second booking experiment and found significance levels as well, indicating the same inclination (Kruskal-Wallis Test,  $\chi^2(2) = 174$ ,  $p < 0.001$ ). Mann-Whitney Tests found combined significance levels between all combinations of access (low  $\leftrightarrow$  medium ( $p < 0.001$ ), low  $\leftrightarrow$  high ( $p < 0.001$ ), medium  $\leftrightarrow$  high ( $p = 0.010$ )) within the 95% threshold. In the second booking experiment, 372 flights were booked. This showed similar results to the analysis of the first booking experiment and strengthens the conclusion, that access level has a significant, positive impact on the tourists decision to mitigate emissions if the option is given to them.

- Comparing 1<sup>st</sup> and 2<sup>nd</sup> Booking Experiment

When the non-normal distributed data of both experiments were compared it was found that tourists offset significantly more (Wilcoxon Signed Rank Test,  $p = 0.038$ ) flights during the second booking experiment. The experiments differed with the level of information provided regarding the mitigation option and described the concept behind it. It can be concluded, that a higher level as well as more detailed information can increase participation in mitigation measures.

Table 3: Booking experiment data overview by geographic region

Origin	Number of Flights Booked	Flight Class	Ticket Price	Offset Level 100% Booked		Offset Cost	Offset Level 50% Booked		Offset Cost	No Offset Booked	
				n	%		n	%		n	%
			US\$			US\$					
North America (USA, Canada, Mexico)	507	Economy	600	170	33.5	44	132	26.0	22	205	40.4
	53	Business	800	19	35.8	83	13	24.5	42	21	39.6
	20	1st Class	1400	13	65.0	110	8	40.0	55	-1	-5.0
Japan	4	Economy	1100	1	25.0	56	1	25.0	28	2	50.0
	4	Business	2400			104	1	25.0	52	3	75.0
		1st Class	9000			139			70		
Asia (without Japan)	10	Economy	1700			74	2	20.0	37	8	80.0
	1	Business	4300			138	1	100.0	69	0	0.0
		1st Class	8000			184			92		
South America, Central America, Caribbean	6	Economy	1400	3	30.0	119	1	10.0	60	2	20.0
		Business	4300			222			111		
		1st Class	10200			296			148		
South Pacific, Australia, New Zealand	42	Economy	1100	13	31.0	66	14	33.3	33	15	35.7
	4	Business	3600	1	25.0	123	1	25.0	62	2	50.0
		1st Class	8000			164			82		
Africa		Economy	2700			151			76		
	1	Business	6500			281			141	1	100.0
		1st Class	14000			374			187		
Europe	92	Economy	1200	17	18.5	122	36	39.1	61	39	42.4
	2	Business	3900	1	50.0	227			114	1	50.0
		1st Class	7000			302			151		
Sum	746			238	31.9		210	28.2		298	39.9
Total Expense US\$			604000		2.3	14182		1.1	6893		

Negative values are due to offset choices made in categories higher than the ticket category (Offset >100%, i.e. booking economy, but offsetting 1st class)

During the second booking experiment (detailed information), tourists were able to choose between different projects (reforestation (n=7), renewable energy (n=6), efficiency (n=0) and equal distribution (n=7)) to offset their emissions.

In detail, participants chose to book the following flight/offset combinations:

- V1: Low accessibility, basic information (n=131).

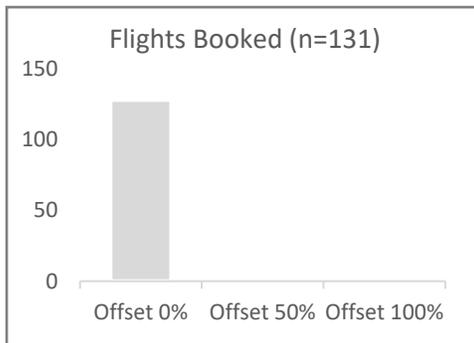


Figure 20: Offset frequencies in survey Variant 1 bookings.

Here tourists had to go to a separate page to offset the flight emissions.

In this option 97.7% (n=128) did not mitigate, 0.8% (n=1) chose to mitigate half of the emissions and 1.5% (n=2) mitigated all flight emissions.

- V2: Medium accessibility, basic information (n=115).



Figure 21: Offset frequencies in survey Variant 2 bookings.

Here tourists were asked to offset their flight on the main booking page and had three options to offset: 0%, 50% or 100% - all of them equally apparent.

Results showed that 27.8% (n=32) did not mitigate, whereas 47.8% (n=55) chose to mitigate half of their emissions and 24.3% (n=28) offset all of their flight emissions.

- **V3: High accessibility, basic information (n=128).**



Figure 22: Offset frequencies in survey Variant 3 bookings.

Here tourists were asked on the main booking page to offset the flight and had to go to a separate page to book the flight without offsetting emissions.

Within this variant 7.0% (n=9) did not choose to mitigate. At the same time, 30.5% (n=39) mitigated half of their emissions and 62.5% (n=80) chose to offset all of their emissions.

- **V4: Low accessibility, detailed information (n=116).**

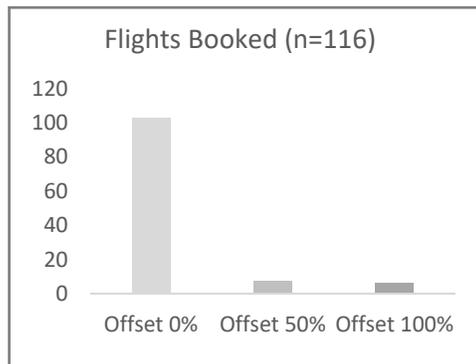


Figure 23: Offset frequencies in survey Variant 4 bookings.

Here tourists had to go to a separate page to mitigate their emissions.

In this option 88.8% (n=103) did not offset any of their emissions, 6.0% (n=7) of the participants chose to offset half of their emissions and another 5.2% (n=6) mitigated all of their travel emissions.

- **V5: Medium accessibility, detailed information (n=129).**

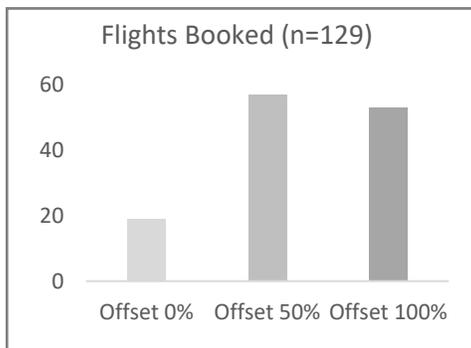


Figure 24: Offset frequencies in survey Variant 5 bookings.

Here tourists were asked on the main booking page and had three options offset: 0%, 50% or 100% - all of them were equally apparent.

With this option 14.7% (n=19) didn't choose to offset any emissions. At the same time 44.2% (n=57) chose to offset half and 41.1% (n=53) all of their emissions.

- V6: High accessibility, detailed information (n=127).

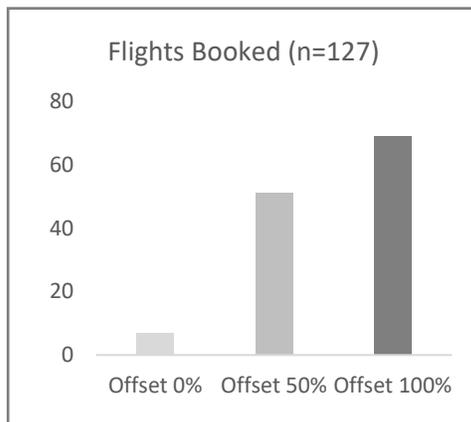


Figure 25: Offset frequencies in survey Variant 6 bookings.

Here tourists were asked on the main booking page to offset the flight and had to go to a separate page to book the flight without offsetting emissions.

In variant 6, 7.0% (n=7) did not chose to mitigate emission. However, 40.2% (n=51) selected to offset half of their emissions and 54.3% (n=69) chose to mitigate the entire flight.

A significant, positive correlation ( $R^2=0.123$ ,  $p=0.014$ ) was found between the offset amount and the reported knowledge on climate change. Thus visitors that reported higher knowledge were more likely to offset their flight emissions. No correlation was found for age, importance of price for vacation or education level when compared to the willingness to offset.

Besides the results derived from the booking experiment itself, participants were asked to rate the level of accessibility to the mitigation option as well as the quality and amount of information provided after each booking. The questions to rate these attributes were only reached if the mitigation option was seen by the tourist. Both attributes could be rated on a five level scale ranging from very low (1) to very high (5). Participants not answering these questions were assigned the value "0".

Level of accessibility as rated by tourists:

- V1 and V4 - low accessibility. These two variants received an average rating of very low or 0.5 (n=43).
- V2 and V5 - medium accessibility. The variants designed with medium accessibility were rated between low and sufficient at 2.5 (n=205).
- V3 and V6 - high accessibility. Both variants together were given an average of being sufficient at 2.8 (n=219).

Quality and amount of information provided as rated by tourists:

- V1, V2 and V3 – basic information. The quality and amount of information provided were rated at an average of just above very low at 1.3 (n=159).
- V4, V5 and V6 – detailed information. Here the quality and amount of information provided was rated at an average of 2.0 or low (n=241).

#### 6.4 [Analysis of shown Mitigation Behavior and Measured PEB](#)

To determine correlations of independent variables describing the environmental predisposition as explained in Chapter 6.2 and the actual measured behavior shown in the booking experiments (Chapter 6.3), further test were conducted.

- Correlations

Statistical tests found no significant correlation between the PEB variables across all of the mitigation levels. Overall, pro-environmental behavior, as measured within this study, showed to have only very little effect on the actual behavior to offset emissions. However, significant correlations were found for four out of six options indicating a tendency to offset more for tourists that belief climate change is of high importance to informal institutions (i. e. grass root organizations) and the civil society. Furthermore, two out of six possible combinations showed significance between the mitigation behavior and tourists that perceive climate change as a threat, that believe private sector institutions should have responsibility to mitigate emissions and that expressed moral concerns about environmental behavior. Results of correlations between dependent and independent variables are displayed in Table 4.

- Pearson Chi<sup>2</sup> test

To verify the findings of the correlation analysis, the data was transformed to allow the calculation of Pearson's Chi<sup>2</sup> test for the individual booking experiments. Similar to the low significance levels for correlations, only small variances were found in this test. However, results differ slightly from the correlation analysis. Within this analysis, each variable was tested against the mitigation behavior of the two booking experiments. Only tourists that perceive climate change as a large threat were found to offset significantly more in both

experiments. Besides, significance levels were found within the second booking experiment for tourists that see climate change as important to informal institutions (similar to the correlation test), that expressed a moral obligation for PEB (similar to correlation test), that act accordingly because of their responsibility towards future generations and that show less frequent use of the car as a mode of transportation. Results for all variables are shown in Table 4 .

Table 4: Significance Levels of measured PEB and Offset Levels as shown in Booking Experiments

Booking Experiment	Mitigation Level chosen by tourist (dependent variable)	Test	Independent Variables describing Behavior - retrieved from Chapter 6.2															
			Threat	Private Sector Responsibility	Public Sector Responsibility	Importance to Institutions and Individuals	Importance to Informal Institutions	PEB as Moral Obligation	PEB because of future generations	Active offsetter	Active in activist group	Recycling at home	PEB at home	PEB at work	Airplane usage	Car usage	Public transportation or Walk, Bike	
1	0%	Correlation Kendall's tau-b Significance Level (2-tailed)	0.220	0.850	0.255	0.888	0.435	0.145	0.272	0.345	0.404	0.336	0.444	0.841	0.435	0.671	0.899	
1	50%		0.149	0.020	0.015	0.665	0.010	0.018	0.070	0.603	0.882	0.289	0.234	0.499	0.697	0.238	0.749	
1	100%		0.042	0.427	0.265	0.558	0.966	0.392	0.077	0.387	0.610	0.680	0.550	0.998	0.962	0.286	0.622	
2	0%		0.319	0.713	0.688	0.989	0.042	0.150	0.631	0.102	0.187	0.509	0.246	0.905	0.061	0.182	0.413	
2	50%		0.001	0.239	0.231	0.661	0.009	0.065	0.105	0.757	0.962	0.431	0.704	0.254	0.208	0.067	0.116	
2	100%		0.059	0.003	0.075	0.795	0.009	0.003	0.000	0.022	0.812	0.543	0.058	0.232	0.242	0.464	0.204	
1	0%, 50%, 100%		Pearson Chi <sup>2</sup>	0.004	0.753	0.883	0.233	0.545	0.280	0.437	-	0.701	0.553	0.236	0.653	0.686	0.820	0.986
2	0%, 50%, 100%			0.005	0.071	0.944	0.233	0.001	0.010	0.035	-	0.055	0.768	0.500	0.977	0.554	0.047	0.589

Significance levels for correlations or Chi<sup>2</sup> at p=<0.050 are marked in grey.

## 6.5 [Open Answers](#)

After each booking experiment tourists were offered four open answer questions to reflect on their experience. The questions were answered as follows.

- Why did you mitigate your emissions?

This question was answered by 79 tourists. The reason mentioned most often to why offset emissions was a feeling of “responsibility” (n=25). Furthermore, it was mentioned that the offset was not expensive compared to the cost of their vacation and thus not a large additional expense (n=18). Other reasons were rather vague and can be summarized as the feeling to support the fight against climate change, the “feeling” of “doing the right thing”, sometimes in combination with the wish to be able to travel in the future by taking action now and the ease and simplicity of taking action within their booking (n=36).

- Why did you not mitigate your emissions?

A total number of 35 participants answered this question. The most important reason for not mitigating emissions were financial constraints of the tourists. Offsetting was either too expensive or participants would have had preferred an option in which the cost is split between the consumer and the service provider or the government and not only paid by them (n=20). Another important aspect mentioned was a lack of “trust”. Tourists stated their concern about “what happens” to their money and if contributions are spent responsibly (n=9). Other aspects included the preference of other solutions (i.e. a carbon tax) (n=6).

- If you did not mitigate your emissions, what would have been an acceptable amount?

This question was answered by 39 tourists. One group of participants mentioned a quantitative amount with values ranging from \$5 to \$100 (n=20) with a mean of \$45. The other group (n=7) gave percentage amounts of their airplane tickets as a reference with values ranging from 5% to 30%. Others did not want to spend anything (“0”) on offsetting (n=9). They would have preferred an option that can be freely determined depending on the income (n=2) or asked for more information (n=1).

### What was better/worse than in the first booking experiment?

Responses to this question was given by 161 participants. Answers to this question were separated into the different groups of access levels.

- High access (V3, V6):

Here tourists mentioned the simplicity and an easy to understand design as well as only a couple choices are a positive trait. Furthermore, these options were perceived positively because offset prices were already included and no extra steps were required. Negative remarks criticized the lack of a “no offset” option (which actually was given but not seen) as well as that it felt like a larger expense.

- Medium access (V2, V5):

Within these options tourists mentioned that the booking pages were confusing and had too many options. However, some stated that it was beneficial to see all prices in comparison.

- Low access level (V1, V4):

What tourists mostly liked about this option was the simplicity. However, tourists also mentioned that it was “hard to find” the offset option.

Across all access levels it was mentioned that more information would have been “nice” supporting the finding that most tourists did not see the provided information as described in the booking experiment.

## 7 [Discussion](#)

For the interpretation of the results found in this project, it has to be acknowledged that even though both alternative locations for the survey were chosen carefully a bias of the sample at these sites cannot be fully eliminated. Furthermore, demographic data of the surveys show that certain groups of tourists (i. e. Asians) to the Island of Hawaii are underrepresented whereas others are overrepresented. This was due to different factors, i.e. a language barrier. Despite a particular focus on simplicity of language during the survey design it was still too difficult for some to be completed. Additionally, time was a constraint in particular for Japanese and other Asian tourists which often travel in tour groups that allow only a little time at one location (personal observation, not verified by data). Also the sample period of October and November may not be representative of the average tourist distribution throughout the entire year. Lastly, participants could have answered questions regarding environmental behavior in a way that reflect those values even though surveys were not undertaken in an interview style but in privacy. These limitations have to be kept in mind when valuing the results.

### 7.1 [The Hawaii Island Tourist and the Willingness to Offset Emissions](#)

Overall, tourists showed a high willingness to compensate travel related carbon emissions through voluntary carbon offsets when made available to them. Information on the mitigation option was also of importance to increase participation of tourists but of less significance than increasing access levels. PEB was not found to have profound influence on the decision to compensate emissions.

When tourists were asked if “mankind is changing the climate”, 83.9% (n=333) agreed with this statement, 4.5% (n=18) did not believe that mankind is changing the climate and another 7.8% (n=31) were not sure what to think of this issue. No significant relation was found between formal education level and being a “climate change believer” or “denier”. However, tourists agreeing on man-made climate change reported a higher knowledge on this specific topic. Average age of tourists believing in climate change was found to be significantly younger

than those denying climate change. As their most important reason for choosing Hawaii as a vacation destination tourists selected outstanding attractions and the uniqueness this destination has to offer. Least important to them were price constraints reflecting the high spending of the tourists in the State at an average of \$191/day and person (HTA 2016a). This high spending mindset among tourists coming to Hawaii has to be considered when putting the results of this study into context as well. The high spending could be due to visiting a “premium destination”, but might also be a result of the very high education level of the tourist with 88.5% reporting at least one college degree leading itself to a higher ability to spend. Thus, the willingness to spend money for this vacation could be one factor contributing to the survey results because it reduces or even eliminates perceived “barriers” to pay for an offset. An aspect highly important to trigger wanted action as described by Kollmuss and Agyeman (2002) or de Leeuw et al. (2015). Low price sensitivity among travelers was also found by Gössling et al. (2012) and Hsu et al. (2009) who described reasons similar to the ones found here as more important to travelers.

Within this study, combining both booking experiments, 448 out of 746 flights were offset. Of them 53.1% (n=238) chose to offset 100% of their emissions and 46.9% (n=210) chose to offset 50% of their emissions at an average price of \$23.14 per ton<sup>22</sup> of CO<sub>2</sub> leading to an overall willingness to pay of \$17.72 per ton of carbon dioxide among tourists to the Island of Hawaii. This value is comparable to other findings, i. e. AU\$21.38 (Choi and Ritchie 2014), \$20.00 - \$28.00 (Lu and Shon 2012) or £13.20 (\$16.23) (MacKerron et al. 2009). The WTP of \$17.72 would be sufficient for most carbon offset prices as described in Dhanda and Hartman (2011).

When looking at the amount spent by flight, the minimum offset chosen was at \$22 (50% emission mitigation for a round trip North America – Hawaii in economy class) which was also the minimum offset amount available for all flights. Maximum offset chosen was \$227 to mitigate 100% emissions for a round trip from Europe travelling in business class.

Analysis of the survey results show that the likelihood to offset emissions was significantly dependent on the level of access to the mitigation option. Tourists booking a flight with a low access to offsetting their flight spent an average of \$3.64 on mitigation compared to \$41.80

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<sup>22</sup> Measurements are in the metric system. Here, metric ton.

with high access during the booking process. The differences were found to be significant on both levels, between low and medium as well as between medium and high access levels and apply to both booking experiments. The differences in participation seem reasonable when compared to other studies that show an overall low knowledge and/or participation within these measures (Chang, Shon and Lin 2010, MacKerron et al. 2009). However, results from this study suggest that the differences in mitigation participation are not due to what was previously postulated, which is that low participation is because people are not interested, but rather that low participation could be due to a lack of convenient access in combination with a lack of knowledge towards offset programs. Results from this study showed that people are interested if they get the choice. This is supported by findings that only 6.5% (n=16) of all participants who went through the low access level booking chose to offset flight emission, whereas 93.7% (n=237) of all participants who went through the high access level chose to mitigate emissions while other factors remained unchanged. Despite the high influence of the access level, analysis of the survey data showed that various factors describing PEB of tourists had very limited influence on the tourist's decision to offset emissions. This suggestion aligns with other publications i.e. from McKenzie-Mohr (2011) or Gardener and Stern (1996) which describe that approaches targeting only education or moral aspects are not as likely to be successful to induce behavioral change. Besides this, booking an airplane ticket for a vacation is also not primarily seen as action based on environmental cautiousness. Consequently, looking for a link to offset emissions as given in two versions of the surveys, was not a priority to tourists. In fact only 6.5% of tourists found the offset option at low accessibility. Thus it is of importance to have this offer as an option during the booking process to increase participation to reduce barriers. Similar findings were found by Richard H. Thaler and Shlomo Benartzi (2004) on how to increase employee savings. They reported that almost 80% of people joined the savings plan when it was offered to them and even increased their savings over time. In addition to the importance of accessibility of the mitigation option, the amount and quality of information provided was also found to have significant importance. However, better information was found to be less powerful to increase participation compared to increasing access.

Consequently, an increase of emission mitigation through voluntary carbon offsets should be highly accessible and contain a sufficient level of information for the tourist to help make the decision. As found in this study, the two booking versions in which tourists had to go to a separate page to book the flight without mitigation were the most successful in terms of offsetting emissions. At these variants, the main booking page contained only two options – a ticket including 50% mitigation and a ticket including 100% mitigation. Within these options, the majority of tourists selected to offset 100% of their emissions.

## [7.2 An Outlook on Voluntary Carbon Mitigation](#)

Results from this study might not be representative for all destinations since the average Hawaii tourist is likely not an average tourist in a worldwide context. However, it draws a promising picture given the finding that 93.7% chose to offset emissions – given high access. It has to be kept in mind that not all of them chose to offset 100%, but if all offsets were combined, participants of this project with high access to the mitigation option chose to offset 515t of CO<sub>2</sub> or 75.5% out of the 682.1t they would have had produced with all flights booked during the experiment. A similar participation rate was also found by Brouwer et al. (2008). In monetary terms, tourists with high access booked airline tickets amounting to \$200,500 and chose to spend in total an additional \$11,773 or 5.9% of their ticket price on offsetting their emissions. This willingness to pay (WTP) for mitigation is higher than values found in other studies, i.e. Lu and Shon (2012) who reported WTP of 1.5% among Taiwanese travelers.

Increasing accessibility in the form of reducing barriers requires the collaboration and involvement of the tourism sector itself. Results suggest that action towards offering access to these options will be rewarded. Going this direction is also supported by The Global Commission on the Economy and Climate who state that the long standing paradigm, that a green economy is costly, not competitive and slows down growth is being rewritten (NCE 2014). Leading examples into this future are British Columbia, Canada (carbon tax), Costa Rica or the Maldives who are on the path to become carbon neutral by 2021, respectively 2020.

Despite finding a high WTP, concerns of the additional payments were also reported by tourists. Most tourists that chose not to offset their flight mentioned financial constraints

(affordability), the preference of a shared payment by the customer and the service provider/or government as well as trust issues regarding the mitigation option.

## 8 Conclusion and Recommendations

This study shows that voluntary carbon offset (VCO) measures have great potential. VCOs are available today and can be used to compensate various kinds of emissions. Even though, concerns were expressed by the tourists and are also described in science regarding these programs, a growing number of credible providers are available to consumers and businesses in this expanding market. Results of the survey were aimed to find factors influencing the decision to offset travel-related emissions of tourists coming to visit Hawaii.

It was found that there is a number of factors that play an important role determining participation in these measures. The most important reason for participants was the level of accessibility towards the mitigation option. Given high access, 93.7% of the tourists booking a flight chose to offset some or all of their emissions. Average spending among tourists with high access was at 5.9% of the ticket price or \$17.72/t(CO<sub>2</sub>). High access can be described as a mandatory step within a booking process (i.e. online) or as a version in which the offset is automatically included in the ticket price while booking. However, it has to be made convincingly clear and held simple, that the extra charge will not go towards the airline but instead is transferred towards a credible offset provider. Information on the offset measure was also found to be important to increase participation. Instead, pro-environmental behavior as determined in this study was not found to have a significant impact on the willingness to offset emission. Of the numerous attributes tested, it was found that the perceived threat of climate change had influence on several levels and tourists that assign importance to handle this topic to informal institutions (i.e. grassroot organisations) were more likely to offset emissions.

Results lead to the overall conclusion that convenient, highly accessible mitigation options in combination sufficient, reliable information on the concept of the issue have the potential to highly increase emission mitigation through voluntary offset programs. If one has to decide, ease of access should be given priority to provided information. Nevertheless, the quality of the offset measure should meet high standards even without information to grow trust in this voluntary approach.

Further research should be conducted to better understand the overall potential that VCO pose on a global level compared to a global carbon tax. Particularly with respect to its actual implementation potential and real world effect to reduce emissions.

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## 10 [Appendix](#)

### 10.1 [Survey Sample for the Geographic Region of North America](#)

Shown is the survey variant 1 as it was found for visitors from North America if the participant selected that “mankind is changing the climate” or “I am not sure what to think of climate change” and then chose to continue. All pages except the pages of the booking experiment were the same for all participants, regardless of the chosen geographic region. However, not all of the pages might have been visited by the participant during the survey since some links skipped pages. The digital copy of the surveys provided in Chapter 10.2 contains all hyperlinks.

# Thank you and welcome



## to a survey about carbon mitigation among tourists of Hawai'i Island (USA).

### **About the survey.**

This survey is part of a graduate degree with the Technical University of Munich (TUM), Germany. Its aim is to better understand if you (in your role as a visitor to Hawai'i Island) would be willing to reduce your travel-related carbon emissions caused by air and ground transportation. We are particularly interested in finding ways to make emission offsetting as informative, transparent and convenient for you as possible and consider your concerns on this issue.

It may take a maximum of 15 minutes to answer the questions. Your time and contribution is gratefully appreciated.

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## Privacy.

Your contributions will remain strictly anonymous and will be treated confidentially for the use of this research only. All data entered is anonymously. If you decide to leave your email to participate in the competition (you can win one of three pounds of Estate Grown 100% Kona Coffee) and/or you want to be informed about the results, it is collected separately in the end of the survey and will not be linked to your information.

## Instructions.

The survey consists of several questions which are grouped. During the survey you will be asked to book a hypothetical flight. You will not be charged at any point. Please fill in all questions, otherwise your information can not be used.

If you have questions or concerns, please contact: [mj.seidel@tum.de](mailto:mj.seidel@tum.de) or call +1 (808) 333 4735 (printed contact information is available for you if requested).

This survey is part of a Masters Thesis and undertaken by:

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Dr. Klaus Pukall | Research Associate at Chair of Forest and Environment Policy and

Prof. Dr. Anton Fischer | Department of Geobotany | Specialist in Ecotourism

both from Technical University of Munich.

The Survey will start on the next page.



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At first, we would like to ask you a few general questions about your trip to Hawaii.

What is/was the primary reason for your trip?

Personal/ Private

Work/ Business

How long is/was your trip?

Days

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Please rate the importance of the following aspects for choosing Hawaii as your vacation destination.

	Not important at all	Less important	Neutral	Somewhat important	Very important
Overall price of vacation					
Accommodation quality					
Activity possibilities					
Destination of choice					
Outstanding attractions, uniqueness of destination					
Recommendation of family/friend					

How would you rate your overall knowledge on climate change?

	Very low	Low	Sufficient	High	Very High
Knowledge					

What is your opinion on climate change? (please first tick the correct answer and then click on the corresponding box)

Mankind is changing the climate  
(i. e. through the burning of fossil  
fuels).

Mankind is not changing the climate.

I am not sure about what to think  
of climate change.

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Progress 

Even though you are not sure about the cause of climate change we would like you to continue the survey. This can help us understand why you are not sure about climate change. If so, please choose “Continue Survey” below. However, if you wish, you can also go to the end of the survey now by clicking on the button “Go to end of Survey”.

Continue Survey

Go to end of Survey

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## Do you agree with or oppose the following statements about environmental behavior?

strongly oppose

oppose

neutral

agree

fully agree

---

It is the moral obligation of each individual to utilize planet earth carefully.

---

Because of my responsibility for future generations, I try to live a sustainable lifestyle.

---

It requires responsible behavior of all individuals to reduce and stop environmental damage.

---

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## Do you agree with or oppose the following statements regarding climate change?

strongly oppose

oppose

neutral

agree

fully agree

---

Climate change is a threat to social stability in the world (i.e. through induced droughts, food and water shortage).

---

Climate change is a threat to the world's economy (i. e. through damages from extreme weather events).

---

Climate change is a threat to the environment and biodiversity (i.e. changing habitats, changing conditions).

---

Climate change is a threat to your national security (i.e. sea-level rise, climate refugees, increasing likelihood of conflicts).

---

What is your opinion? How important is climate change to the following groups of your national society?

not important  
at all

less important

neutral

somewhat  
important

very important

---

Federal and State  
Governments

---

Local Government (i. e. City)

---

Businesses

---

Grassroots Organizations /  
Civil Society

---

Individual Citizen

---

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Now we are going to ask you a few questions about ways to reduce the impact of climate change through mitigation. One way to do this is to offset or compensate carbon emissions. This is a concept where emissions (greenhouse gases that cause warming) are taken out of the atmosphere i. e. by planted trees. However, emissions can also be reduced i. e. by replacing fossil fuel based power generation with energy from renewable sources like wind or solar.

Have you heard about carbon mitigation before? (please first tick the correct answer and then click on the corresponding box)

Yes, I have heard about carbon mitigation/offsetting before.

No, I have not heard about carbon mitigation/offsetting before.

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What do you think? How should the responsibility to mitigate emissions (emission reduction and/or compensation) be distributed among the following parties?

	No responsibility	Little responsibility	Some responsibility	Most responsibility	Full responsibility
The provider of a service (i. e. Airline)					
The provider of a product (i.e. the manufacturer of an airplane)					
The consumer of a product or service					
The government (regional or national scale)					
The United Nations (UN) (international scale)					

Where did you hear about carbon mitigation? (please tick all correct answers)

Media (TV, Internet, Newspaper, Magazine, ...)

Friends, Family

Work, Colleagues

During Booking of flight

Other

Have you participated in carbon mitigation programs before? (please first tick the correct answer and then click on the corresponding box)

Yes, I have participated before.

No, I have not participated yet.

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How did you participate in carbon mitigation programs? (please tick all correct answers)

I have offset private flights before.

---

I have offset work related emissions before.

---

I have offset other emissions.

---

Other

Do you (roughly) remember the cost of your last offset contribution? (please select a value range provided)

US Dollar

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Starting on the next page we would like you to go through a simplified procedure to book a hypothetical flight. You will not be charged at any point!

Please imagine the following situation:

You are at home, planning your next trip to Hawaii. After you have set the dates of your travel you went to the airline's website to book your ticket. Your airline today is "Aloha Airways". Please follow the simplified steps until you get to the confirmation page. Thank you.

To start the process, please go to the next page and chose your home location.



Progress



Next Page

I visit Hawaii from (please click on your location)

North America (USA, Canada,  
Mexico)

Japan

Asia (without Japan)

Central, South America (south of  
Mexico), Caribbean

South Pacific, Australia, New  
Zealand

Africa

Europe

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Progress

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Welcome to Aloha Airways. Please view your selected flight and proceed.

North  
America

Round Trip

Kona, Hawaii



Proceed  
to  
Step 2

BACK

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Please choose your preferred way of traveling and proceed.

Thinking about offsetting your flight to Paradise?  
Find out more [here](#).

North America

Round Trip

Kona, Hawaii

Economy	600 \$
Business	800 \$
First Class	1400 \$



BACK

Proceed  
to  
Step 3

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Together with our partner “fairclimate” we can offer you the following options below to offset your flight.

The table on the left shows you the prices to compensate emissions generated by your flight to Hawaii. By choosing one of these options you can reduce your carbon footprint and do your part to reduce the impact on climate change. Your monetary contribution will be used by fairclimate to finance a variety of projects like renewable energy, reforestation or alternative transportation methods that reduce emissions.

← Round Trip →

Class	No Offset	Economy	Business	1 <sup>st</sup> Class
Emissions mitigated <sup>1</sup>	0 kg	1903 kg	3569 kg	4758 kg
Offset Price 50% <sup>2</sup>	0 \$	22 \$	42 \$	55 \$
Offset Price 100 % <sup>2</sup>		44 \$	83 \$	110 \$

<sup>1</sup> Emission calculation are based on a non-stop flight using a fuel efficient aircraft (i. e. Boeing 767-400) and include contrails and ozone formation.

<sup>2</sup> The Offset price as shown for your Class will be added to your ticket price.

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Step 3

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Please confirm your flight.

North America

Round Trip

Kona, Hawaii

Your choice today

1 Ticket, in selected class from North America to Kona, HI.

Your price is :            US Dollar



BACK

Proceed  
to  
Step 4

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Please confirm your flight.

North America

Round Trip

Kona, Hawaii

Your choice today

1 Ticket, in selected class from North America to Kona, HI including your selected amount of emission mitigation. Thank you.

Your price is :                      US Dollar



BACK

Proceed  
to  
Step 4

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Thank you for flying with Aloha Airways.

North America

Round Trip

Kona, Hawaii

[Enjoy your trip to Hawaii.](#)

We hope to see you again soon.



Return  
to Survey

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Welcome to Aloha Airways. Please view your selected flight and proceed.

North America

Round Trip

Kona, Hawaii



Proceed  
to  
Step 2

BACK

Did you see the option to mitigate your emissions during the booking process?

Yes, I did see the option.

No, I did not see the option.

If you did mitigate your emissions during this experiment, why did you do this?

Please explain briefly:

If you did not mitigate your emissions during this experiment, why did you do this?

Please explain briefly:

---

What amount would have been acceptable to you?

What is your opinion on accessibility and the level of information provided regarding the mitigation option?

Very low

Low

Sufficient

High

Very High

---

Accessibility

---

Information

---

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Progress

Next Page →

Starting on the next page we would like you to book another hypothetical flight.  
Again, you will not be charged at any point!

To start the process, please go to the next page and choose your home location. Please choose the same as you did earlier.



I visit Hawaii from (please click on your location)

North America (USA, Canada,  
Mexico)

Japan

Asia (without Japan, New Zealand)

Central, South America (south of  
Mexico), Caribbean

South Pacific, Australia, New  
Zealand

Africa

Europe

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Progress

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Welcome to Aloha Airways. Please view your selected flight and proceed.

North America

Round Trip

Kona, Hawaii



BACK

Proceed  
to  
Step 2

Get on board and explore the worlds most active volcano  
**OUR DESTINATION: PARADISE**

Please choose your preferred way of traveling and proceed.

Find out more about offsetting and select your favorite program from our partner "fairclimate" [here](#).

Round Trip

North America

Kona, Hawaii

Class	Price	We are glad to offer you the following offset options in cooperation with our partner "fairclimate". Please choose.		
		Compensate 0%	Compensate 50% <sup>1</sup>	Compensate 100% <sup>2</sup>
Economy	600 \$	0 \$	22 \$	44 \$
Business	800 \$		42 \$	83 \$
1 <sup>st</sup> Class	1400 \$		55 \$	110 \$

<sup>1,2</sup> The amount shown below will be added to your ticket price to offset half (50%) or all (100%) of the emissions generated by your flight. Find out [more](#).

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Proceed to Step 3

# LIVING THE FUTURE. TODAY.

## YOUR RELIABLE PARTNER IN A CARBON CONSTRAINED WORLD

Welcome To FairClimate.

Together with our partner Aloha Airways we now offer you the possibility to compensate your travel-related emissions.

By choosing FairClimate as your carbon mitigation provider you can be sure that your contribution makes a difference, because:

- Our emission calculation follows the strict international standard “GHG Protocol”
- Our mitigation projects are independently certified by a 3<sup>rd</sup> party and follow strict international standards (Gold Standard or Verified Carbon Standard)

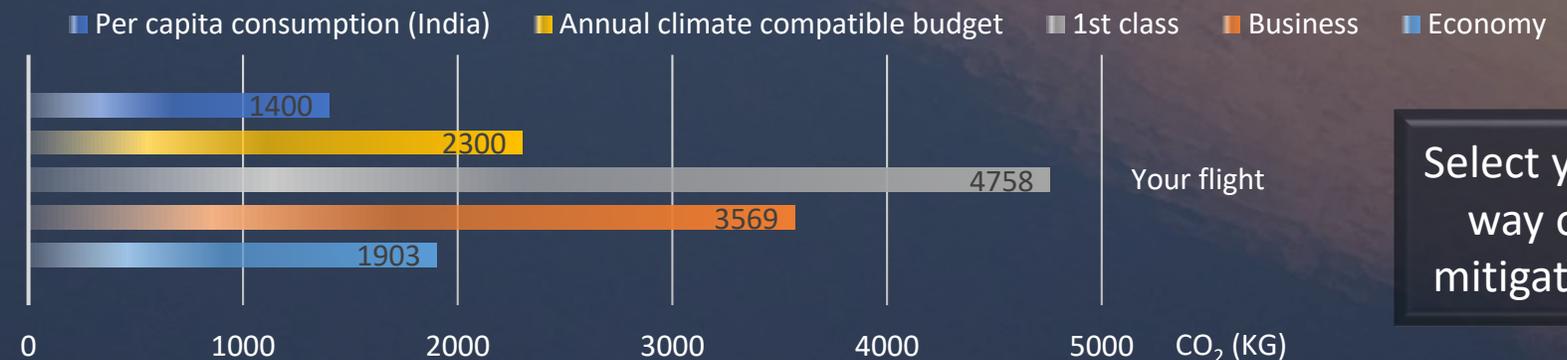
By following these standards we can assure our customers high quality, transparency as well as accordance to social and environmental norms.

Based on your travel information (Round Trip North America – Kona, HI), your emissions are calculated as follows:

Class	Economy	Business	1 <sup>st</sup> Class
Emissions <sup>1</sup>	1903 kg	3569 kg	4758 kg

<sup>1</sup> Emission calculations are based on a non-stop flight using a fuel efficient aircraft (i. e. B767-400) and include contrails and ozone formation.

Emissions put in perspective<sup>2</sup>:



<sup>2</sup> The annual climate budget is calculated using the global goal to keep warming under 2°C. A level which is considered to keep climatic changes in a manageable scale. To achieve this goal, the global carbon budget until 2050 is estimated at 750 billion tons of CO<sub>2</sub>. Assuming an average world population of 8.2 billion people between 2010 and 2050, every individual has a climate budget of 2300 kg per year.



BACK

Select your way of mitigation

# LIVING THE FUTURE. TODAY.

YOUR RELIABLE PARTNER IN A CARBON CONSTRAINED WORLD

Please select a project.

Thank you for your interest in our carbon mitigation program. Please choose from one of our current programs shown below. Your contribution will then be funneled towards this project.

Project	Please select	Description
Reforestation		A project in the southern Amazonas basin, Brazil. Degraded farmland is going to be reforested into Rainforest which will act as a carbon sink, habitat and shelter for indigenous people of the region.
Renewable Energy		Solar lights are installed in Ethiopia, bringing light into rural communities. In Ethiopia, less than 20% of houses have electric light. We are cooperation with a local solar panel manufacturer to make sure revenue is being accumulated locally.
Efficiency Projects		We are providing cook stoves to replace inefficient open-fire cooking in Rwanda. This reduces the amount of carbon needed to cook a meal and makes a difference three times every day.
Equally distribute to all		If you choose this option, we will distribute your contribution equally to all project we are currently working on.

BACK

Continue to Step 3 (back to Aloha Airways)

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Please confirm your flight.

North America

Round Trip

Kona, Hawaii

Your choice today

1 Ticket in selected class from North America to Kona, Hawaii including your selected amount of emission mitigation. Thank you.

Your price is :            US Dollar



BACK

Proceed  
to  
Step 4

*Get on board and explore the worlds most active volcano*  
**OUR DESTINATION: PARADISE**

Thank you for flying with Aloha Airways.

North America

Round Trip

Kona, Hawaii

[Enjoy your trip to Hawaii.](#)

We hope to see you again soon.

Return  
to Survey

BACK

Did you see the option to mitigate your emissions during the booking process?

Yes, I did see the option.

No, I did not see the option.

What did you like better/ or not as much as in the first booking procedure?

Please explain briefly:

What is your opinion on accessibility and the level of information provided regarding the mitigation option?

Very low

Low

Sufficient

High

Very High

Accessibility

Information



Finally we would like to ask you a few questions about your daily life (when you are not on vacation).

In which country do you live right now? (Please type in the name of your country i.e. "Germany")

What is your gender?

Male

Female

Other

What is your year of birth? (Please type in a year i.e. "1982")

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## What is your highest level of education?

Secondary school (or similar)

---

High school (or similar)

---

College/University (Bachelor)

---

College/University (Master)

---

Doctoral degree

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## How often do you recycle and/or apply other sustainability practices?

	not available	never	sometimes	often	most of the time	always
Recycling at home (i.e. Cans, Plastic, Paper, Glass)						
Recycling at work/school/university						
Conserving water at home (i.e. short shower, turn of faucet while brushing teeth, ...)						
Conserving water at work/school/university						
Conserve electricity at home (i.e. energy star certified appliances, turn off the light when leaving the room, ...).						
Conserve electricity at work/school/university						
Conserve resources at home (use recycled paper or plastics, using reusable items like shopping bags, ...)						
Conserve resources at work/school/university						

What kind of transportation do you use for work including the way to work/school/university

Not at all	Less than once per year	About once per year	A couple times per year	About once per month	More than once a month	About once per week	More than once a week	Daily
------------	-------------------------------	---------------------------	-------------------------------	----------------------------	---------------------------------	---------------------------	--------------------------------	-------

Walking or  
Riding a bike

Driving the car

Using public  
transportation

Flying

## What kind of transportation do you use in your (private) life?

Not at all	Less than once per year	About once per year	A couple times per year	About once per month	More than once a month	About once per week	More than once a week	daily
------------	-------------------------------	---------------------------	-------------------------------	----------------------------	---------------------------------	---------------------------	--------------------------------	-------

---

Walking or  
Riding a bike  
(store, friends,  
restaurant, ...)

---

Driving the car

---

Using public  
transportation

---

Flying

---

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## How would you describe yourself?

doesn't describe  
me at all

describes me  
somewhat

neutral

describes me

describes me  
very well

---

I care about other people  
especially about people that  
are less well off than I am

---

Things that happen to  
others don't affect me to  
much

---

I like things the way they  
are. Although some things  
were better in the past

---

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Are you a member in and/or financially support an activist group? (Please tick all that apply)

Yes, an environmental group (i.e. WWF, Greenpeace, Sierra Club, ...)

---

Yes, a social group (i. e. World Vision, Save the Children, Change.org, Avaaz, ...)

---

Yes, another group

---

No

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Progress 

End survey 

# Thank you for your participation!

If you wish to be informed about the survey results, and/or to participate in the competition to win one of three pounds of Estate grown 100% fine Kona Coffee, please provide your email address to the researcher. A hardcopy list is available for you to enter your information.

Please do not close this survey. Please hand the device to the researcher to save your information. Thank you.

# Thank you for your participation!

If you wish to be informed about the survey results, and/or to participate in the competition to win one of three pounds of Estate grown 100% fine Kona Coffee, please provide your email address to the researcher. A hardcopy list is available for you to enter your information.

Please do not close this survey. Please hand the device to the researcher to save your information. Thank you.

10.2 [CD-ROM with Survey Variant 1, 2, 3, 4, 5 and 6](#)