Transforming Cyprus into a Carbon Neutral Destination

TOWARDS A MORE SUSTAINABLE TOURISM

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EXECUTIVE SUMMARY

This report tries to establish the impact of the tourism industry on the environment and its contribution to global warming, both globally and in Cyprus. We examine the concept of a carbon neutral tourism destinations and the necessary steps required to realize it as well as the boundaries of the system. Through the study of various policies adopted by other countries such Costa Rica, Scotland and Sri- Lanka towards that goal. We try to distinguish which of these policies and action plans can be implemented to Cyprus. Afterwards, we delve deeper into the offsetting aspect of carbon neutrality and more specifically forestry projects. The last part of this report, presents our conclusions concerning Cyprus's potential of becoming a carbon neutral destination.

Contents

Introduction

One of the main objectives for the future of the EU is to establish a low-carbon economy by 2050 (Roadmap 2050, 2010). The targets set by though EU's climate change policy are, the reduction of the GHG emissions by 20% of the 1990 levels by 2020, 20% of the energy should come from renewable energies by 2020 and a 20% increase in efficiency also by 2020 (Delbeke and Vis, 2015). The Davos Declaration that resulted from the Second International Conference on Climate Change and Tourism, that took place in Switzerland, suggests that all governments and International Organizations need to join forces in International Strategies, policies and action plans in order to reduce the Greenhouse Emissions (GHG) from transport, accommodation and tourism activities (UNWTO, 2008).

The tourism industry has been identified as a substantial contributor to climate change, as it is estimated that a 5% of global CO2 emissions and a significantly higher share of the radiative forcing is a result of all GHG related to the Tourism industry (Gössling, 2009). Most of the activities in the tourism industry, require either energy directly from fossil fuel or indirectly such as electricity which is often generated from petroleum, coal or natural gas. The huge energy requirements of the tourism industry, lead to a huge amount of GHG and mainly carbon, thus a two-way relationship is created between tourism and climate change. With its significant contribution in GHG emissions from extensive fossil fuel based energy requirements, the tourism industry has a huge impact on the changing climate.

But, the climatic changes will have in their turn a significant number of impacts in the tourist destinations and flows (Dick Sisman & Associates, 2007).

Three segments of the Sector have been associated with GHG emissions either directly or indirectly (Janjusevic, 2013):

1. Transport (Including Aviation)
2. Accommodation
3. Activities

During the past decades, tourism in Cyprus experienced a rapid growth and the dependence of the island's economy on mass tourism caused a number of adverse effects, including environmental degradation and perishing cultural identity amongst others (Clerides & Pashourtidou, 2007). The increasing number of tourist arrivals of the last decade lead Cyprus Tourism Organization (CTO) to recognize the need of adopting a more sustainable development strategy for the tourism industry, aiming to reduce the environmental pressures caused by it (CTO, 2010). With climate change becoming a major issue all around the world, the tourism industry also realizes the need to reduce emissions. The purpose of this report is to investigate how Cyprus can become a 'Carbon Neutral' tourist destination by analyzing strategies and plans from other countries with similar ambitions. Nevertheless, the carbon footprints of various destinations are likely to differ greatly, depending on the climate, culture, energy sources, available technologies and type of activities of the destination.

Carbon neutral destinations

Defining 'Carbon Neutral' Destinations

The ambition is to transform Cyprus into a 'Carbon Neutral' Destination but what exactly does that mean. There are two parts we need to define in 'Carbon Neutral' and Destination.

First, we will clarify what do we mean when we talk about carbon neutrality. The term is often linked with other terms such as 'Carbon free', 'Carbon clean' or 'Climate neutral'. The two first terms differ since they are referring to zero generation of CO2 emissions and the third one is focusing on all GHG while Carbon Neutrality only comprises CO2. Here we have to note that GHG cannot be "neutralized" only compensated for. This usually happens by offsetting emissions through various projects such as renewable energy or forestry projects. The term Destination refers to comprise an entire country, in this case Cyprus, even though it can also be used for a wider region or local level (Gössling, 2009).

For the purposes of this report Carbon Neutral Destination refers to a destination that does not contribute to climate change.

Tourism related emissions

There is an increasing pressure for the tourism industry to be remodeled in a more sustainable way. With the increased number and more intense nature of travelers, tourism development comes in contrast with the EU emissions

reduction targets (Gössling, 2009). Within the tourism industry all actors should have an equal responsibility for reducing GHG emissions, with different tasks being distributed to them but no clear priorities (UNWTO, 2007). The focus on GHG emissions in the industry centers around three sectors: Transport, Accommodation and Activities.

But, not all sectors share the same contribution to GHG emissions, transport and more specifically, Aviation is the sub-sector of tourism that holds the biggest share of CO2 emissions (Holden, 2008). The environmental footprint of air travel has been for some years now the subject of academic enquiry, both in relation to tourist behavior and destination initiatives (Hares, Dickinson and Wilkes, 2010). The main argument on the topic is whether tourist or airlines should be burden with the GHG of aviation. National governments of EU member states, through the European parliament, have assumed responsibility for emission from aviation. Even more, despite the advancement in aviation technologies or operational aspects, it still remains the most significant factor of GHG emissions. Cyprus is no different with the island's CO2 emissions majority being attributed to air-travel (IEA, 2015).

GHG emissions related to the Accommodation sector are mainly indirect and are due to electricity production for Hotels (Lights, Air-Conditioning, Cooking, Laundry etc.), Hotel oil and Gas demands, Food transport for accommodations and waste disposal generated from hotels as well as water supply related energy

generation. In addition, accommodation and transportation of people employed by the industry should be taken into account.

System boundaries

A Destination that seeks to achieve a status of a ‘Carbon Neutral’ destination will need to define the boundaries of their system. This often leads to a number of countries reporting emission reductions but it is unclear whether there is an actual reduction or if just the result of the boundaries they have chosen for their system (Gössling, 2009). Thus while the reports indicate emission reductions, their economies might not be transforming to low-carbon ones. A Destination such as Cyprus needs to decide early whether to include only CO2 emissions or all GHG, in addition to defining their tourism system (Becken, 2002). It’s worth noting that comparing CO2 emissions with other GHG emissions can be a difficult task since non-CO2 emissions have a shorter lifetime, (Peeters, 2007).

When it comes to setting boundaries for accounting, in the case of islands such as Cyprus it’s much easier. The system for accounting will need to include all accommodation related CO2 emissions as well as all CO2 emissions that were emitted from tourism related activities, carried by both International and domestic tourists. Furthermore, CO2 emissions from transport including air travel to and from the island need to be addressed (Gössling, 2009).

For the sectors of Accommodation and Activities the boundaries are very clear, but as we discussed above that is not the case with Aviation related CO2

emissions. The first approach we are going to discuss is the *Consumption approach*, which centers around the idea that the emissions should be attributed to the citizens of a country e.g. UK should be accounted for the emissions caused by its citizens travelling to Cyprus. The argument against this approach is that even partially the destination has economic benefits thus it should share the burden of CO2 emissions. The second approach we come across is the *production approach*. In this approach each country/destination is responsible for the entirety of the CO2 emissions caused by incoming and outgoing flights. Against this approach it is argued that all actors that profited, should be held responsible for the CO2 emissions. Additionally, this approach is likely to make Cyprus responsible for a far great share of emissions, resulted from wealthier nations (Gössling, 2009).

Considering this, we set the boundaries to include direct and indirect CO2 emissions produced by the Accommodation and Activities segments of the tourism industry in Cyprus from both International and Domestic tourists as well for the transportation and accommodation of the personnel of the industry. For the calculations concerning on land transportation we also include CO2 emissions from both International and Domestic tourists, while on the matter of inbound and outbound flights the burden of emission should be shared between tour operators and the destination.

Reducing CO_2 emissions – becoming more sustainable

Having set the boundaries of what we consider to be the emissions accredited to the tourism industry in Cyprus, the next step after measuring is an effort to reduce them. On this section we are going to consider the various aspects of direct and indirect emissions by the Accommodation and Activities segments of the tourism industry, how do we measure them and how can we reduce their emissions.

The first area we are going to look into is reducing the electricity demands of Hotels. A great energy saving opportunity is presented in the hotel's laundry services, more specifically a reduction between 20% and 30% is possible, with just giving the guests the of reusing their towels and bedding if they're staying more than one night. Approximately 40% of the hotel's energy bill responds to heating water systems and given the large steam and hot water requirements of laundry services that would mean a significant cut back (Pieri S., Tzouvadakis I. and Santamouris M., 2015).

The second most energy demanding system in hotels is most likely the lighting system, but at the same time is one of the easiest to manage, and most cost-effective one. Successful management of the lighting system of a hotel can have major economic and environmental benefits, with a simple action like replacing incandescent lights with LED or fluorescent lamps. There is a significant number of benefits from the switch to LED lighting, with a lifespan between 50,000 and 80,000 hours in contrast with the typical 10,000-hour lifespan of incandescent or

fluorescent light, LED reduces light replacement expenses as well as waste. The main reason for LED's popularity is that it offers the option of a low-energy lighting with it excellent energy saving properties, that can lead up to a reduction of more than to 50% on the energy bill. Thus reducing the energy demand of the hotel and CO2 emissions as a result (Khorasanizadeh et al., 2015). Additionally, the use of sensors to control not only lighting but also other systems, will result in a significant reduction of electricity consumption. Photocells can be used to control day/night cycle operations, occupancy sensors can be used for lighting, ultrasonic sensors can be used in bathrooms. Moreover, other sensors are available with the ability to control operation of lighting or device by door opening, time of day, timer, noise level, and proximity. Finally, projects that link energy use to room occupancy can ensure that all energy appliances are shut down when the guest leaves the room, with the exception of necessary devices. Thus reducing energy consumption when the guest in not out the room or the room is vacant (Placet, M et al., 2010).

Another aspect of CO2 emissions associated with the tourist industry is related to food. By developing programmes to support local farmers in producing food in order to satisfy the tourism industry demands instead of importing food not only can have economic benefits to the country but it can also reduce food mile related CO2 emissions (Holden and Fennell, 2013).

Waste also offers a great opportunity for reducing the carbon footprint of the industry. By reducing the volume of waste going to the landfill, produced by hotels and their guest through recycling and food recycling we can reduce the

waste management related energy requirements thus CO2 emissions. Even more through the process of anaerobic digestion, human sewage and food waste generated by the hotel, can be utilized to produce Biogas thus creating carbon neutral energy. The capability for energy production though depends on the size of the hotel, typically applies to larger hotels (Lou, Nair and Ho, 2013).

The following table illustrates the various activities of different segments of the tourist industry and how we measure their energy consumption in order to calculate the emissions related to the sector. The table also includes some proposals for mitigation techniques.

Energy Consumption	Activity	Approach to Estimating	Energy Metric	Conversion to CO2 Reference UK DEFRA	Key Reduction Ideas
Hotel (Electricity)					
Lights	Lighting	No of lights of specific watt rating and hours on – as subset of electricity bill	Kilowatt hours (kWh)	0.43 kg CO2 per kWh	Low energy replacements. Room key cards to stop usage when vacant
Air Conditioning	Fixed units and fans	No of units, rating time of use - subset as for lighting	kWh	0.43 kg CO2 per kWh	Room key cards to stop usage when vacant
	Mobile units and fans	No of units, rating time of use - subset as for lighting	kWh	0.43 kg CO2 per kWh	Minimise use through use of ventilation. Use lowest comfortable thermostat setting – vary seasonally
Heating		Subset as for lighting	kWh	0.43 kg CO2 per kWh	Timers, seasonal variation in thermostat setting, insulation
Cooking	Cookers	use average per person per day (pppd)separate meter– subset as for lighting	kWh	0.43 kg CO2 per kWh	Energy efficient stoves
	Hotplates	No of units, rating time of use – subset as for lighting	kWh	0.43 kg CO2 per kWh	Minimise use and heat Loss
Refrigeration	Fixed units	use average (pppd), separate meter– subset as for lighting	kWh	0.43 kg CO2 per kWh	Energy rating
	Coolers	As Above	kWh	0.43 kg CO2 per kWh	Minimise use
Laundry	Washing	As Above	kWh	0.43 kg CO2 per kWh	Energy efficient systems
	Drying	As Above	kWh	0.43 kg CO2 per KWh	Possible open air drying
Hotel Oil & Gas					
Oil and gas consumption	Power consumption heating etc.	Annual	Quantities of gas and/or oil consumed	2.68kg CO2 per litre oil Natural gas Therms x 5.5 kg CO2 or kWh x 0.19 kg CO2	Care not to double count
Hotel Food Transport					
Food and drink	Food miles	Mainly air transport	Tonne kilometres	c 1kg CO2 per tonne km (11)	
Personal Transport					
Transfers	Bus/car/train (mini buses & luggage trailers)	Home to airport	Petrol Diesel LPG	2.31 kg CO2 per litre 2.68 kg CO2 per litre 1.51 kg CO2 per litre	Order of preference Hybrids > diesel >petrol
	Bus/ car/ train	Airport to accommodation	Rail Bus Car	0.06 kg CO2 per pass km 0.038 kg CO2 per pass km See above	Use bus and train where possible
	Air journey		Air	As above	
	Local transport		Base on fuel Consumption/ petrol diesel or LPG	See figures above for petrol and diesel	Wider use of efficient electric vehicles

	Cruise holiday		One week cruise (13) Two week cruise	3000 kg CO2 per passenger 6000 kg CO2 per passenger	Conversion factor debatable –limited data – more comparative information required
Waste Disposal					
	Waste disposal route	Anaerobic digestion / landfill / incineration w/w out energy recovery	Methane and CO2	2kg CO2 equivalents per kg waste 0.28 tonnes CO2 per kg waste	Avoid landfill reduce reuse recycle use anaerobic digestion with methane capture Incineration with energy recovery is another option but large plants are required
	Aerobic bio treatment	Energy consumption		Depends on source Electricity / oil / gas	Reduce water volumes e.g. dual flush toilets
	Transport	Trucks	Tonne kilometres	0.94 kg CO2 per tonne kilometre (diesel - trucks)	Reduce reuse recycle will lead to decrease in transport requirements Replace fleet
Staff					
	Accommodation	See hotels	See hotels	See hotels	Same factors apply as for hotels
	Transport	See hotels	See hotels	See hotels	As above replace fleet – gasoline to diesel to Hybrids
Agricultural Production					
	Transport	See hotels	Food miles/km	For air c 1.00 kg CO2 per tonne kilometre (10) Use, vehicle miles and fuel consumption for trucks etc.	Use local products
Car/ Vehicle Hire					
	Small car	Fuel consumption	km/litre or manufacturers data on CO2	0.17 kg CO2per passenger km (ppkm)	CO2 production in diesel cars is Approx.0.75 that of petrol cars per pass km
	Medium car	As above	As above	0.22 kg CO2 ppkm	
	Large car	As above	As above	0.27 kg CO2 ppkm	
Water					
	Water heating	Energy consumption		Depends on source Electricity /oil /gas	Reduce hot water use e.g. low flow shower heads
	Bottled water				Use tap water where appropriate
Swimming pools	Heating	Based on energy Consumption			Cover pools
	Pumping				use low energy circulation Systems

Carbon Neutral Destinations – Efforts from across the world:

Here we are going to investigate and analyse the policies, plans and actions from a variety of countries which aspire to remodel their tourism industry into a more sustainable one.

Costa Rica

Since 2007 the country of Costa Rica expressed their ambition to transform the country into a Carbon neutral destination, with the government announcing its plans to implemented legislation for more efficient usage of energy. The main aim of the government was for tourism and other major emission contributors to offset as much CO2 as they emitted. Setting the target to reducing emissions to zero by 2021 the National Forestry Financing Fund came to an agreement with the Board in order to involve domestic and foreign tourists in a scheme for compensating for GHG emission, generated from aircraft and cars. Tour operators joining the venture will charge their customers upon arrival or departure with a tax for the emissions generated as a result of their journey. Companies such as Nature Air and the National Air Service were the first to get involved with offsetting, compensating with financing reforestation proportionally to the amount of aviation fuel consumed (Gössling, 2009).

The mechanism of Payment for Environmental Services (PES) is becoming even more and more popular for financing conservation of natural resources. Through the concept of nature, a service provider the mechanism is designed to

incentivize resource preservation with compensations for valued ecosystem services thus covering the opportunity costs of alternative resources use (Fletcher and Breitling, 2012).

Source: BLP

Scotland

The Scottish Tourism Innovation group (TIG) was formed in 2002 and is private-sector led group with the aim of stimulating tourism operators in taking action for adding quality and bringing success to tourism businesses thus enhancing the country's competiveness in the international tourist market. Part of the group's work was the launch of a wide carbon offsetting initiative throughout the country in order to balance the carbon intensity of the tourism industry with the clean image of Scotland's unsullied environment.

Source Visit Scotland

The initiative introduces a three-stage procedure, comprising of ‘measurement’, ‘emission reductions’ and ‘offsetting’. All segments of the tourism industry in Scotland that aspire to become part of the scheme need to measure their emissions and try to reduce them. When it comes to the unavoidable emissions they must be offset. The carbon offsetting projects is deemed necessary to be implemented in Scotland, they should be beneficial to the environment and visible to the tourists, in order to increase donations and promote the concept of carbon neutrality. In addition, this scheme offers marketing advantages (Gössling, 2009).

Sri-Lanka

The last country we will be looking into is Sri-Lanka, that during the 2nd International Conference on Climate Change and Tourism which was organized by the UNWTO in 2007, declared its ambition to become the first carbon neutral travel and tourism destination. All actors including both public and private sector as well as the country’s citizens and visitors would all work towards creating a carbon neutral haven in Sri-Lanka. Workshops would be held in order for all stakeholders and people involved to discuss the strategies for financing this venture amongst other issues (Gössling, 2009).

As in Cyprus, tourism is an important sector for the economy of Sri-Lanka, Earth Lung Project (ELP), a carbon mitigation initiative was developed as a response to the uncertainties that follow climate change. With the project actors were aiming to improve the sustainability of the Tourism sector in accordance with the UN

guidelines on how a correct structured tourism industry can play a major role in the sustainable development of a country. The aim of ELP was to enable tourists to associate with the country as well as to provide a national response to the climate change. The primary focus of ELP is forests which are the lungs of the earth, hence the name. the idea behind the project is to encourage tourists to pay a carbon offset fund to help relief the country's deforestation issue as well as use the country's 30% coverage of forest as a carbon sink. While it is hard to gather statistics and data for the progress of the project due to the fact that is still in an early stage, there has been reports for miscommunication between various sectors, thus endangering the success of the project (Welton, R., 2013).

Can carbon offset work in Cyprus?

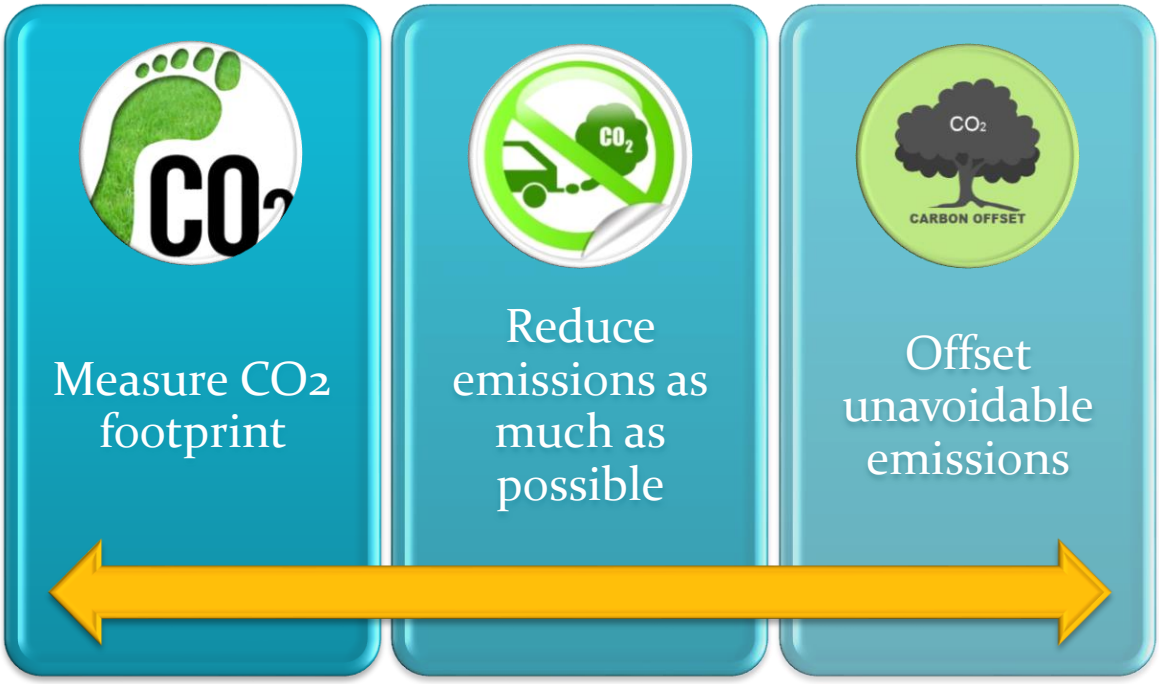
The cases briefly examined above can provide valuable lessons for Cyprus in its own effort to become a Carbon Neutral Destination. This section we try to identify the strong points of the examined policies that can be implemented to Cyprus as well as the weak points to be avoided.

Learning from other Countries

While all the countries we have examined are larger that Cyprus in both area and population, they too have a relatively small number of emissions, only Scotland can be seen as having substantial tourism related emissions. Furthermore, all these countries aspire to achieve a reduction of a considerable share or even the entirety of their national emissions. In order for any carbon neutrality related

project to succeed, the cooperation and active involvement of all actors is essential. Without meaningful cooperation between public and private sector as well as the country's citizens, carbon neutrality projects cannot be fruitful. Tour operators, airline companies must also participate by gathering money from their customers in order to finance carbon offset projects.

To sum-up, the plan to transform Cyprus into a Carbon Neutral Destination needs to include the three-step process as seen in other countries. *Measurement* is the first step, with setting the boundaries of emission calculation to include emissions generated by domestic and International tourists as well as Air-travel of international tourists. The second step would be *Decarbonising* the industry, with reducing energy use as much as possible, in order to reduce carbon emissions as well remodelling the industry in a more eco-efficient way. The third and final step is *Offsetting,* the remaining emissions that are unavoidable. Offsetting, projects should be done within the country and should be visible by both tourists and citizens, more over such projects should be long-term ones.



Carbon offset projects – Forestry

Carbon offsetting serves to neutralize the emissions by investing into various projects with the goal of reducing the atmospheric concentrations of GHG, mainly in reforestation or renewable energy projects. Such schemes are often associated with the tourism industry and the emissions caused by tourists (McLennan et al., 2016). Forestry schemes, are the most common within the carbon offsetting strategies, with most of the offset projects being forestry ones. This is mainly due to the fact that globally forests are facing demise and urgent action is required to undo the damage done to our planet's lungs (Gössling et al., 2007). Forests in Europe are bound to be affected by climate change and more specifically the ones in the south part of Europe. More frequent and severe droughts are likely to lead to decreased productivity and more frequent forest

fires (Zachariadis, 2016). Moreover, Cyprus has suffered from extensive and devastating fire out-brakes in the past decade, thus making reforestation projects vital to the island (Cyprus Mail, 2016). However, this should not be considered as a solution to the deforestation problem, since it's primary focus is to offset carbon emissions.

As we have seen in the countries we examined, all of their offsetting strategies are focused on forestry related projects such as forest management, reforestation and forest conservation. Criticism on such schemes focuses on the permanency of such projects, since vast areas on land will need to be dedicated to the project for at least 10 years. However, forestry projects seem to have a great appeal to tourists, who are more than eager to provide funding for them (Gössling, 2009). Mainly, because at the same time they are helping their welcoming destination as well as the planet as a whole. Another weakness of the system is the distrust of travelers to offsetting mainly due to lack of knowledge and understanding of how the system works. Additionally, lack of transparency and the sense that this system works as an excuse to carry on such behavior also discourage the tourist involvement (Becken, 2016).

Burned forest at Solea
Source: Cyprus mail

Afrobanana festival in Cyprus forests
Source: Cyprus Insider

Conclusions

Cyprus needs to abandon the short-term, pro-growth development approach that is following in favour of a more sustainable agenda. Lack of awareness of the potential benefits of sustainable tourism is currently a barrier to the implementation of a more sustainable tourisms industry in the country (Farmaki et al., 2015). So far the label of a 'Carbon Neutral' Destination has serve entities as an excellent marketing strategy in contrast with the growing CO2 emissions from the industry. With transport and most specifically Air travel being the main contributor, airlines and tour operators should share along with the Government the burden of emissions. CO2 emissions from the tourism industry should be calculated in clear and fair boundaries, as to not benefit some actors and burden others. Afterward, all segments need to work towards reducing direct and indirect emissions as much as possible, with more energy efficient technologies and by integrating more renewable energy technologies where possible. Additionally, reducing waste is also essential. For the remaining unavoidable emissions, offset projects based in Cyprus must be made, from all industry actors. Forestry-based projects are essential as the country is suffering from deforestation and due to climate change the situation is estimated to worsen. However, it would be beneficial if not all the projects were centred around forestry. Offsetting projects also need to be visible and both tourists both domestic and international must be able to "touch and feel" them in order for them to gain faith to the system and support it further. As a closing remark, we would like to point out that CO2 offsetting projects while necessary in order to mitigate the increased emissions of

the industry should not be considered a solution to the problem or an excuse to prolong unstainable behaviours but a way of dealing with the emissions the industry cannot at the time eliminate.

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