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OVERVIEW AND HOTSPOTS ANALYSIS OF THE TOURISM VALUE CHAIN IN DOMINICAN REPUBLIC

wrap

Ministerio de Medio Ambiente y Recursos Naturales

Playa Dorada República Dominicana

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Executive Summary

An assessment of the environmental hotspots associated with the tourism sector in the Dominican Republic (DR) was conducted by the United Nations Development Programme and Waste and Resources Action Plan using the process and guidance contained in the 2017 Life Cycle Initiative overarching methodological framework for **hotspots analysis**[1]. **Environmental hotspot** is a process which accounts for a significant proportion of the negative environmental impact in the value chain. **Value chain** is the entire sequence of activities or parties that provide or receive value in the form of products or services (e.g. suppliers, outsourced workers, contractors…).

The combination of a top-down approach (using information drawn from national input-output databases, which did not include imported goods) and a bottom-up approach (e.g. using WRAP's Hotspots Tool to identify the environmental impact hotspots associated with the full lifecycle of products used in the tourism sector) was used to identify and quantify hotspots.

A supporting analysis was conducted in order to identify the implications that imports for the tourism sector had on the ranking and size of product related hotspots. Results showed that, whilst imported goods did not affect the ranking of environmental impact hotspots, they did increase the overall size of hotspots relating to tourism sector consumables.

In order to better understand the location and context for environmental hotspots during this analysis, the tourism value chain for the Dominican Republic was mapped to illustrate how the tourism sector operates, how it is supported by other sectors of the economy (e.g. energy and water supply infrastructure, building and construction, facilities management, food and beverage, transportation), and show the activities that are in scope of this study (see **Figure 3**), how expenditure in the tourism sector is distributed in the economy (see **Figure 4**) and which value chain actors are able to control or influence the environmental hotspots identified during the analysis (see **Figure 5**). Further information on the approach taken to map and define the Dominican Republic tourism value chain can be found in 3.2 below.

In summary, the environmental hotspots identified for the tourism sector in DR are broadly split between:

- **Electricity and fuel use in hotel and restaurants** is a green-house gas emissions and energy use hotspot. Typical hotel energy use is for heating, ventilation and air-conditioning (HVAC) (40%), followed by water heating (26%), cooking (11%) and lighting (6%). This electricity use is also associated with the environmental impacts associated with the extraction of raw materials (fossil fuels: coal, oil and gas), their conversion to electricity or heat and the transmission of energy from point of generation to point of use in the tourism sector. Hotels in the Dominican Republic pay between US$0.20 to US$0.26 per Kw for their electricity; and hotels surveyed estimated that their energy costs made up 10-22% of their total operating costs.

[1] **Source:** http://www.lifecycleinitiative.org/new-hotspots-analysis-methodological-framework-and-guidance/

- **Primary production of food**, particularly GHG emissions and water use in meat and dairy production, and GHG emissions, water use and waste generation in primary production of fresh produce. In addition, processing of meat and fresh produce is also a hotspots for energy use. The tourism sector in the Dominican Republic consumes over US$500 million of food and beverage products each year according to The National Hotels and Restaurants Association (ASONAHORES) and this figure is rising as the sector grows. UN Environment 2017 and FAOstat suggest that the Dominican Republic imports approximately 20% of food and beverages.
- **Lack of recycling of dry recycles (paper, plastics, metal and glass) and food waste**. This is contributing to a significant issue of inadequate landfill capacity on the island, and ground water, river and marine pollution from leachate at open, unsealed landfill sites, air pollution from fires caused by methane emissions at landfill sites.

A summary of environmental impact hotspots by tourism activity and impact category can be found in **Table 1** below. More detail on the approaches taken to hotspots analysis and key findings can be found in **section 4** of the report below, with a further summary table of hotspots organised by impact category and life cycle stage in **Annex E** of this report.

Summary of hotspots across environmental impact categories for the tourism sector in the Dominican Republic				
TO Rank	**GHG**	**Energy**	**Water**	**Waste**
1	**Primary production of meat and dairy products**: methane emitted through bovine enteric fermentation (digestion) and production of manures. 98% of beef comes from domestic sources[2], including a major cattle-raising area in the province of La Altagracia, where Punta Cana is located. According to the World Resources Institute (WRI)[3], agriculture was the second highest source of emissions (31.6%) in the Dominican Republic in 2013, with enteric fermentation and manure left on pasture contributing 75% of the sector's emissions.	**Electricity and fuel use in hotel and restaurants**: typical hotel energy use is for heating, ventilation and air-conditioning (HVAC) (40%), followed by water heating (26%), cooking (11%) and lighting (6%).[4] Electircity used in hotels presents 57% of energy used in the whole value chain. NOTE: Same as Energy hotspot no 2	**Water use in hotels and restaurants**: guest washing and sanitation, cleaning of rooms and public spaces, laundry services, food preparation and cooking, irrigation of grounds, swimming pools and spas. It is worth noting that some destination studies show that hotel guests consume three times as much water as the average Dominican[5].	**Food waste in hotels and restaurants**: average of 7-12% meat waste in kitchens, with some hotel surveys indicating overall food waste levels at up to 35% of food purchased.
2	**Electricity, fuel and refrigerants use in hotels, particularly in generating heating and cooling**: emissions from the combustion of fossil fuels in energy generation[6] for electrical and electronic appliances. This also includes the use of back-up generators (where they are available) during power outages. NOTE: Same as Energy hotspot no 1	**Processing and storage of meat and poultry products**: slaughterhouse processing and energy used in chilled storage and refrigeration contributes to post-farm gate emissions.	**Primary production of meat and dairy, including primary production of animal feed**: water use in feed production (including irrigation water) and for livestock (drinking and cleaning water).	**Primary production of Fresh produce**: in-field, unharvested crops and immediate post-harvest crop waste due to supply chain quality requirements and poor demand forecasting (estimates are up to 20% losses/waste).

[2] Source: FAOStat (2013).
[3] See: http://cait.wri.org/
[4] Source: the Worldwatch Institute (2015).
[5] Source: Dominican Republic Ministry of Environment, Water Footprint Study in Playa Dorada, Puerto Plata (2011).
[6] Within the Dominican Republic 94% of energy produced for consumption comes from the burning of fossil fuels (coal, oil, and gas) (Source: SENI – Sistema Eléctrico Nacional Interconectado (National Interconnected Electrical System: http://www.cne.gob.do/estadisticas-energeticas/ and http://www.sie.gob.do/#. Fossil fuels are imported from countries such as Venezuela and Mexico.

Summary of hotspots across environmental impact categories for the tourism sector in the Dominican Republic				
TO Rank	**GHG**	**Energy**	**Water**	**Waste**
3	**Primary production of fresh produce**: emissions from use of fertilizers and methane emissions from organic wastes. Fuel use for in-field operations. Over 50% of the vegetables produced in the Dominican Republic are consumed by the accommodation sector.	**Processing and packing of fresh produce:** energy use in the processing and packing of produce, energy use in product chill chain or for freezing of produce post-harvest.	**Primary production of fresh produce**: water used to grow fruit, vegetables and other food crops dominates water use across the life cycle.	**Landfilled solid waste that could be recycled:** resulting from a lack of modern, regulated waste management infrastructure. All destinations suffer from a lack of public waste management and recycling infrastructure (waste collection and treatment). Landfilling materials that could be recycled (particularly paper and plastics) add to landfill pollution problems on the island.
4	**Emissions from solid waste, particularly food waste in landfills**: discarded food/organic materials can emit methane, a potent greenhouse gas, and results in the need to burn off methane from open landfill sites for safety reasons, which are poorly controlled and lead to frequent air pollution events [7].	**Transport of people and goods:** Seasonal peaks in the transportation of tourists within and between tourism destinations and attractions. In the Dominican Republic, domestic transportation accounted for 33.89% of national greenhouse gas emissions in 2000 (Second National Communication to the UNFCCC).	**Untreated waste-water from hotels causing pollution of water sources**: a lack of public infrastructure, regulation and enforcement in some destinations leads to sub-optimal use of water resources and pollution from untreated wastewater has an impact on the natural environment, which places a burden on hotels to provide water supplies via boreholes and individual on-site wastewater treatment plants.	**Landfilled food/organic waste**: a lack of private and public-sector infrastructure for collection and treatment of food/organic waste leads to wasted resource and high methane emissions from open, unlicensed landfill sites[7], and contributes to leachate from unlicensed open landfills poses threats to groundwater, public health, local rivers, beaches and ecosystems.
5	**Production of beverages**: in the tourism sector appears to be a hotspot based on national-level data and (limited) evidence from individual hotels.		**Water use in the energy sector**: water used in cooling and power generation, emitted as steam and not returned to water source.	**Single use items**: e.g. plastic packaging, water bottles, cups, drinking straws, etc. creating litter and marine pollution, damaging natural environments.

Table 1: summary of Dominican Republic tourism sector hotspots across impact categories, ranked in order of importance

[7] For example: Puerto Plata has an open dumpsite administered by the city council and located right at the entrance of the tourist destination and in sight of the nearby cruise ship port of Amber Cove. It suffers from fires frequently due to the large concentration of methane generated there. The leachate percolates through canyons affecting the beaches of Costambar, Maimón and Cofresí, as well as the hotels that are there.

Those hotspots identified and quantified by the UDP and WRAP were then validated at a workshop with tourism stakeholders in November 2017. At the same workshop, stakeholders were consulted to seek their views on the range of solutions and interventions that could be implemented to address key environmental hotspots, primarily in tourism business value chains. The hotspots identified will also be used to inform and prioritise the implementation of national-level solutions and interventions required to enable or support actions by private sector tourism companies and other key stakeholders. Those solutions and interventions suggested at the workshop were then supplemented through desktop research and further discussions with stakeholders to arrive at an agreed long list of potential solutions and interventions, which, in turn, were divided into solutions relevant to tourism business value chains and those requiring interventions at a national-level, either through the development of government policies and strategies or through improvements in national or regional infrastructure. This long list can be found in summary form at **Section 7** of this report and is presented in **Annex F** as a fuller list of actions and activities.

To summarise, the long list covers the following range of solutions and interventions:

Business value chain solutions and interventions: have the potential to be implemented by individual tourism businesses and value chains or via collaborations between tourism businesses and/or the public sector. Some business value chain solutions would benefit from a supportive government policy and strategy framework, or from improvements in national, regional or local infrastructure, like the options for national-level solutions identified below.

- **Sustainable purchasing and value chain initiatives**: that enable multiple hotspots across all impact categories to be addressed, including sustainable procurement policies and practices; appointing a 'green procurement champion'; adopting voluntary sustainability standards for key raw materials (e.g. meat, seafood, timber and paper, textiles); supplier accreditation, environmental KPIs and benchmarking and shared / consortia-based supplier platforms and databases to help identify reliable, high-performing suppliers; the use of product/packaging specifications (product life requirements for hotel furniture and electrical items) and healthy, sustainable menus (e.g. local, seasonal sourcing of food).
- **Improving operational practices**: including the provision of information to guests to help them make the right environmental choices when choosing or buying goods and services; adopting healthy, sustainable menus to reduce the environmental 'food print' of food served in destinations; measuring and monitoring food waste; reviewing food storage, preparation and cooking practices (e.g. portion control) and using data analytics to improve inventory management and demand forecasting to reduce food waste; donating uneaten food and establishing food recycling programmes to produce compost and renewable energy.
- **On-site energy management and efficiency**: making significant improvements in energy use by: developing an energy and GHG policy; conducting and acting on the findings of energy audits; specifying energy efficiency and GHG emission improvements in HVAC systems and electrical equipment (including laundries);

installing room energy management systems; and increasing the amount of in-situ renewable energy generation.

- **Sharing best practice and site visits**: the potential for hotels and restaurants to learn from each other's best practices and to learn from other's experiences of implementing solutions (e.g. food waste reduction, energy management, water efficiency).
- **Team training and cross-functional training**: training within and across teams to enable them to minimise their contribution to environmental hotspots and that equips them to help deliver a range of solutions and interventions – e.g. sustainable procurement approaches, monitoring and measuring resource use (food and beverages, water and energy) as well as eco-design tools and techniques for buildings and rooms.

National-level solutions and interventions:

National-level solutions that have been ranked and grouped based on their likely impact and require either actions led by government policy-makers and/or that call for public or public/private sector investment in national and local infrastructure to address identified hotspots. These national-level solutions should support private sector tourism actions to achieve a more sustainable value chain. They include:

- **Developing / adapting a National GHG / Energy Policy for the tourism sector**: policies on renewable energy and energy efficiency can provide essential context for business action. The Government of the Dominican Republic promotes renewable energy through incentives and tax exemptions under the Renewable Energies Incentives Law 57-07. Examples of other activities in SIDS include the St Lucia Energy Roadmap (2015), which presents a five-year plan of cost-effective energy efficiency programs, renewable energy, and energy storage investments, as well as the necessary regulatory changes to set Saint Lucia on the pathway to meet its energy transition goals.
- **Mandatory and voluntary standards for efficient use of resources and energy in hotels and restaurants**: support the creation of mandatory standards for efficient use of resources and measurement of emissions in all hotels with more than 100 rooms. Voluntary for hotels with 50+ rooms.
- **Policy support for healthy, sustainable food sourcing, purchasing and diets**: the development of dietary guidance that promotes and supports the use of healthy, low-carbon and resource efficient menus in hotels and restaurants to reduce the greenhouse gas emissions (GHG) resulting from sourcing, menu and consumption decisions. A healthy, low-carbon and resource efficient menu minimizes the emissions released from the production, packaging, processing, transport, preparation and waste of food.
- **National food waste strategy**: develop a national food waste strategy in line with UN SDG target 12.3 to halve food loss and waste by 2030, with specific components and targets for the tourism sector, including food waste reduction targets, incentives to

redistribute surplus food to charitable organisations and the provision of food waste recycling infrastructure to enable the production of renewable energy from biogas and compost for use in agriculture. Implementation of the strategy could include a voluntary agreement with the tourism sector; a consumer/tourist focused behaviour change campaign in collaboration with tourism operators, hotels and restaurants; and a national food waste quantification and best practice platform.

- **Enhance legislation and regulation of waste management to optimise waste management and reduce land-based, river and marine pollution**: the role of legislation and better regulation and enforcement in ensuring appropriate collection and management of waste streams was identified in workshops in the Philippines and the Dominican Republic. This could include new targets for food waste prevention.

The summary long list of potential solutions with an accompanying narrative and a table on how these solutions help to address the hotspots identified for the tourism sector in the Dominican Republic can be found in **Section 7** of this report. A full list of business value chain and national-level solutions captured during the November 2017 country workshop can be found in **Annex F** of this report.

1. Introduction

1.1. Background

The project "Transforming Tourism Value Chains in developing countries and Small Island Developing States (SIDS) to accelerate more resilient, resource efficient, low carbon development" has been developed in the framework of the International Climate Initiative financed by the German Federal Ministry for the Environment, Nature conservation, Building and Nuclear Safety. The project proposes to transform tourism activities along three key tourism value chains (accommodation, food & beverage, and meetings/incentives/conferences/events – MICE) in participating countries (the Dominican Republic, the Philippines, Mauritius and St. Lucia), so as to reduce carbon emissions and improve resource efficiency by implementing low carbon development actions integrated with sustainable consumption and production patterns. This four-year project has two phases: an assessment phase (2017/2018) and an implementation phase (2019/2020). The goals of the assessment phase are to define tourism value chains with high resource use and to identify and assess key environmental indicators for greenhouse gas (GHG) emission and resource consumption impacts (presented as 'hotspots') within these chains.

1.2. Purpose

This document is a project report for the Dominican Republic. Its purpose is to support decision making of key stakeholders within the Transforming Tourism Value Chain's project so as to prioritise feasible solutions to reduce GHG emissions and improve resource efficiency (RE) in the target value chains during the project's implementation phase and beyond the project timeline in the Dominican Republic. The document may also be useful for other tourism stakeholders, e.g. destination management and civil society organizations, policy makers and other public-sector bodies that design, develop, regulate or manage tourism destinations.

It has been produced with information collated by local partners[8] in the Dominican Republic, WRAP and with the support of both UN Environment and UDP. The report assesses the accommodation value chain and its impacts at the national level (based on published data). The report also includes an assessment at hotel level to provide background information on GHG emissions levels and resource efficiency in the Dominican Republic. The findings of this report (hotspots) have been discussed during a workshop held in November 2017. Based on the recommendations of this meeting, a long list of potential mitigation solutions has been produced and will evolve to a short list of solutions and interventions through a consultation process with industry and experts to define priority areas for business action and implementation.

Supplementary information and data are contained in the following Annexes:

A. Dominican Republic Country Context Report;

[8] Dominican Republic: Association of Hotels Playa Dorada, Ministry of Environment and el Programa Nacional de Producción Más Limpia.

B. WRAP survey template for the tourism value chain;
C. Dominican Republic Workshop Results Nov 2017;
D. UDP Climate change policy report;
E. Summary table of environmental impact hotspots for the Dominican Republic tourism sector organised by impact category and product life cycle stage; and
F. Long-list of business value chain and national-level solutions and interventions captured during November 2017 country workshops.

1.3. Scope of the report

The scope of the report assesses the accommodation value chain, integrating food and beverage value chain aspects and considerations. This approach has been used as the all-inclusive model is predominant in the Dominican Republic, hence both value chains can be addressed using all-inclusive hotels as a point of entry. The value chain approach to tourism covers all stakeholders involved in delivering a tourism experience in the accommodation service (dining, recreation, leisure, shopping, etc.). The analysis covers all goods and services in the respective value chains and the life cycle impacts created by the international and in-country manufacture, storage, distribution, consumption and disposal of these goods and services. Therefore, tourist travel into the country is excluded, but impacts embedded in imported goods and services are included. This enables a strategic way of identifying and prioritizing critical issues along the chain and facilitates the development of targeted solutions and interventions in order to achieve maximum impact.

The first section of the report (National Context) is an introduction to the Dominican Republic and the three geographical focus areas of the project, to understand the context and scale of the tourism industry.

The remainder of the report focuses on the activities related to the first assessment phase of the project. Firstly, the outcome of the value chain mapping, the agreed boundaries and the selected sustainability indicators. It then details the rationale, methodology and outcome of the national level data and local level hotel assessments conducted over a five-month period. The local assessments serve to understand the structure of the tourism value chain at the company (e.g. hotel) level, such as different types of accommodation, their activities and impact. The report then highlights the quantitative energy and consumables data that was evaluated using tools and models available to UDP and WRAP respectively in order to identify the environmental impact hotspots associated with the tourism sector. This is to provide an initial assessment of the GHG and resource use impacts associated with tourism and range of these impacts, at the company-level. Leading from the national assessment and the pilot activity, a successful workshop was held in November 2017 to validate the identified hotspots, to develop the long-list of solutions and to provide inputs for further prioritization (**Annex C**). The quantitative data collected, supplemented with the qualitative information gained during the workshop, has been detailed in this report. The result is the hotspots identified and the associated long list of potential mitigation options.

Overall this report includes impacts of both domestic and international value chain though imported goods. However, the top-down analysis (which in the end contributed the majority of quantitative data used in the report) did not include imported goods. We therefore conducted a separate analysis of imports and added comments on its significance were relevant.

2. National Context

2.1. Overview

The rapidly expanding growth of tourism arrivals in Dominican Republic and recent research has indicated that tourism's consumption of key resources - energy, water, land and materials (e.g. fossil fuels, minerals, metals, biomass) - is growing commensurately with its generation of solid waste, sewage and greenhouse gas emissions. The current and forecast levels of travel and tourism have considerable environmental and social impacts. Through the Transforming Value Chains project, we seek to prioritise the activities that contribute the most to critical environmental impacts. These activities aim to reduce GHG emissions and improve resource efficiency in key tourism sector value chains with high resource use.

This first section of the report provides an overview of the Tourism Sector in the Dominican Republic to contextualise the scale and dynamics of the tourism industry. A detailed report provided by the Association Playa Dorada is provided in **Annex A** for reference. The national context session of this report provides an overview of the tourism sector covering geographical information, the economic and employment contribution of tourism to the national economy. This is followed by a summary of visitor arrivals, the typical visitor stay and expenditure, an overview of the accommodation sector, and certification schemes present in the Dominican Republic.

2.2. Geography of Dominican Republic and Tourism Sector Overview

The Dominican Republic is located on the eastern side of the island of Hispaniola in the Caribbean. The island of Hispaniola is shared with Haiti, occupying the western end. The Dominican Republic is the second-largest Caribbean nation by area (after Cuba) at 48,445 square kilometres (18,705 sq. mi). It has the third largest population with approximately ten million people, of which approximately three million live in the metropolitan area of Santo Domingo, the capital city.[9,10] The Dominican Republic is a leader in the Caribbean region as a tourist destination. For more than 40 years, it has been developing a "sun, sand and sea" model, focusing on all-inclusive types of accommodation. With occupancy rates at over 75%, the Dominican Republic is experiencing a boom in new hotel development and refurbishment of its existing hotel stock. There are currently 70,000 hotel rooms in the country and the projected pipeline will bring a further 8,000 on stream over the next few years. This highlights

[9] Dominican Republic | Data. data.worldbank.org.

[10] Estimaciones y Proyecciones de la Población Dominicana por Regiones, Provincias, Municipios y Distritos Municipales, 2008.

the importance of solutions in Dominican Republic to mitigate any negative environmental impact caused by the accommodation value chain.

There are approximately 130 hotels in the Dominican Republic of which 59% are large (>200 rooms), 21% are medium (51 – 199 rooms) and 20% are small (<50 rooms). 74% of the hotels are chain owned[11]. Most of the hotel investments are foreign and correspond to large hotel corporations. Much of the investments are in coastal areas, which are highly vulnerable due to the effects of climate change[12]. The average hotel occupancy rate across all hotel types for the Dominican Republic as a whole in 2017 was 77.1%, for the three destinations considered in this report the average occupancy rates in 2017 were as follows: Punta Cana (82.8%), Puerto Plata (64%) and Romana Bayahibe (82%)[13].

Provincia #1	# Establecimientos (Categoria: Hoteles)	% Establecimientos (Categoria: Hoteles)	2017 Habitaciones	2017 Habitaciones (% Total)
Large	114	18.6%	56,469	77.17%
Medium	89	14.5%	8,861	12.11%
Small	405	66.8%	7,841	10.72%
Grand Total	**608**	**100.00%**	**73,171**	**100.00%**

Of the 130 hotels, approximately 30 across all categories hold one or more international certifications related to sustainable tourism. This highlights the high level of awareness on environmental issues and a willingness to address them at a hotel level. Certifications implemented to date include:

2.3. Voluntary Standards and certification

- **Green Globe:** The Green Globe certification is a structured assessment of the sustainability performance of travel and tourism businesses and their supply chain partners. The Green Globe Standard includes 44 core criteria supported by over 380 compliance indicators. The applicable indicators vary by type of certification, geographical area as well as local factors. The Dominican Republic currently has 18 hotels certified with Green Globe. Recognized by Global Sustainable Tourism Council (GSTC).
- **Green Key**: It is an international European certification program currently found in 53 countries, which certifies improvement processes in the environmental management

[11] **Source:** http://www.asonahores.com/dir-de-hoteles/directorio-de-hoteles/2014/6/directorio-de-hoteles.aspx

[12] **Source:** Final Report of Critical Points for Vulnerability and Climate Change in the Dominican Republic and its Adaptation to it. USAID-IDDI, TNC.

[13] **Source:** DR Central Bank: http://www.bancentral.gov.do/estadisticas_economicas/turismo/

of hotels, campsites and other hotel establishments around the world. Green Key covers 13 core criteria areas. The Dominican Republic currently has six hotels certified with Green Key[14].

- **Rainforest Alliance:** A certification for hotels, tour operators and other tourism companies that helps them to improve their environmental, social and economic practices. The Dominican Republic currently has seven hotels certified with the Rainforest Alliance[15].
- **Blue Flag:** It is a recognition that is regularly awarded to the beaches and marinas that have complied with the rules and requirements of the Blue Flag in the Dominican Republic, there are currently 30 beaches with this recognition. In the Dominican Republic, there are currently 30 beaches with Blue Flag certification.
- **Travelife:** It is a certification created by tour operators to improve sustainability of both tour operators, travel agencies, and hotels worldwide. It integrates both management and performance criteria. The standard has a range of sustainability criteria (based on GSTC) and Corporate Social Responsibility (ISO 26000) themes and issues. The Dominican Republic currently has 16 hotels certified with Travelife[16].

In 2016, the Dominican Republic played host to 5.9 million tourists of which 86% were foreign visitors. The total number of tourists and visitors arriving in the Dominican Republic has risen by 1.2 million since 2013[17]. 88% of foreign visitors arrive by air with the remaining 12% arriving by cruise ship[18]. According to the WTTC in 2016, travel and tourism contributed 15.9% of employment and 17.3% of GDP, including direct and indirect contributions. Direct contributions to employment and GDP were 4.8% and 5.4% respectively. Whilst direct and indirect employment is forecast to rise by 2.6% per year until 2027[1], direct and indirect GDP is forecast to rise by 3.2% per year until 2027[19].

The largest contribution of visitors originate from the United States, accounting for around 18.5% of visitor arrivals[20]. The typical tourist demography is composed of families of four members and couples. Tourism in the Dominican Republic is based on a 'sun and sea' model with leisure travel responsible for 90% of visitor arrivals. In 2016, the length of the average tourist stay was 8.5 nights and average visitor expenditure is 130.66 US$ per night[21]. This is higher than the Caribbean average stay, estimated at 7.3 nights in 2014.

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14 **Source:** http://www.greenkey.global/green-key-sites/

15 **Source:** https://www.rainforest-alliance.org/green-vacations

16 **Source:** http://travelifecollection.com/home

17 DR Central Bank https://www.bancentral.gov.do/estadisticas_economicas/turismo/

18 https://www.bancentral.gov.do/estadisticas_economicas/turismo/

19 **Source:** https://www.wttc.org/-/media/files/reports/economic-impact-research/countries-2017/dominicanrepublic2017.pdf

20 **Source:** Dominican Republic Ministry of Environment, Water Footprint Study in Playa Dorada, Puerto Plata (2011).

21 Within the Dominican Republic 94% of energy produced for consumption comes from the burning of fossil fuels (coal, oil, and gas) (Source: SENI – Sistema Eléctrico Nacional Interconectado (National Interconnected Electrical System: http://www.cne.gob.do/estadisticas-energeticas/ and http://www.sie.gob.do/#. Fossil fuels are imported from countries such as Venezuela and Mexico.

The government has set a target to receive 10 million tourists by 2020, which would almost double the actual number of arrivals. By 2027, international tourist arrivals are forecast to total 8,778,000. To support this predicted planned growth investment in the Travel & Tourism industry is forecast to rise by 4.6% per year till 2027[22]. This growth presents a challenge for the tourism industry to do so, while reducing GHG emissions and improving resource efficiency.

2.4. Climate change- policy summary

Most investment in tourism is in coastal areas, which are highly vulnerable due to the effects of climate change (erosion of beaches, hurricanes, destruction of marine ecosystems, and salinization of coastal aquifers, among others). Key findings from a recent US AID report suggest sea-level rise will likely exacerbate coastal flooding and beach erosion. Secondly, it stated that the intensity of tropical storms and their accompanying precipitation will increase as ocean and global temperatures continue to rise. Combined with environmental degradation, tropical storm damage will worsen[23]. For this reason, the Ministry of Tourism is seeking plans for diversification that provide greater resilience of the sector. The plans propose alternatives to the current sun, sand and sea tourism model. Proposals for health tourism, adventure, ecotourism, rural tourism, among others have been put forward.

The highest governmental body in charge of climate change policy and strategy in the Dominican Republic is the National Council for Climate Change and the Clean Development Mechanism (Consejo Nacional para el Cambio Climático y el Mecanismo de Desarrollo Limpio - CNCCMDL). The CNCCMDL was established by presidential decree in 2008 (Decree No. 601-089)[24] with the aim to coordinate and join the efforts from the different institutions that integrate the key development sectors of the country to address the global problem of climate change. The CNCCMDL is chaired by the president of the Dominican Republic and is composed of representatives from the Ministry of Environment and Natural Resources, the Ministry of Economy, Planning and Development, the Ministry of Agriculture, the Ministry of Foreign Affairs, the Ministry of Finance, the Ministry of Industry and Commerce, the Ministry of Public Health and Social Assistance as well as from the Central Bank of the Dominican Republic, the National Energy Commission, the Transport Reform Office, Superintendence of Electricity, the Association of Industries of the Dominican Republic, the National Council of the Private Enterprise and civil society organisations.

Although the Dominican Republic does not have a climate change strategy for the tourism sector specifically, most of the strategic documents relative to climate change consider tourism as a key sector for climate change adaptation and/or mitigation. In the same way, the existing legal and regulatory framework related to climate change refers many times to the

[22] **Source:** http://www.lifecycleinitiative.org/new-hotspots-analysis-methodological-framework-and-guidance/

[23] Final Report of Critical Points for Vulnerability and Climate Change in the Dominican Republic and its Adaptation to it. USAID-IDDI, TNC.

[24] https://ccclimatico.files.wordpress.com/2016/02/dec-no-601-08.pdf

tourism sector, where links are made between the sector and the adaptation or mitigation to climate change. The Climate Compatible Development Plan (CCDP) of the Dominican Republic can be considered as the core document describing the vision and plan of the country in terms of low-emission economic growth. The document identifies tourism as a key and strategic sector of the country´s economy and one of the "quick wins" sectors for implementing mitigation actions together with the cement and waste sectors. It also states that by 2030, the tourism sector can reduce its annual emissions by 35% relative to the BAU scenario. Further detail on these strategic documents can be found in UDP's Policy Analysis Report at **Annex C** to this report. It is clear that the Government of the Dominican Republic considers the tourism sector as a strategic sector for both adaptation and climate change mitigation. This context provides a good basis for considering addressing the key GHG hotspots in the remainder of this report.

The Dominican Republic has set an ambitious target to get 10% of its electricity supply from renewable sources (including large hydro) by 2015, rising to 25% by 2020. As of December 2016, 13% of the nation's total 14.7TWh came from clean energy generation[25]. The country continues to experience frequent electrical outages that can last from several minutes to several days; nevertheless, the DR is poised for an energy transformation. Many renewal energy projects are taking place and could be collaborating within the scope of this project.

The Dominican Republic submitted its Intended Nationally Determined Contribution (INDC) in August 2015; and ratified the UNFCCC Paris Agreement in September 2017. Together with its instrument of ratification, the Dominican Republic submitted its first Nationally Determined Contribution (NDC) (whose content is similar to that of the INDC). The NDC of a country sets out its efforts to combat climate change, including its mitigation goals and its national contribution to global mitigation efforts. At the national level, NDCs will be implemented through individual policies and measures, which countries are now in the process of designing. The mitigation goal established by the Dominican Republic in its NDC is expressed as a "Reduction of 25% of base year emissions by 2030", the base year being 2010, with national emissions estimated at 3.6tCO_2e per capita. The NDC also identifies adaptation as a constitutional priority for the country. The document does not identify any specific mitigation or adaptation actions but specifies that the NDC planning processes will be based on the National Development Strategy, the National Policy on Climate Change, the Climate Compatible Development Plan, and the National Adaptation Plan of Action (NAPA-DR).

2.5. National focus areas

In the Dominican Republic, the project is working with three tourist destinations: Puerto Plata Province, Romana-Bayahibe and Punta Cana (La Altagracia Province). The following section outlines a high-level summary of the context of each of these locations. Data was collected during field visits to 16 hotels located in the tourist destinations of Puerto Plata (7), Punta Cana (6) and Bayahibe (3), Information was obtained on the operations of each hotel and their performance in the consumption of natural resources. Hotel selection criteria were defined by hotel size (more than 120 rooms), and engagement with voluntary labels and standards. A

[25] **Source:** https://www.export.gov/article?id=Dominican-Republic-Renewable-Energy

sample of hotels locally owned and operating traditionally in the country were included to verify distinctions with the traditional 'all-inclusive models'.

2.5.1. Puerto Plata

Puerto Plata is located on the Atlantic coast of the island and its tourism development was one of the first in the country starting in the 70's. In Puerto Plata, the tourist model of "sun, sand and sea" was developed under the "all inclusive" concept. **Annex A** (pages 13-25) provides a detailed discussion of the tourism industry in Puerto Plata.

Based on airport arrivals Puerto Plata received less than 400,000 visitors in 2013, a significant decline from nearly 900,000 in 2000. Most of the hotels in Puerto Plata belong to foreign hotel chains that decided to invest in this tourist destination. 86% of which have at least one environmental certification. Puerto Plata currently has 12,576 rooms available, which represents 16.7% of the national total. Following a similar decline to tourist arrivals the number of rooms has been in decline 2006. Occupancy rates have seen a similar decline from roughly 80% in 2006 to under 64% in 2017. These declines are largely attributed to environmental and social deterioration. Following this decline in the industry the Dominican Republic has made significant investments in the destination to motivate new investments, including the new cruise ship Port of Amber Cove. Since 2013, the tourist arrivals have stabilised and have even started to increase again. Seven hotels with total capacity of 2,455 rooms were selected for study. Two hotels have Green Globe certification; one hotel has been certified by Green Key; and the remaining four have no certification. Seven hotels participated in the survey.

Resource use & waste management

A summary of the resource use and management in Puerto Plata is described in this section. More detailed analysis is provided in the appended country context report at **Annex A**. Management of *solid waste* in Puerto Plata is provided through an open landfill that, managed by the city council, is located just at the entrance of the tourist destination. The tourism sector of Puerto Plata has an aqueduct that supplies water, especially for hotels. A 2011 water footprint study conducted by the Ministry of Environment found that:

- A guest demands about three times as much water as an average Dominican
- That 50% of the vegetables produced in the country are consumed by the hotel sector
- The tourism sector exerts the greatest pressure for groundwater extraction (especially in the Eastern Region)

There is no public wastewater treatment plant in the province. Solutions, in general, especially residential, are handled via septic tanks. In the case of the tourism sector, environmental regulations must be complied with. Private waste water treatment companies take on the management of waste water from the resorts. The treated waters once treated are injected into the sea. Energy to the hotel sector in Puerto Plata is provided by either Puerto Plata Electricidad (a private company) and EDENORTE (a public company under private management). The country continues to experience frequent electrical outages that can last

from several minutes to several days. Some hotels have their own energy generation stations to mitigate against the risk of energy outages.

2.5.2. Romana-Bayahibe

Romana-Bayahibe includes the territory formed by Santo Domingo, La Caleta, Boca Chica, Juan Dolio, San Pedro de Macorís to the Río Higuamo and La Romana. It is a destination of sun, sand and sea, although it is also an important ecological and cultural area given its proximity to the Cotubanamá National Park, where there is a rich biodiversity and an important cultural legacy of the Taino Indians. Annex 1 (pages 26-38) provides a detailed discussion of the tourism industry in Romana-Bayahibe. The destination has a small international airport mostly with charter and seasonal flights that caters for 7% of the international travellers in the Dominican Republic. Romana-Bayahibe also has a cruise ship port that was built in the 1950's.

The combined hotel offer in Romana-Bayahibe is made up of 7 large hotels providing around 6,000 rooms, however, the tourist destination had an occupancy rate of 84.9% in 2017, one of the highest occupancy levels in the Dominican Republic. Three hotels were selected for the field work element with a combined room total of 2,131. One hotel has Green Key certification, one hotel has been certified by the Rainforest Alliance; and the remaining hotel has no environmental certification. Three hotels participated in the survey.

Resource-use & Waste Management

A summary of the resource use and management in Romana-Bayahibe is described in this section. More detailed analysis is provided in the appended country context report at **Annex A**. Solid waste in Romana-Bayahibe is destined for a landfill site administered by the municipality. It does not have an environmental permit and has been operating for nine years. Four municipalities use this landfill to dispose of their waste. It receives domestic, industrial, hospital waste, dead animals, radioactive and agricultural waste. The aquifers located in Cotubanama National Park supply drinking water to both the tourist sector and communities of Bayahibe. The aqueducts are supervised by the National Institute of Aqueducts and Drinking Water (INAPA). There is no public wastewater treatment plant operating in Romana-Bayahibe. Wastewater is generally handled via septic tanks. In the case of the tourism sector, resorts have opted for individual solutions, each with its own treatment plants to guarantee the proper management of wastewater. Punta Cana-Macao Energy Council (CEPM) provides energy to the entire eastern zone of the country. The concession for the provision of electricity in the entire eastern zone of the country has been awarded to CEPM (Punta Cana-Macao Energy Council), who provide electricity to residents, hotels and restaurants in Romana-Bayahibe.

2.5.3. Punta Cana

Punta Cana is in the eastern region of the country and is the most important tourist destination in the Dominican Republic. Currently, this destination receives more than 63% of

tourists arriving in the Dominican Republic and represents the greatest demand for goods and services by population. Punta Cana is the third city in the country offering financial services, the third in energy consumption and sale of vehicles, and contributes more than 12% to the Gross Domestic Product of the country. **Annex A** (pages 39-53) provides a detailed discussion of the tourism industry in Punta Cana.

The destination has the only private airport in the country, Punta Cana International Airport (PUJ), which is the best-connected airport in the Caribbean and Central America, with flights from 26 countries. For several years, it has been leading tourist arrivals in the country, representing 66.9% of arrivals until May 2017. The number of visitors in 2017 reached 1,606,009, equivalent to a growth of 9.0% over the same period in 2016. Punta Cana offers 51% of the accommodation offered in the country and has 75 first class hotels, most of them 5 stars, with a capacity of 36,614 rooms. The average occupancy rate in 2017 was 82.8%[26]. 6 hotels were selected for the fieldwork element with a combined room total of 2,613. One hotel has Green Globe and Rainforest Alliance certifications, two hotels have been certified by the Rainforest Alliance and four hotels have no environmental certification. Five hotels participated in the survey.

Resource-use & Waste Management

A summary of the resource use and management in Punta Cana is described in this section. More detailed analysis is provided in the appended country context report at **Annex A**. Solid waste in Punta Cana is sent to a landfill site regulated by the City Council of Verón. However, as its capacity is insufficient, unregulated landfills have emerged. There is no central water supply in the region. In the tourism sector each hotel has its own well. The wells are operated without control or supervision[27]. There is no public wastewater treatment plant. In general wastewater is handled via septic tanks. In the case of the tourism sector, resorts have opted for individual solutions, each with its own treatment plants that guarantee the proper management of these waters. In general, they reuse waste water in the irrigation of the gardens and golf courses. Punta Cana-Macao Energy Council (CEPM) provides energy to the entire eastern zone of the country.

3. General Methodology on Mapping of Tourism Value Chains, Hotspots Analysis, Data Collection and Processing

3.1. Concepts and Definitions

This project and report have followed the Life Cycle Initiative 2017 overarching methodological framework for **hotspots analysis[28]**.

[26] http://www.bancentral.gov.do/estadisticas_economicas/turismo/

[27] Water Footprint Study in Playa Dorada, Puerto Plata. Ministry of the Environment 2011

[28] **Source:** http://www.lifecycleinitiative.org/new-hotspots-analysis-methodological-framework-and-guidance/

This allows for the rapid assimilation and analysis of a range of information sources, including life-cycle based and market information, scientific research, expert opinion and stakeholder concerns. The outputs from this analysis can then be used to identify potential solutions and prioritize actions around the most significant governance, economic, environmental and/or social sustainability impacts or benefits associated with a specific country, city, industry sector, lifestyle, product portfolio, product category or individual product or service.

The Life Cycle Initiative (2017) identifies that hotspots may be defined in two ways. Firstly, a hotspot may be a life cycle stage (such as material sourcing, processing, manufacturing, transport, retail, use and disposal) whose contribution to the impact category (such as global warming potential) is greater than even distribution of that impact across the life cycle stages. For example, if five life cycle stages are defined, a hotspot should be at least 20% of the impact category. Secondly, hotspots may be all life cycle stages collectively contributing more than 50% to any impact category, ensuring that most of the impact is considered. In this project, the second approach is taken to ensure that the impact of data uncertainty on addressing hotspots is minimised.

Hotspots analysis comprises 8 stages, as illustrated in **Figure 1** below.

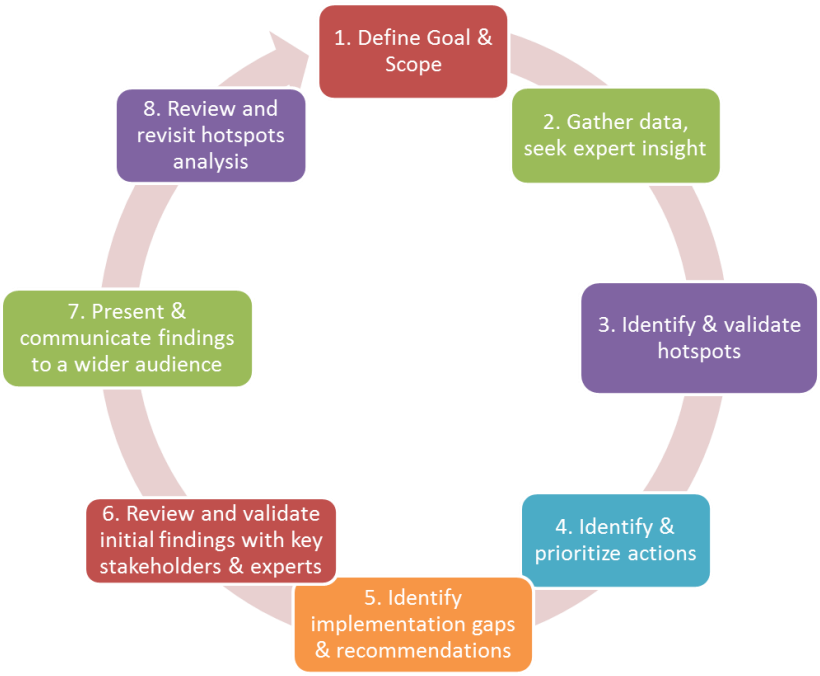


Figure 1: 8 Stages of Hotspots Analysis

The goal and scope for the hotspots analysis are established in the introductory section of this report. The remainder of this report goes through to step 7 of the hotspots analysis framework. Step 8 of the framework was undertaken during a workshop in the Dominican Republic in May 2018.

The project has adopted the value chain definition contained in the second committee draft of ISO14001: “the entire sequence of activities or parties that provide or receive value in the form of products or services (e.g. suppliers, outsources workers, contractors, investors, R&D,

customers, consumers, members)"[29]. **Figure 2** below further illustrates this definition noting how there are stakeholders that are not necessarily part of the supply chain, but that perceive social, economic and environmental value and impacts from the series of activities required to deliver a product or service.

Mapping and managing value chain is all about extending line of sight and influence beyond the traditional areas of focus and looking to limit risk and add value at each stage. It looks both upstream to the suppliers and materials, and downstream to the customers and reuse/disposal, to identify key risks and opportunities for business.

Figure 2: The difference between supply chain and value chain

Clear boundaries are essential to ensure that appropriate information is obtained and used within the analysis. Whereas a supply chain includes the activities of all parties involved in fulfilling a customer request, such as a product or service, a value chain also includes the customer themselves and the impact of subsequent waste.

3.2. Value chain mapping

A value chain approach is based on a comprehensive look at the entire commodity chain, from all involved producers to end market consumers to end of life management. Inherent to the value chain approach is acknowledging that there are other stakeholders in the chain and that they are interrelated[30].

A value chain approach will provide the 'big picture' that should guide the activities to be taken within the value chain based on the identification of hotspots, threats, and

[29] ISO14001 CD2, 2013, in UNEP and UDP (2017) Eco-Innovation Manual http://unep.ecoinnovation.org/
[30] **Source:** https://www.ifad.org/documents/10180/43d9cf7a-e86c-47e9-a7b3-906e0b1be055

opportunities. It will help decide where partnerships need to be established, what type of collaboration is required from stakeholders, identify clients to target with services, or what changes are required to meet clients' expectations.

Within this project, the value chain mapping has been developed in consultation with key local partners and stakeholders. This development comprised an analysis of the structure and description of the key components of the tourism value chain, based mainly on national statistics for the country, and primary data collection. A desk-based analysis of the sector and policy environment were also undertaken to identify key actors to attend the workshop to support amending and improving the value chain maps. In the first workshop held in 2017, WRAP held interactive sessions to gain key insights from stakeholders in the tourism value chain in Dominican Republic. WRAP supported stakeholders in identifying key areas creating environmental hotspots in the tourism sector and in understanding the causes of the hotspots identified. The second workshop in Dominican Republic held in November 2017, built on the interactive sessions in the first workshop to further map out key value chains. The value chains under consideration in the workshop were those with the highest contributions to greenhouse gas impacts, water and energy consumption (including on-site waste). This built on workshop 1 which focused on greenhouse gas emissions. Ten specific value chain maps were provided to stakeholders (for example, electricity and gas, meat products). Then, delegates were encouraged to review the value chains and hotspots identified within these chains. Further information gathered in these workshops is detailed throughout the remainder of the value chain and hotspots analysis.

The value chain map for tourism in the Dominican Republic is shown in **Figure 3** below. This identifies the activities and actors involved in the provision of tourism services all of which are within the scope of the project. Expenditure by hotels and restaurants across the value chain in the Dominican Republic is shown in **Figure 4**; and value chain actors able to control or influence environmental hotspots are shown in **Figure 5**. In addition, **Table 2** provides supplementary information to help identify those value chain actors involved in the distribution of food and beverage products to hotels and restaurants in the Dominican Republic.

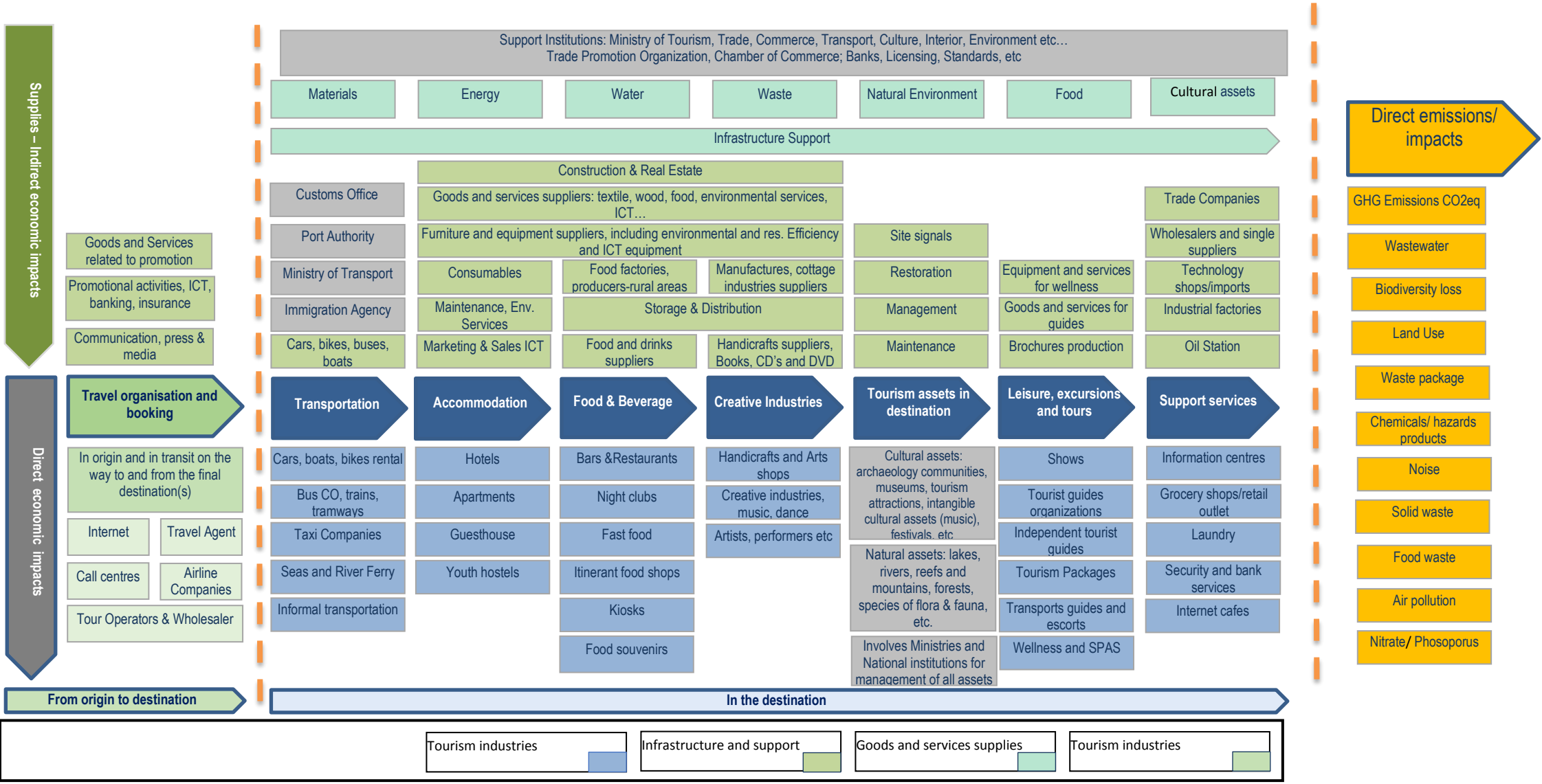


Figure 3: Value chain map for tourism in the Dominican Republic. Adapted by UN Environment from ITC WTO (2015)

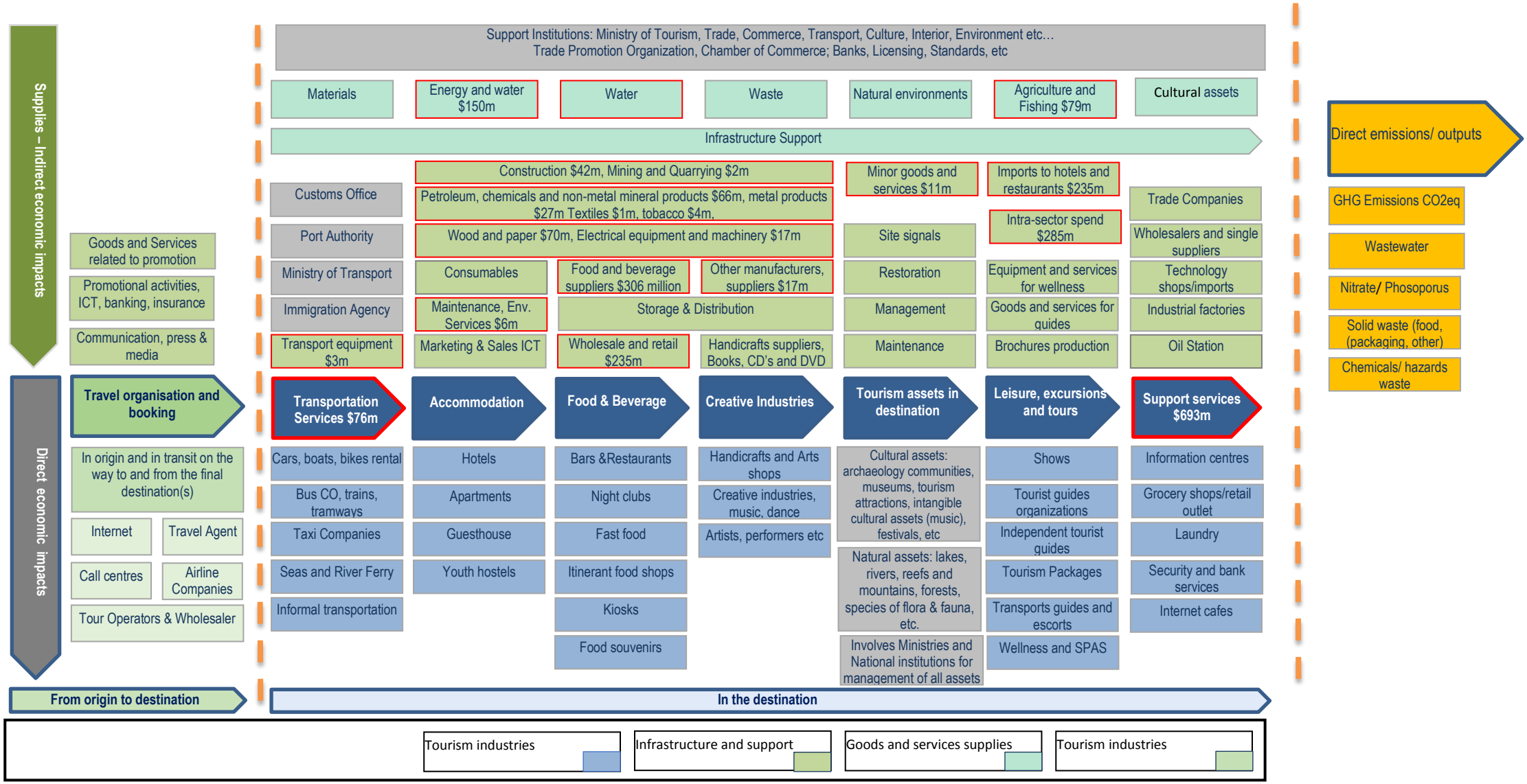


Figure 4: Expenditure by hotels and restaurants across the Dominican Republic tourism value chain, 2013 (**Source:** Lenzen et al 2012, 2013).

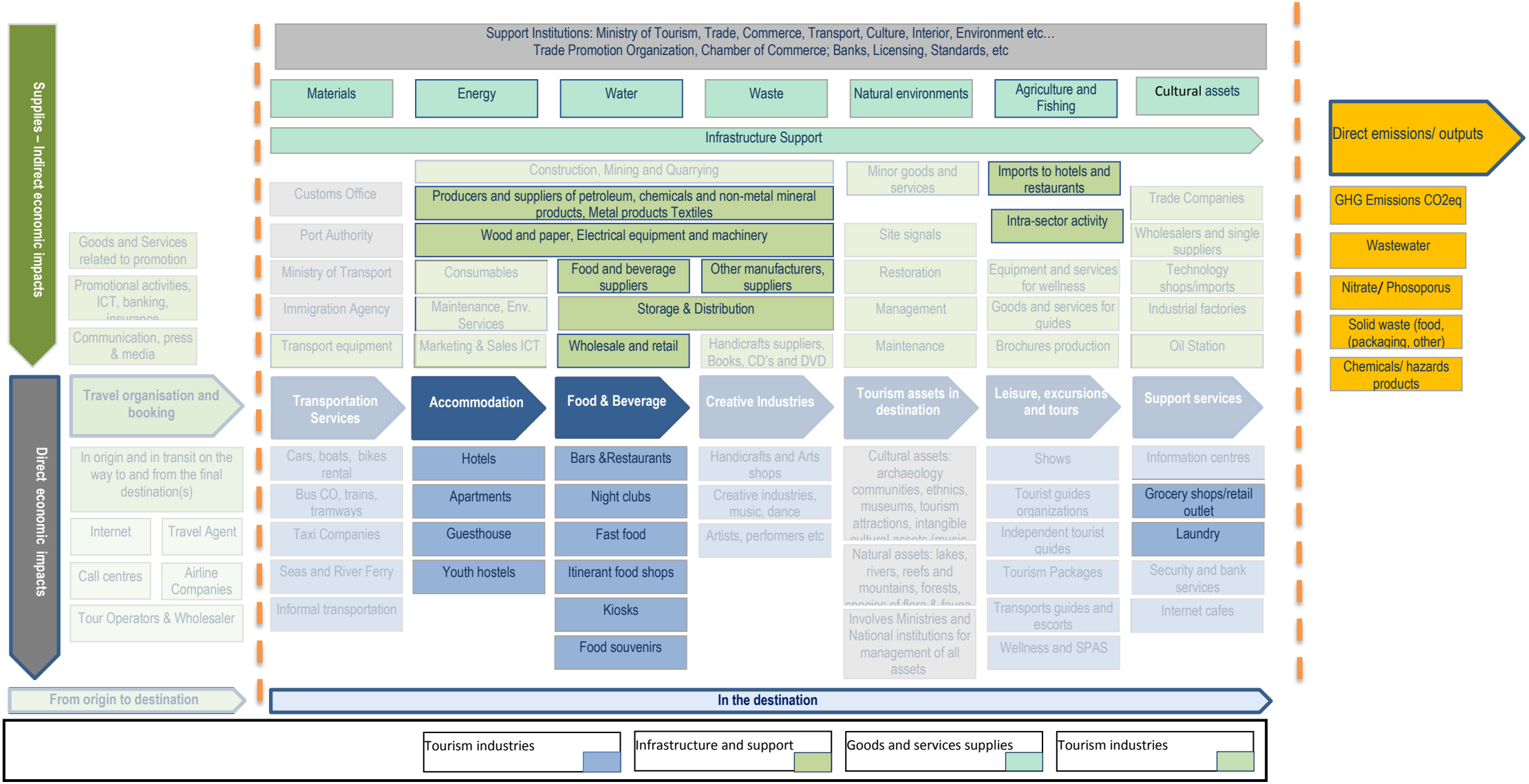


Figure 5: Value Chain actors able to control / influence environmental hotspots

3.2.1. Food and Beverage

The Dominican Republic has a strong and dynamic tourism industry, which generates a large demand for agri-food products of many kinds, both locally-produced and imported. The National Hotels and Restaurants Association (ASONAHORES), estimates the annual consumption of food and beverages by the tourism industry at over US$500 million in 2015, and this is expected to keep increasing with more hotels being built. The tourism industry is expected to continue to offer opportunities for international suppliers of products such as prime cuts of beef and pork, fish & seafood, fruits, beverages, and dairy products among others. There are several well-established institutional suppliers that serve hotels and restaurants, functioning as the main distribution channel to reach the hospitality industry.

The major players in the distribution of food and beverage products in the Dominican Republic are presented in **Table 2** below. These are key actors within the value chain this project will need to engage when addressing the key food and beverage-related hotspots identified in **Table 4** and **Table 5**[31].

Market channel	Name of retailer/wholesaler
Supermarket and hypermarket chains (number of stores)	GRUPO RAMOS: Multicentro (25), Supermercados Pola (7); CENTRO CUESTA NACIONAL: Supermercados Nacional (14); JUMBO (12); Supermercados La Cadena (9); Plaza Lama(8); Supermercados Bravo (7); PriceSmart (3); Carrefour (1)
Wholesalers and distributors	Almacenes León; Anacaona & Lonjeff; Alvarez & Sanchez; Alpa Import; Almacenes Continente; Grupo Mejia Arcala
Hotel and restaurant suppliers (meats, fish and seafood)	Frigorificos Bahía; Congelados del Caribe; EAZ Foods; Mopax Caribbean Imports; Petro Antillana
Alcoholic beverages importers	El Catador; Hiper Marcas; Vinos, S.A.;Pastoriza C x A; Importadora Villalba; Punto & Corcho; Manuel Gonzalez Cuesta; Alvarez & Sanchez; Bodegas Julian Barcelo e Hijo

Table 2: Main actors in the food and beverage supply chain

[31] Government of Canada, Agriculture and Agri-Food Canada, Agri-Food Sector Profile - Dominican Republic, May 2016. http://www.agr.gc.ca/eng/industry-markets-and-trade/international-agri-food-market-intelligence/latin-america-and-the-caribbean/market-intelligence/agri-food-sector-profile-dominican-republic/?id=1485956370308s

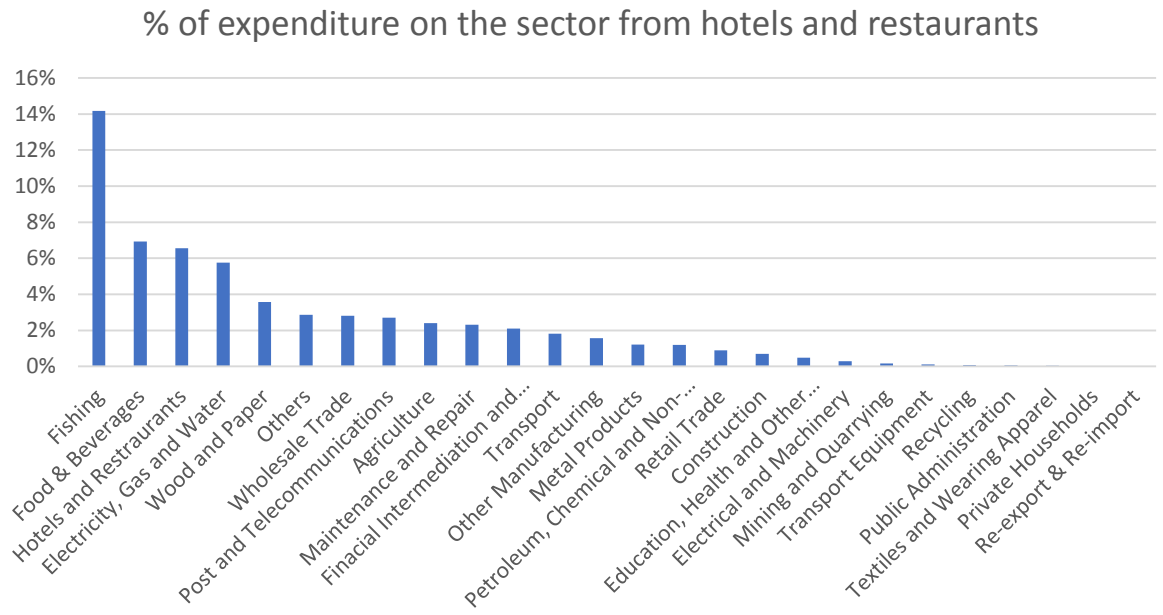


Figure 6: proportion of income to a sector from hotels and restaurants (**Source:** Lenzen et al 2013).

Figure 6 above shows the proportion of income to a sector from hotels and restaurants. This shows that hotels and restaurants account for 14% of income for the fishing sector, and 7% for the food and beverages sector. This suggests that the sector is a relatively significant customer in these sectors and may therefore have a strong degree of potential influence on practices which relate to hotspots through collective activity.

3.2.2. Power Generation, Energy Supply and Use

In terms of the energy mix and infrastructure in the Dominican Republic, it is important to understand the national and local context in the three project areas, in order to inform the future implementation phase of the project. Within the Dominican Republic, 94% of energy produced for consumption comes from the burning of fossil fuels (coal, oil, and gas)[32]. Fossil fuels are imported from countries such as Venezuela and Mexico. There are three energy distribution companies in the Dominican Republic. The government owns two of these: EdeNorte and EdeSur. The government also controls 50% of the third, EdeEste (the other 50% belongs to Trust Company of the West (TCW), operated by AES Corporation, its original buyer). All three companies serve a similar market share.

Puerto Plata has two public energy generating services: Puerto Plata Electricidad (PPE, a private company) and EDENORTE (public company under private management). Most hotels use the services of the second, although two of the hotels interviewed uses PPE. The price of energy in Puerto Plata is high and revolves, for the hotel sector, at around 0.20 U$/kw-0.26U$/kw. Overall, energy makes up one of the highest percentages of a hotel's total costs.

[32] SENI – Sistema Eléctrico Nacional Interconectado (National Interconnected Electrical System). http://www.cne.gob.do/estadisticas-energeticas/ and http://www.sie.gob.do/#

To better understand the energy consumption practices of the hotels, the in-country partners conducted a survey as detailed below. Of the seven hotels surveyed (representing 24% of room availability) most of the hotels interviewed use EDENORTE services (71%) and the rest use the Puerto Plata Electricity system (29%). All have their own power generation systems in case of emergency or failures of the public system.

In Romana-Bayahibe the concession for the provision of electric energy in the entire eastern zone of the country is CEPM (Punta Cana-Macao Energy Council). The kilowatt hour costs for residential and commercial customers of this company is US $ 0.26/kw, while the rate for the hotel sector that supplies energy is around US $ 0.20/kw. The three hotels surveyed in this specific area, representing 43% of the total room availability in the destination, use CEPM energy services.

The Punta Cana-Macao Energy Consortium (CEPM) is a private company in the Dominican Republic's electricity sector that generates, transmits, distributes and markets energy exclusively in the Punta Cana- Bávaro and Bayahibe tourist area, with an available capacity of over of 198.95 MW. Throughout 612.8 kilometres of high, medium and low voltage transmission lines, the company has provided energy to 60% of the national tourist sector - over 40.000 rooms - for two decades. All hotels have their own power generation systems in case of emergency or failures of the public system, but the CEPM system is very efficient and they rarely have to use their own electricity back-up generation. In Punta Cana, CEPM (Punta Cana-Macao Energy Council) has the concession for the provision of electric energy in the entire eastern zone of the country. Their listed price per kilowatt hour for residential and commercial customers is US $ 0.26/kw, while the tariff for the hotel sector is around US $ 0.20/kw.

The six hotels surveyed in Punta Cana, representing 11% of total room availability in the destination, all use CEPM energy services[33], two use the service of the “puntacana energy service” [34] and the last one “cap cana caribe energy service” [35]. Though rarely needed, all surveyed hotels possess an independent power generation system for cases of emergency or failure of the public system.

[33] The Punta Cana-Macao Energy Consortium (CEPM) is a private company in the Dominican Republic's electricity sector that generates, transmits, distributes and markets energy exclusively in the Punta Cana-Bávaro and Bayahibe tourist area, with an available capacity of over of 198.95 MW. Throughout 612.8 kilometers of high, medium and low voltage transmission lines, the company provides energy to 60% of the national tourist sector - over 40 thousand rooms - for two decades.

[34] The Puntacana S.A. Group offers a wide range of services to its hotels, its airport, the owners and residents of this destination, as well as other companies in the area. These services include electricity from their power plant.

[35] Cap Cana Caribe is the company that exclusively supplies energy to the entire tourist and real estate resort of Cap Cana, which houses one of the hotels interviewed.

4. Identification of Hotspots

4.1. Introduction

This section provides information on the methodologies and processes used to collect data to inform the hotspots analysis for the tourism sector value chains in the Dominican Republic. It starts by providing a summary of the two approaches taken, the methodologies used and key findings from each. This is followed by a short discussion of the inherent data limitations in both approaches and how using both approaches can help to provide a more well-rounded view of hotspots. Finally, an analysis of imported food and beverage products to help sense-check their significance and any implications for the hotspots analysis.

Two approaches have been combined to gather data and identify hotspots. The first approach has been to gather data at a national level (top-down approach) relevant to the goal and scope of the study, and the second to collect data from individual organisations in three tourism destinations in the Dominican Republic (bottom-up approach).

The top-down approach offers a rapid way of approximating the greenhouse gas emissions, energy use and water footprint associated with the tourism value chain using national statistics collated in a consistent manner. The bottom-up approach gathers data through a survey of individual hotels to identify data at a greater degree of resolution and compare this to the national data. Where common themes are identified, this gives greater confidence in the results of the hotspots analysis.

The two approaches, how they have been used and the findings from each are included in the following sections of the report.

4.2. Top-down Approach and Results

The top down approach builds on the work of Lenzen et al [36]. The Eora multi-region input-output table (MRIO) database provides a time series of Input Output tables with matching environmental and social satellite accounts for over 180 countries. Input Output tables provide data regarding the economic spending of sectors within an economy in other sectors, and the economic output that results. In short, these tables can tell us how much is spent in all sectors of the economy (inputs) to produce one US$ of value in a given sector (output). Using this data, we can calculate the cascade effect of spending within an economy. For example, $1 spent in the electricity sector requires the electricity sector to spend a given fraction of a dollar on fuels and so on.

Where the total environmental impact of a sector and its total economic output for a given year are known, the environmental impact per dollar of economic output for each sector can be calculated. At a high level, this allows the direct and indirect environmental impact of spending in a given sector

[36] Lenzen, M., Kanemoto, K., Moran, D., Geschke, A. Mapping the Structure of the World Economy (2012). Env. Sci. Tech. 46(15) pp 8374-8381. DOI:10.1021/es300171x
Lenzen, M., Moran, D., Kanemoto, K., Geschke, A. (2013) Building Eora: A Global Multi-regional Input-Output Database at High Country and Sector Reso lution, Economic Systems Research, 25:1, 20-49, DOI:10.1080/09535314.2013.769 938

to be calculated. The raw data is drawn from the UN's System of National Accounts and COMTRADE databases, Eurostat, IDE/JETRO, and numerous national agencies. By mapping the economic interactions of hotels and restaurants with other sectors of the economy, the impact incurred through expenditure by hotels and restaurants can be identified and quantified.

A top down approach has a number of strengths and weaknesses. By capturing all of the data from a sector (e.g. food and drink manufacturing), a top-down approach allows a comprehensive view of the impacts of a system. However, it is constrained by the availability of data in a suitable format. For example, data may be available for the sector "accommodation", or for "accommodation and restaurants", which will lead to results that cannot be used to separately benchmark the impacts of these two sectors of a tourism value chain with those in other countries where the data is available for both sectors separately. Inferences and assumptions are also required to sub-divide activities (e.g. imports) to identify the relevant emissions. The top down approach does not include product specific information; therefore, it needs to be complemented by the bottom-up approach, for a detailed accounting of the environmental impacts at the product and activity level.

This top-down data available for hotels and restaurants in the Dominican Republic allows for modelling of their environmental impacts through their value chains. The expenditure by hotels is quantified in **Figure 4**: **Expenditure by hotels and restaurants across the Dominican Republic tourism value chain, 2013 (**Source: **Lenzen et al 2012, 2013).** above, with the names of different sectors in the value chain modified in line with national data sources. Significant areas of expenditure are outlined in red. Imports procured directly by hotels are also shown separately, and this is discussed further in the section on data limitations. The analysis of expenditure suggests that imports, support services, energy and food and beverage products are key elements in the value chain. **Figure 7** translates this expenditure into environmental impact, showing greenhouse gas emissions and water footprint.

Figure 7 below shows that the greatest contributors to greenhouse gas emissions related to hotels are from electricity and gas, food and beverages, agriculture and transport. When considering the water footprint, food crops and beverages are the dominant causes of demand. This is due to the amount of water required in agriculture to produce crops. On both graphs 'hotels and restaurants' appear as a source of impact due to the expenditures within the sector (i.e. hotels and restaurants purchasing services from other hotels and restaurants). Translating economic expenditure into environmental impact demonstrates that expenditure is not a proxy for impact and should not be used as a basis for action to reduce the environmental impacts of tourism value chains. It also shows that the results can vary depending on the environmental issue under analysis.

No national-level data is available to allow hotels and restaurants to be divided in the Dominican Republic. However, if the distribution of spending for a hotel is known, the same approach can be used to calculate the hotel-specific hotspots. This underlines the importance of taking both a top-down approach to obtain rapid results, and a bottom-up approach to validate the findings at a finer level of detail.

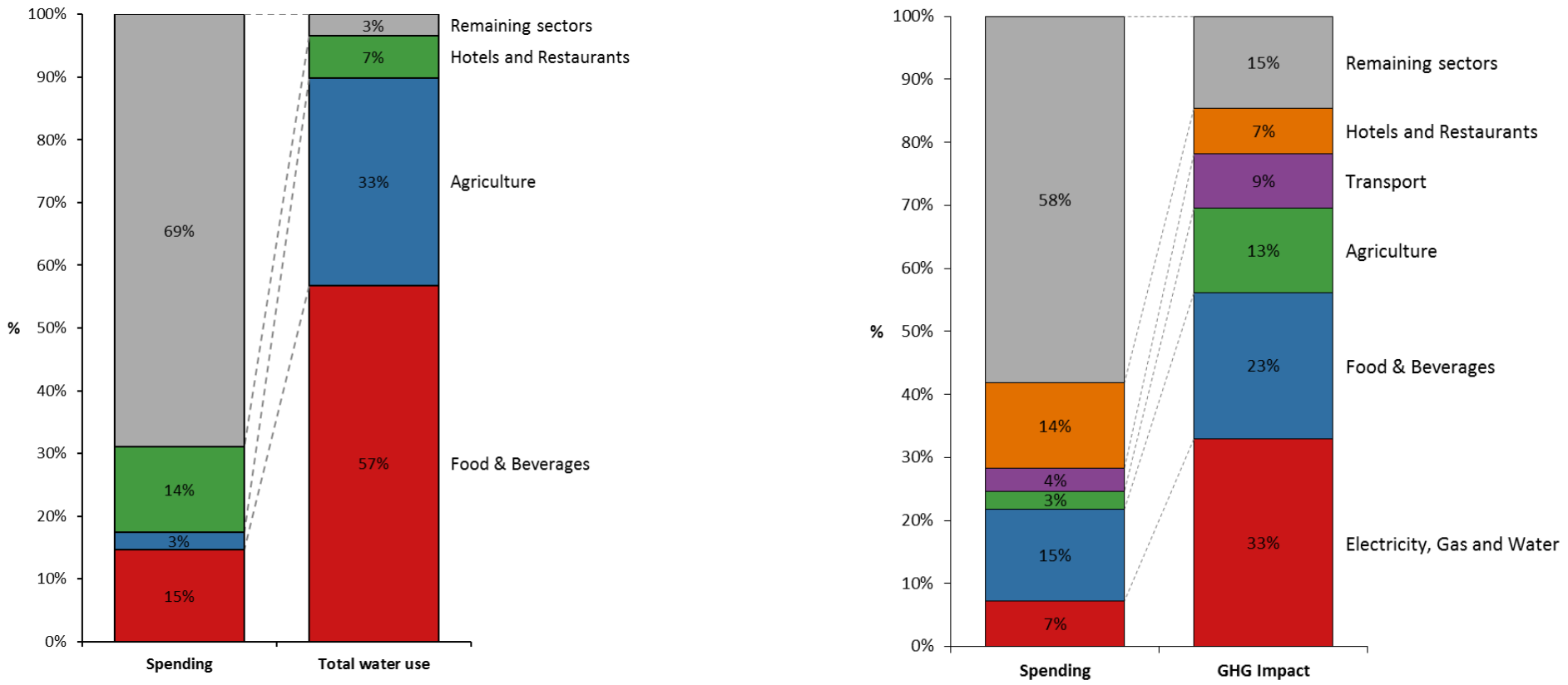


Figure 7: Expenditure and environmental impact of hotels and Restaurants in the Dominican Republic from the top down approach (input output analysis). The chart on the right shows GHG emissions, and the left chart shows water use. Data source: Environmentally Extended Input Output tables: Eora Version 199.82, 2013 data (http://www.worldmrio.com/). Hotels and Restaurants as an impact category due to intra-sector transactions. Food and Beverages: includes manufacturers / processors of food and beverages; Agriculture: includes produce supplied without additional processing.

4.3. Bottom-up approach and results

The bottom-up approach is based on a survey of individual hotels in three destinations in the DR tourism value chain. The strength of the bottom-up approach is the high level of detail it can provide and the good traceability due to high transparency in how and where the data is collected. The approach allows for the inclusion of additional products that may not be identifiable through national data (e.g. non-apparel and apparel textiles), which can provide more guidance on potential interventions where these relate to a hotspot.

In addition, the bottom-up data can include more detail on imported products, and the significance of these can then be considered when interpreting the national, top-down data to assess its suitability in identification of hotspots. A weakness of this approach is the time required to gather data, the need to convert it into consistent units and the heterogeneity of the sector, which means that the hotspots identified may vary from one hotel to another. This may mean that a large sample is required to obtain an indication of hotspots that can be considered representative of the sector as a whole and suitable for comparison. The degree of alignment between bottom-up data sets will be assessed and commented upon before drawing any conclusions.

The survey used in the bottom up approach can be found in **Annex B**. It covers a range of topics, however for the purposes of the pilot assessments the purchasing data was crucial to enable WRAP to complete the hotspots analysis. The survey was administered by the in-country partners in the Dominican Republic, who surveyed 16 hotels in three tourism destinations. The survey was anonymised to ensure we had co-operation from hotels surveyed and is reported in this format for the purposes of this report.

The survey questions include data required for the UN Environment (2017) Recommended key environmental indicators for the tourism private sector. The indicators that most closely align to hotspots are reviewed in **Section 8**.

Completed surveys were entered into WRAP's hotspots tool. This is a Life Cycle Assessment based tool that contains regionalised life cycle data for over 70 products utilised by hotels and restaurants in the Dominican Republic. The tool has previously been used in a range of peer-reviewed projects including WRAP (2013)[37] and is currently used with signatories to voluntary agreements facilitated by WRAP in the UK. For the current project, these products are aggregated to the level at which participating organisations can provide data (e.g. bananas, coconuts and pineapples are assessed as 'fruit'). The range of products and services has been expanded to cover electricity, textiles, furniture, chemicals and glassware, based on feedback on what hotels are able to provide, and the data for electricity has been tailored to the country. Once data on the quantity purchased has been entered, the GHG emissions, water,

[37] WRAP (2013) An initial assessment of the environmental impact of grocery products http://www.wrap.org.uk/sites/files/wrap/An%20initial%20assessment%20of%20the%20environmental%20impact%20of%20grocery%20products%20final_0.pdf

waste and energy associated with that product is identified in total and by life cycle stage. This allows specific products to be prioritised and key life cycle stages identified.

Data for two example hotels from the four who have provided sufficient data are presented in **Figure 8** below. These show the contribution of the hotel to greenhouse gas emissions, water, waste, and energy consumption. The findings are consistent with the national analysis, confirming the importance of animal products and electricity consumption across the environmental impacts considered. In the bottom-up analysis, food products were found to have a higher impact/importance compared to electricity use, which may be due to the exclusion of imports. It can however be assumed that excluding imports has a negligible effect on the hotspots identified for tourism value chains in the Dominican Republic. For one of the hotels, textile consumption is also significant. This highlights that although general hotspots can be identified using national data, there may be hotel-specific variations.

4.4. Data Limitations

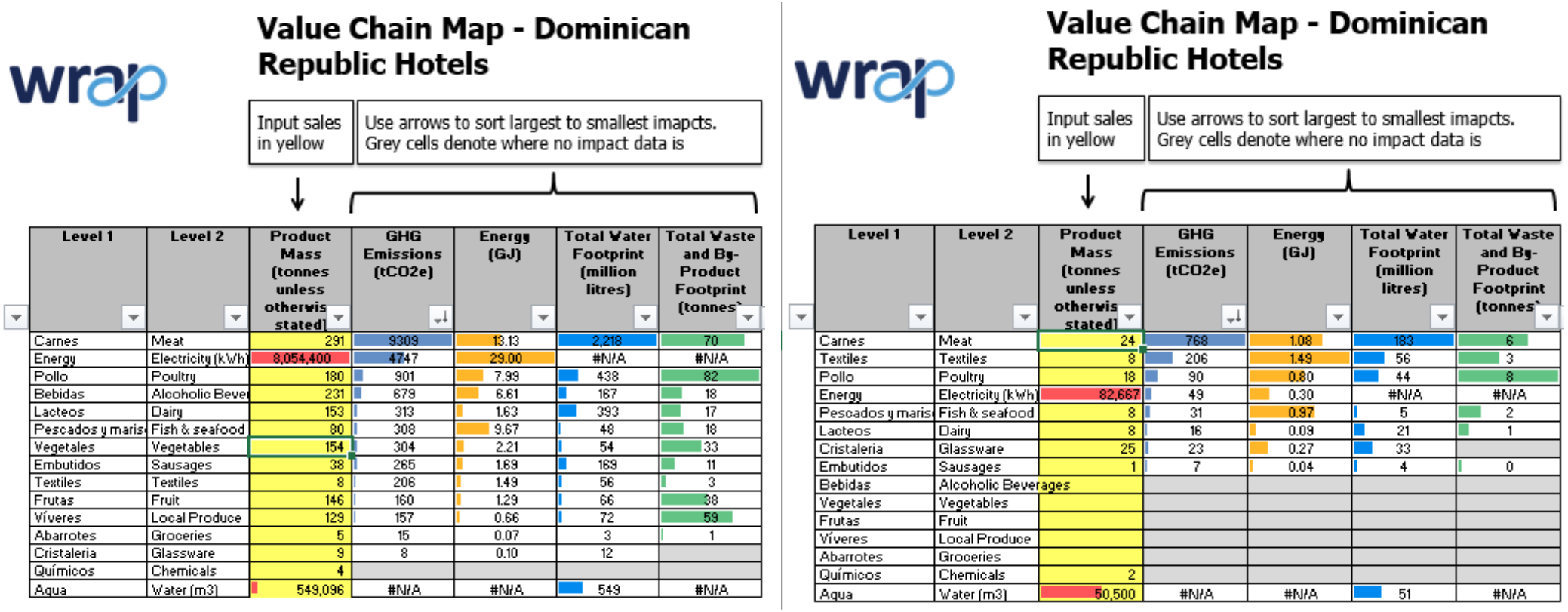
A top down approach has a number of strengths and weaknesses. By capturing all the data from a sector (e.g. food and drink manufacturing), a top-down approach allows a comprehensive view of the impacts of a system. However, it is constrained by the availability of data in a suitable format. For example, data may be available for the sector "accommodation", or for "accommodation and restaurants", which will lead to results which cannot be used to benchmark the results of a tourism value chain with that in other countries. Inferences and assumptions are also required to sub-divide activities (e.g. imports) to identify the relevant emissions.

As well as domestic supply and use, databases such as Eora contain information on the value of imports to a country, including the country of origin. The environmental impacts in the country of origin can be attributed to these imports. However, Eora do not provide details on the nature of the imports, nor to which sector specific items are being imported. This means that whilst we may know what is imported to a country and from where, we cannot use the model to attribute specific imports and therefore combine imports into the analysis of sectors contributing to hotspots. Supplementary data from literature and surveys of hotels is therefore required to allow understanding of the significance of imported products.

In a business context, financial/economic data is usually easier to come by, and better understood by stakeholders, than the material flow data that is usually required for Life Cycle Assessment. The survey therefore allows both sets of information to be provided by a hotel for the bottom-up approach.

Analysis at a hotel level was challenging due to the level of data required to input into the WRAP hotspots tool. The in-country partners experienced difficulties gathering all the data required, due to most hotels having central purchasing departments located outside the Dominican Republic (for example, Spain). As a result, WRAP was only able to include the hotel level hotspots analysis of 4 hotels, with a fifth hotel providing all data required apart from electricity use. However, despite the potential for heterogeneous results, there is a strong

degree of alignment between the results collected from these hotels and the top-down data. Whilst not definitive due to the small sample size, this indicates that the national level data is appropriate for the identification of hotspots in the tourism sector.



Value Chain Map - Dominican Republic Hotels

Input sales in yellow

Use arrows to sort largest to smallest imapcts. Grey cells denote where no impact data is

Level 1	Level 2	Product Mass (tonnes unless otherwis stated)	GHG Emissions (tCO2e)	Energy (GJ)	Total Water Footprint (million litres)	Total Waste and By-Product Footprint (tonnes)
Carnes	Meat	291	9309	13.13	2,218	70
Energy	Electricity (kWh)	8,054,400	4747	29.00	#N/A	#N/A
Pollo	Poultry	180	901	7.99	438	82
Bebidas	Alcoholic Bever	231	679	6.61	167	18
Lacteos	Dairy	153	313	1.63	393	17
Pescados y maris	Fish & seafood	80	308	9.67	48	18
Vegetales	Vegetables	154	304	2.21	54	33
Embutidos	Sausages	38	265	1.69	169	11
Textiles	Textiles	8	206	1.49	56	3
Frutas	Fruit	146	160	1.29	66	38
Víveres	Local Produce	129	157	0.66	72	59
Abarrotes	Groceries	5	15	0.07	3	1
Cristaleria	Glassware	9	8	0.10	12	
Químicos	Chemicals	4				
Agua	Water (m3)	549,096	#N/A	#N/A	549	#N/A

Value Chain Map - Dominican Republic Hotels

Input sales in yellow

Use arrows to sort largest to smallest imapcts. Grey cells denote where no impact data is

Level 1	Level 2	Product Mass (tonnes unless otherwis stated)	GHG Emissions (tCO2e)	Energy (GJ)	Total Water Footprint (million litres)	Total Waste and By-Product Footprint (tonnes)
Carnes	Meat	24	768	1.08	183	6
Textiles	Textiles	8	206	1.49	56	3
Pollo	Poultry	18	90	0.80	44	8
Energy	Electricity (kWh)	82,667	49	0.30	#N/A	#N/A
Pescados y maris	Fish & seafood	8	31	0.97	5	2
Lacteos	Dairy	8	16	0.09	21	1
Cristaleria	Glassware	25	23	0.27	33	
Embutidos	Sausages	1	7	0.04	4	0
Bebidas	Alcoholic Beverages					
Vegetales	Vegetables					
Frutas	Fruit					
Víveres	Local Produce					
Abarrotes	Groceries					
Químicos	Chemicals	2				
Agua	Water (m3)	50,500	#N/A	#N/A	51	#N/A

Figure 8 : Data from two hotels showing the contribution of different products and services consumed to greenhouse gas emissions, water, waste, and energy consumption (bottom-up approach). The grey cells indicate either no data was provided or no suitable conversion factors have been identified.

4.5. Implications of Imported Food and Beverages on Hotspots Analysis

Databases such as Eora contain information on the value of imports to a country, including the country of origin. The environmental impacts in the country of origin can be attributed to these imports. However, Eora do not provide details on the nature of the imports, nor to which sector specific items are being imported. This means that whilst we may know what is imported to a country and from where, we cannot use the model to attribute specific imports and therefore combine imports into the analysis of sectors contributing to hotspots. Supplementary data from literature and surveys of hotels is therefore required to allow understanding of the significance of imported products. The implications of imported products on the hotspots analysis are covered separately below.

The effect of excluding imports on the identification of hotspots is assessed by comparing the results against the bottom-up data, and sense checking the importance of imports through other data sets.

Agricultural imports can be grouped in three (3) major categories:

- Bulk agricultural commodities: such as wheat, beans, corn, etc.
- Intermediate products: soybean meal, vegetable oils, animal fats, fish & seafood, meats, fresh fruits and vegetables, sugar and other sweeteners, and tobacco.
- Processed, consumer-ready products: breakfast cereals, salted fish, bottled beverages, dairy, snack foods, canned goods, etc. (Government of Canada 2016)

UN Environment 2017 and FAOstat suggest that the Dominican Republic imports approximately 20% of food and beverages, as illustrated in **Figure 9** below. Other estimates suggest 30-40% of food and beverages consumed in the Dominican Republic are imported. The figure 9 above also suggests that the proportion of food and beverages imported is relatively stable over time, though USDA (2016) identifies the potential for increased imports of food from the USA specifically for the tourism sector.

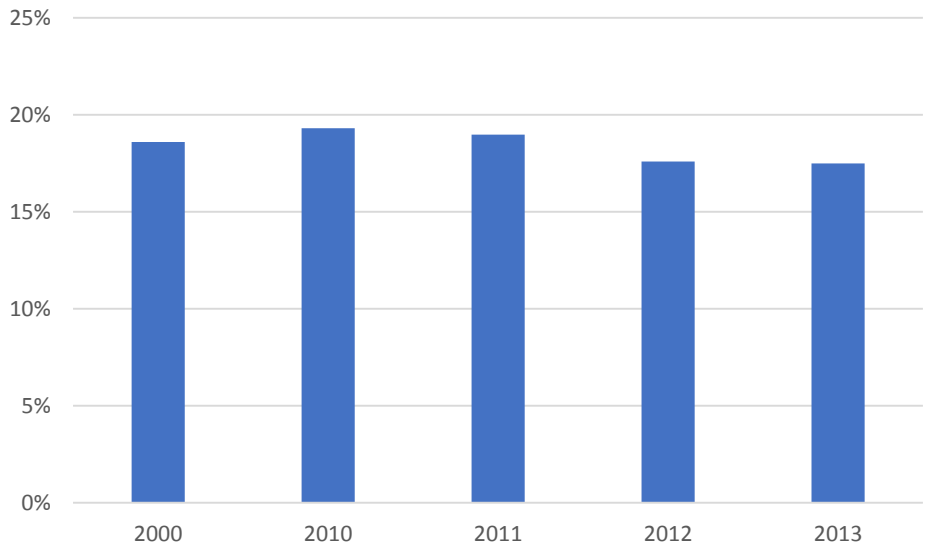


Figure 9: Proportion of food and beverages imported to Dominican Republic for selected years (FAOStat)

Total agri-food imports in 2015 are estimated at over $2.0 billion, with the United States (US) and the European Union (EU) (both of which have Free Trade Agreements with the Dominican Republic) being the main suppliers. The countries from which the hotel and restaurant sector represents a significant proportion of imports are shown in **Figure 10.** This shows that hotels and restaurants account for over 40% of imports from the USA, and over 10% of imports received from Spain, by value.

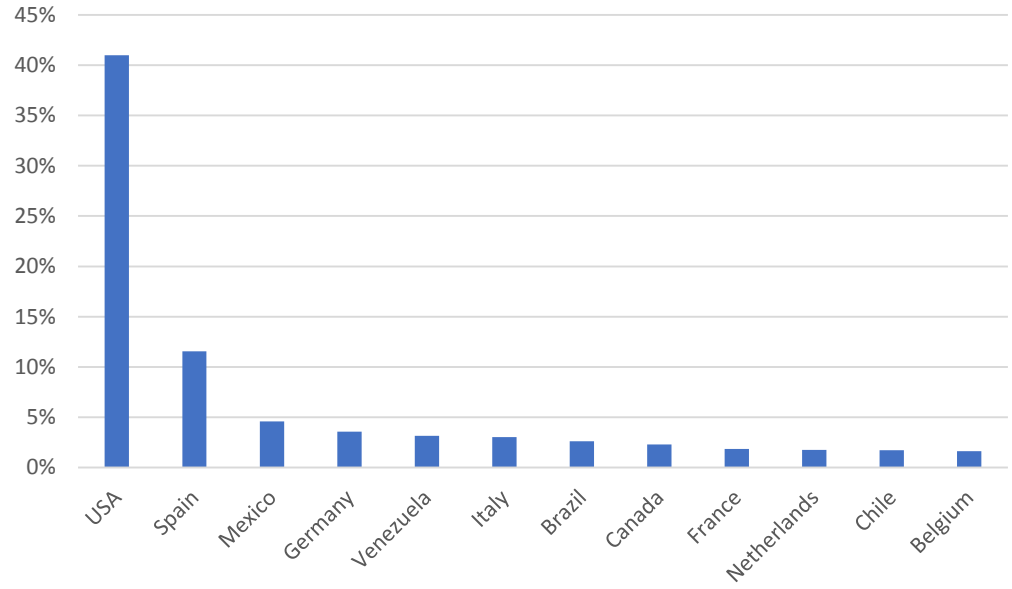


Figure 10 Proportion of Dominican Republic imports by hotels and restaurants by value, 2013 (Lenzen et al 2013).

The percentage of goods imported varies by food and beverage type. The most significant imported produce for 2013 are shown in **Table 3**. Although more recent data is available through the Ministry of Agriculture, 2013 data has been selected as this is the year for which top-down data is available for comparison with the bottom up data. This suggests that the hotspots identified through national data could underestimate the importance of goods and services procured by hotels, such as wheat and maize products. However, comparison with the survey data validates the hotspots identified through national data, suggesting that little additional work is required to fill this gap. This will be discussed further in review of specific indicators and survey responses.

Most imported products by weight		Most imported products by proportion of total consumption	
Product	Quantity (000 tonnes)	Product	Percentage
Maize and products	**984**	**Wheat and products, barley, oats, soybean oil, wine**	**100%**
Wheat and products	**584**	**Maize and products**	**95%**
Milk excluding butter	**133**	**Fish (various)**	**85%-100%**
Soybean oil	**120**		
Rice (milled equivalent)	**67**		

Table 3: Most imported products, 2013 (**Source:** FAOStat)

5. National Baseline for the Environmental Impacts of the Tourism Value Chain

The top-down analysis provides information on the environmental impacts that occur within a country. For different indicators, these are commonly referred to as production-based, territorial, national or domestic impacts. This section is mostly based on the top-down analysis (as bottom-up data was limited to two hotels) and therefore consistent with national accounting frameworks such as the United Nations Framework Convention on Climate Change (UNFCCC) for greenhouse gas emissions but does not include the impacts of the tourism value chain which occur overseas, in particular, imported goods and air travel. We added comments on how we think including the imported goods changes the baseline from the results of top-down analysis (however air-travel is completely excluded from this project).

Greenhouse Gas Emissions - GHG emissions associated with hotels and restaurants are estimated to be 2 million tonnes CO_2eq. According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), the Dominican Republic's GHG emissions in 2013 were 24.4 million tonnes CO_2eq, suggesting that hotels and restaurants are associated with 9% of national greenhouse gas emissions.

This is illustrated in **Figure 11**. The emissions come from a range of sectors including agriculture, energy and waste. They are equivalent to over half the emissions associated with industrial processes and waste (4.5 million tonnes CO_2eq).

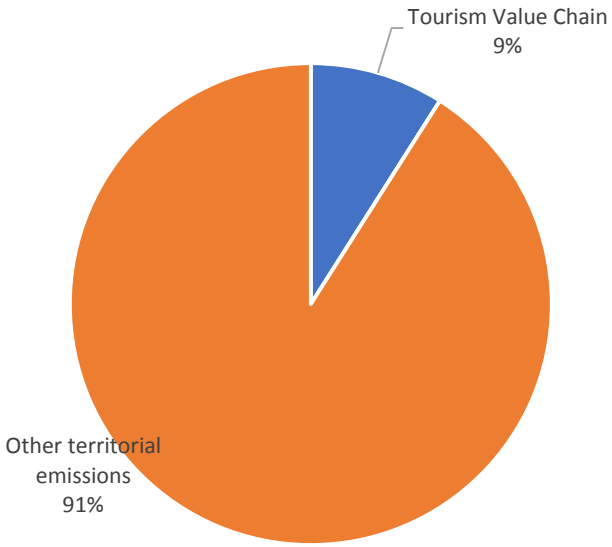


Figure 11: Proportion of national greenhouse gas emissions associated with the Tourism Value Chain in the Dominican Republic, 2013.

GHG emissions associated with electricity production are a hotspot for hotels and restaurants directly, and within their supply chains. Electricity generation in the Dominican Republic is dominated by thermal units fired mostly by imported oil or gas (or liquefied natural gas). The emissions in the supply chains are far greater than the emissions from the use of energy in the hotel as illustrated in **Figure 12** below. These are shown as scope 1, 2 and 3, estimated in line with the WRI GHG protocol.

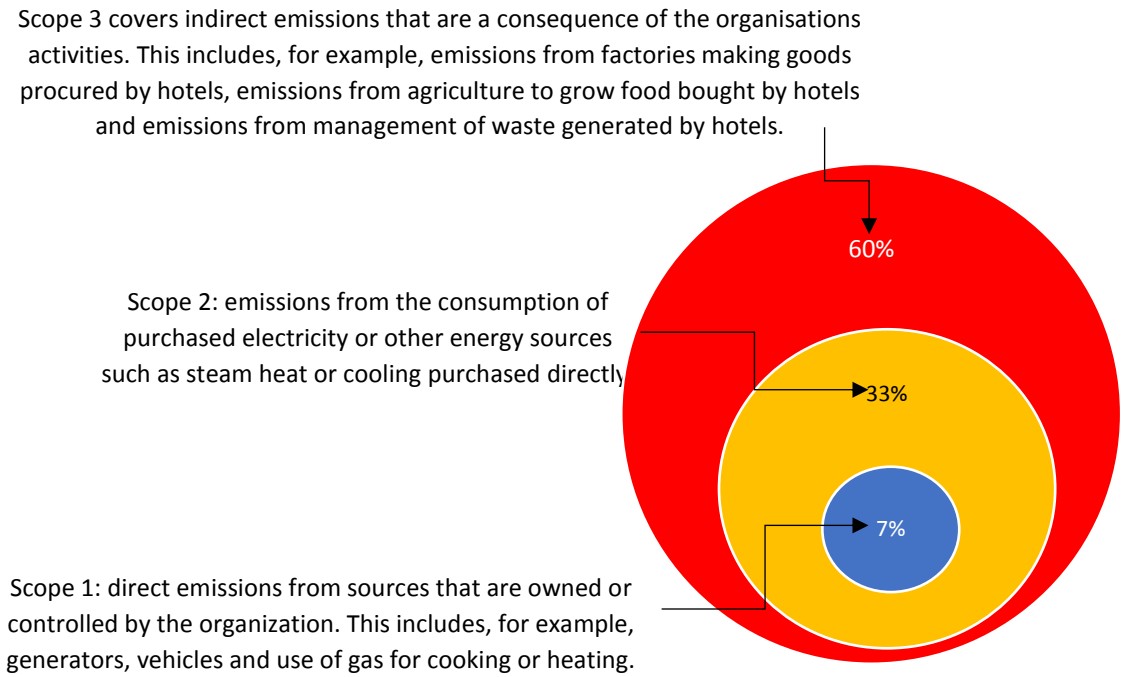


Figure 12: Greenhouse gas emissions across the hotel and restaurant value chain (NB scope 3 excludes employee commuting and tourist travel to the Dominican Republic). Please note, scope 3 excludes employee commuting and tourist travel to the Dominican Republic)

In identifying hotspots, the definition used is activities that contribute over 50% of an impact, as set out earlier in the report. The use of electricity, gas and water in the hotels, agricultural products and products from the food and beverage industry consumed in hotels, is associated with 69% of the emissions. Within this percentage, significant contributors are the direct use of electricity, gas and water by hotels and restaurants, which account for 33% and scope 3 greenhouse gas emissions associated with food production, particularly rearing animals for meat and dairy products (enteric fermentation, manure), which account for 36% of the GHG emissions associated with hotels and restaurants.

In the hotels who participated in the survey, the main source of meat products were domestic businesses, though some products were imported. This is in line with FAOStat data, which suggests that 80% of pork, 92% of poultry and 98% of beef came from domestic sources in 2013. Therefore, the majority of greenhouse gas emissions are likely to be captured in this assessment. It is important to note however, that the results for individual hotels may differ.

Beverages, fish, seafood and processed groceries were also reported as coming from a mix of domestic and imported sources. Again, this is in line with FAOStat national data, which suggests 80% of alcoholic beverages and 85-100% of fish and seafood are imported, suggesting that the emissions associated with these product groups may be underestimated in the national statistics. Nonetheless they are captured as hotspots. The data structure for FAOStat does not report processed groceries separately. All survey respondents purchased fruit and vegetables from local sources.

Water - Over 99% of the water associated with hotels is considered as scope 3. The water footprint of hotels and restaurants in the Dominican Republic is over 1.2 billion m^3, equivalent to over half the water held in Lake Enriquillo. Mekonnen and Hoekstra (2011). National Water Footprint Accounts suggest that the internal water footprint of the Dominican Republic is around 7.7 Giga m^3, with a further 0.5 Giga m^3 associated with imports. The water footprint associated with hotels and tourism is therefore a negligible fraction of the total footprint.

Water use in agriculture and in food and beverage production account for almost 89% of the water footprint, with the remaining 10% split across several sectors. The blue (abstracted) water footprint is dominated by food and beverage products (i.e. meat, dairy and other food products). These products use 75% of blue (abstracted) water associated with hotels and restaurants. Data from the hotels surveyed also suggests that meat and dairy products are significant. The importance of direct water use and water associated with textiles was less clear from the data collected.

Energy – **Figure 13** below highlights that the largest use of energy for hotels is using electricity, which accounts for 57% of energy use. The energy embedded in products is of less significance. Direct combustion of fuels (e.g. for transportation) accounts for 7% of energy use. The difference to greenhouse gas emissions highlights the importance of non-energy emissions of greenhouse gases, such as emissions from agriculture, forestry and metal processing.

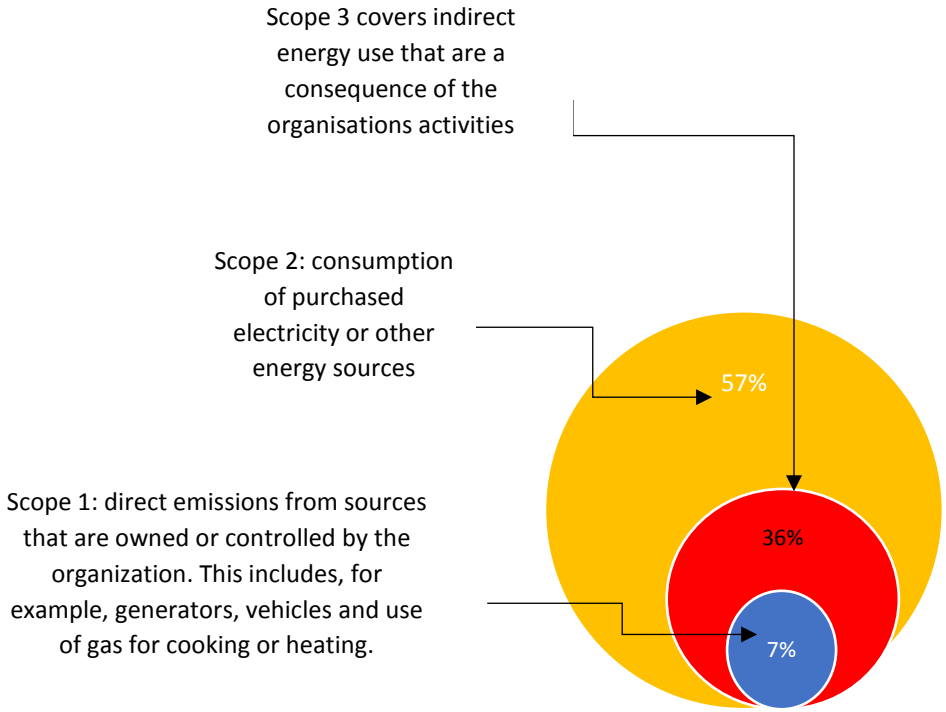


Figure 13: Energy use across the hotel and restaurant value chain. (Please note, scope 3 excludes employee commuting and tourist travel to the Dominican Republic)

Table 4: Energy sources (terajoules) of electricity consumption by hotels and restaurants, 2013 .4 highlights that most electricity is generated from the combustion of (imported) oil and gas.

Energy Source	Electricity and gas consumption
Natural Gas	1,841
Coal	1,290
Petroleum	5,252
Nuclear Electricity	0
Hydroelectric Electricity	348
Geothermal Electricity	0
Wind Electricity	0
Solar, Tide and Wave Electricity	0
Biomass and Waste Electricity	59
Total	8,789

Table 4: Energy sources (terajoules) of electricity consumption by hotels and restaurants, 2013 [38].

[38] Lenzen, M., Moran, D., Kanemoto, K., Geschke, A. (2013) Building Eora: A Global Multi-regional Input-Output Database at High Country and Sector Resolution, Economic Systems Research, 25:1, 20-49, DOI:10.1080/09535314.2013.769 938

Waste – National data on waste occurrence associated with hotels and restaurants is not available for the Dominican Republic. The data collected through a survey of hotels has been cross-checked with purchasing data to give an apparent rate of waste generation, that is the amount of material which appears to be wasted assuming that no other materials leave or enter the system. This has then been benchmarked with typical practice based on WRAPs previous activities in the UK, which suggests an average wastage rate of 20% [39]. Whilst two hotels are within the typical practice range, one significantly exceeds this rate with around 35%, suggesting opportunities to further reduce waste. This is illustrated in **Figure 14** below. However, the range of results means that it is not possible to extrapolate impact to a national level at this time.

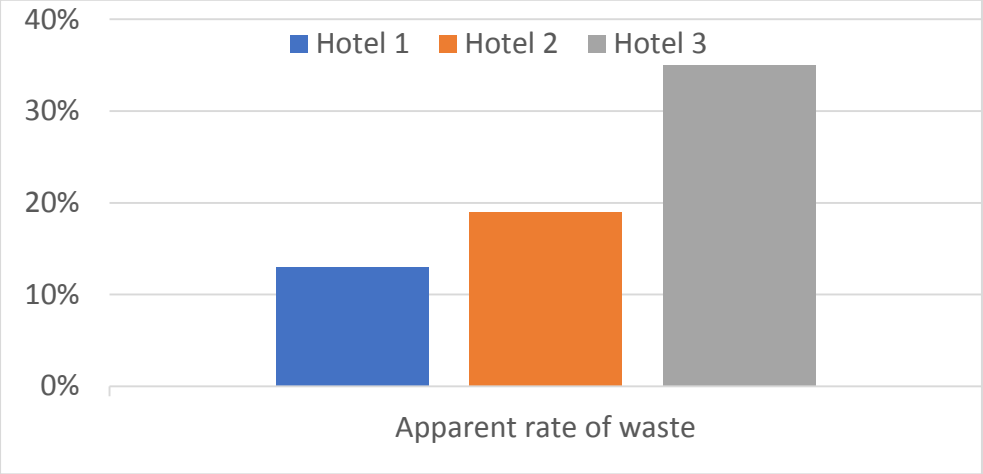


Figure 14: Apparent rate of waste generation (comparing the volume of waste to volume of purchases) at three hotels (drawn from solid waste data provided by hotels, compared with purchased amounts – assumes no other materials enter or leave the system)

WU (2014): Global Material Flows Database suggests that unused food accounts for 6.7 million tonnes of waste in 2013, 98% of wasted biomass in the Dominican Republic. This is equivalent to 39% of biomass harvested for food.

6. Summary of Environmental Hotspots

Table **Table 6** below summarises the environmental impact hotspots in the tourism value chain. Organisations who can influence or control hotspots are identified in **Figure 5** above.

Based on the top-down analysis, the direct use of electricity, and fuels in hotels and restaurants generated about 33% of GHG emissions and 64% of energy use.

Scope 3 greenhouse gas emissions associated with food production account for 36% of the GHG emissions associated with hotels and restaurants supply chains, most of these are likely associated with rearing animals for meat and dairy products (enteric fermentation, manure)

[39] http://www.wrap.org.uk/sites/files/wrap/Overview%20of%20Waste%20in%20the%20UK%20Hospitality%20and%20Food%20Service%20Sector%20FINAL.pdf

Meat and dairy products are also a hotspot in terms of water use, whilst electricity use on site is the energy hotspot for hotels and restaurants. The national and survey data suggests that most associated GHG emissions and water occur within the Dominican Republic.

Although most hotels have taken some action to reduce their energy consumption, there is substantial opportunity to do more to support the hotels in implementing solutions to better address this hotspot in the tourism value chain during the next implementation phase of this project.

Additional information on the environmental impact hotspots contained in **Table 6** follows the table itself.

Summary of hotspots across environmental impact categories for the tourism sector in the Dominican Republic				
TO Rank	**GHG**	**Energy**	**Water**	**Waste**
1	**Primary production of meat and dairy products**: methane emitted through bovine enteric fermentation (digestion) and production of manures. 98% of beef comes from domestic sources[40], including a major cattle-raising area in the province of La Altagracia, where Punta Cana is located. According to the World Resources Institute (WRI)[41], agriculture was the second highest source of emissions (31.6%) in the Dominican Republic in 2013, with enteric fermentation and manure left on pasture contributing 75% of the sector's emissions.	**Electricity and fuel use in hotel and restaurants**: typical hotel energy use is for heating, ventilation and air-conditioning (HVAC) (40%), followed by water heating (26%), cooking (11%) and lighting (6%).[42] NOTE: Same as Energy hotspot no 2	**Water use in hotels and restaurants**: guest washing and sanitation, cleaning of rooms and public spaces, laundry services, food preparation and cooking, irrigation of grounds, swimming pools and spas. It is worth noting that some destination studies show that hotel guests consume three times as much water as the average Dominican[43].	**Food waste in hotels and restaurants**: average of 7-12% meat waste in kitchens, with some hotel surveys indicating overall food waste levels at up to 35% of food purchased.

[40] Source: FAOStat (2013).
[41] See: http://cait.wri.org/
[42] Source: the Worldwatch Institute (2015).
[43] Source: Dominican Republic Ministry of Environment, Water Footprint Study in Playa Dorada, Puerto Plata (2011).

Summary of hotspots across environmental impact categories for the tourism sector in the Dominican Republic				
TO Rank	**GHG**	**Energy**	**Water**	**Waste**
2	**Electricity, fuel and refrigerants use in hotels, particularly in generating heating and cooling**: emissions from the combustion of fossil fuels in energy generation[44] for electrical and electronic appliances. Electricity represents 57% of total energy use in hotels. This also includes the use of back-up generators (where they are available) during power outages. NOTE: Same as Energy hotspot no 1	**Processing and storage of meat and poultry products**: slaughterhouse processing and energy used in chilled storage and refrigeration contributes to post-farm gate emissions.	**Primary production of meat and dairy, including primary production of animal feed**: water use in feed production (including irrigation water) and for livestock (drinking and cleaning water).	**Primary production of Fresh produce**: in-field, unharvested crops and immediate post-harvest crop waste due to supply chain quality requirements and poor demand forecasting (estimates are up to 20% losses/waste).
3	**Primary production of fresh produce**: emissions from use of fertilizers and methane emissions from organic wastes. Fuel use for in-field operations. Over 50% of the vegetables produced in the Dominican Republic are consumed by the accommodation sector.	**Processing and packing of fresh produce:** energy use in the processing and packing of produce, energy use in product chill chain or for freezing of produce post-harvest.	**Primary production of fresh produce**: water used to grow fruit, vegetables and other food crops dominates water use across the life cycle.	**Landfilled solid waste that could be recycled:** resulting from a lack of modern, regulated waste management infrastructure. All destinations suffer from a lack of public waste management and recycling infrastructure (waste collection and treatment). Landfilling materials that could be recycled (particularly paper and plastics) add to landfill pollution problems on the island.

[44] Within the Dominican Republic 94% of energy produced for consumption comes from the burning of fossil fuels (coal, oil, and gas) (Source: SENI – Sistema Eléctrico Nacional Interconectado (National Interconnected Electrical System: http://www.cne.gob.do/estadisticas-energeticas/ and http://www.sie.gob.do/#. Fossil fuels are imported from countries such as Venezuela and Mexico.

Summary of hotspots across environmental impact categories for the tourism sector in the Dominican Republic				
TO Rank	**GHG**	**Energy**	**Water**	**Waste**
4	**Emissions from solid waste, particularly food waste in landfills**: discarded food/organic materials can emit methane, a potent greenhouse gas, and results in the need to burn off methane from open landfill sites for safety reasons, which are poorly controlled and lead to frequent air pollution events [45].	**Transport of people and goods:** Seasonal peaks in the transportation of tourists within and between tourism destinations and attractions. In the Dominican Republic, domestic transportation accounted for 33.89% of national greenhouse gas emissions in 2000 (Second National Communication to the UNFCCC).	**Untreated waste-water from hotels causing pollution of water sources**: a lack of public infrastructure, regulation and enforcement in some destinations leads to sub-optimal use of water resources and pollution from untreated wastewater has an impact on the natural environment, which places a burden on hotels to provide water supplies via boreholes and individual on-site wastewater treatment plants.	**Landfilled food/organic waste**: a lack of private and public-sector infrastructure for collection and treatment of food/organic waste leads to wasted resource and high methane emissions from open, unlicensed landfill sites[7], and contributes to leachate from unlicensed open landfills poses threats to groundwater, public health, local rivers, beaches and ecosystems.
5	**Production of beverages**: in the tourism sector appears to be a hotspot based on national-level data and (limited) evidence from individual hotels.		**Water use in the energy sector**: water used in cooling and power generation, emitted as steam and not returned to water source.	**Single use items**: e.g. plastic packaging, water bottles, cups, drinking straws, etc. creating litter and marine pollution, damaging natural environments.

Table 5: summary of Dominican Republic tourism sector hotspots across impact categories, ranked in order of importance

[45] For example: Puerto Plata has an open dumpsite administered by the city council and located right at the entrance of the tourist destination and in sight of the nearby cruise ship port of Amber Cove. It suffers from fires frequently due to the large concentration of methane generated there. The leachate percolates through canyons affecting the beaches of Costambar, Maimón and Cofresí, as well as the hotels that are there.

To elaborate on the information contained in **Table** above, the environmental impact hotspots identified for the tourism sector in the Dominican Republic are broadly split between:

- Energy and climate change impacts relating to the provision of services to the sector from other sectors of the economy (e.g. power generation and energy supply). These primarily relate to the environmental impacts associated with the extraction of raw materials (fossil fuels: coal, oil and gas), their conversion to electricity or heat and the transmission of energy from point of generation to point of use in the tourism sector). Hotels in the Dominican Republic pay between US$0.20 to US$0.26 per Kw for their electricity; and hotels surveyed estimated that their energy costs ranged from 10-22% of their total operating costs (although none have accurate on-site energy use measurement of their own or capture information on how and where their energy is used, so this is likely to be an underestimate);
- Climate change, water and waste impacts arising from the pollution of land, water and air as a result of deficiencies in national infrastructure (e.g. ground water, river and marine pollution from leachate at open, unsealed landfill sites, air pollution from fires caused by methane emissions at landfill sites, due to a lack of waste management and recycling infrastructure and regulatory permitting and enforcement of waste management sites), which lead to environmental pollution and degradation of natural resources); or a lack of public water supply or wastewater treatment infrastructure leading to over-abstraction of water through hotel wells and boreholes and water/marine pollution from untreated or inadequately treated wastewater;
- Energy, climate change and water impacts relating to the built environment in the tourism sector (e.g. hotel and restaurant energy use in lighting, heating, ventilation and air conditioning; and water heating and use in washing and sanitation, cleaning of rooms and public spaces; and for leisure activities, like swimming pools and spas);
- Climate change, energy, water and waste impacts relating to the production, processing, manufacture, transportation and consumption of food and beverage products (e.g. meat, fresh produce and beverage production, shipment and consumption, including high levels of food loss and waste in agriculture and at point of consumption). The tourism sector in the Dominican Republic consumes over US$500 million of food and beverage products each year accordingly to The National Hotels and Restaurants Association (ASONAHORES); and this figure is climbing as the sector grows. UN Environment 2017 and FAOstat suggests that the Dominican Republic imports approximately 20% of food and beverages. Other estimates suggest 30-40% of food and beverages consumed in the Dominican Republic are imported. Data also suggests that the proportion of food and beverages imported is relatively stable over time.
- Energy and climate change impacts associated with transportation services in the tourism sector, particularly during seasonal peaks in visitor numbers, as tourists require transport to, from and within destinations. The tourism sector is estimated to

spend US$3 million on transportation equipment a year, but this probably represents a fraction of the transportation costs provided by third party service providers.

Further detail on the nature of the hotspots and their drivers is provided in **Annex E**.

7. Hotspots Long-list of Solutions

Introduction

During the year of 2017, workshops were held in each of the four target countries to build understanding of hotspots and identify potential actions to address these. A literature review has also been carried out to identify potential actions. Together, these form the long list of potential actions identified below. These actions will subsequently be reviewed for their feasibility and impact to enable shortlisting in 2018. Some actions may be recommended even where their impact may not be quantifiable (e.g. adoption of a policy) as an enabling action that allows other activities to occur which may be quantifiable.

The long list of solutions has been split into business-level solutions, which are presented first and segmented by topic, followed by national-level solutions that have been ranked and grouped based on their likely impact, that require actions led by government policy-makers and/or that call for public or public/private sector investment in national and local infrastructure to address identified hotspots. Where appropriate some solutions are presented as both business and national-level solutions as action can be taken by individual businesses but may benefit from a supporting national policy or legal framework – e.g. a circular economy policy package could support the development and procurement of sustainable products and services by businesses; or a national food waste strategy would support actions by business to quantify and reduce their food waste.

The next stage of the project will involve shortlisting solutions and at this stage some items on the long list may be brought together under an overarching policy ambition. For example, requiring hotels to achieve an environmental certification or incentivising investments could deliver multiple items on the long list.

To summarise, the long list covers the following range of solutions and interventions:

Business value chain solutions and interventions: have the potential to be implemented by individual tourism businesses and value chains or via collaborations between tourism businesses and/or the public sector. Some business value chain solutions would benefit from a supportive government policy and strategy framework, or from improvements in national, regional or local infrastructure, like the options for national-level solutions identified below.

- **Sharing best practice and site visits**: the potential for hotels and restaurants to learn from each other's best practices and to learn from other's experiences of implementing solutions (e.g. food waste reduction, energy management, water efficiency).

- **Team training and cross-functional training**: training within and across teams to enable members to minimise their contribution to environmental hotspots by equipping them to help deliver a range of solutions and interventions – e.g. sustainable procurement approaches, monitoring and measuring resource use (food and beverages, water and energy) as well as eco-design tools and techniques for buildings and rooms.
- **Sustainable purchasing and value chain initiatives**: that enable multiple hotspots across all impact categories to be addressed, including sustainable procurement policies and practices; appointing a 'green procurement champion'; adopting voluntary sustainability standards for key raw materials (e.g. seafood, timber and paper, textiles); supplier accreditation, environmental Key Performance IndicatorIs and benchmarking and shared / consortia-based supplier platforms and databases to help identify reliable, high-performing suppliers; the use of product/packaging specifications and healthy, sustainable menus (e.g. product life requirements for hotel furniture and electrical items, local, seasonal sourcing of food).
- **Improving operational practices**: including the provision of information to guests to help them make environmentally friendly choices when choosing or buying goods and services; adopting healthy, sustainable menus to reduce the environmental 'food print' of food served in destinations; measuring and monitoring food waste; reviewing food storage, preparation and cooking practices (e.g. portion control) and using data analytics to improve inventory management and demand forecasting to reduce food waste; donating uneaten food and establishing food recycling programmes to produce compost and renewable energy.
- **On-site energy management and efficiency**: making significant improvements in energy use by: developing an energy and GHG policy; conducting and acting on the findings of energy audits; specifying energy efficiency and GHG emission improvements in HVAC systems and electrical equipment (including laundries); installing room energy management systems; and increasing the amount of in-situ renewable energy generation.

National-level solutions and interventions:

National-level solutions that have been ranked and grouped based on their likely impact and require either actions led by government policy-makers and/or that call for public or public/private sector investment in national and local infrastructure to address identified hotspots. These national-level solutions should support private sector tourism actions to achieve a more sustainable value chain. They include:

- **Developing / adapting a National GHG / Energy Policy for the tourism sector**: policies on renewable energy and energy efficiency can provide essential context for business action. The government of the Dominican Republic promotes renewable energy through incentives and tax exemptions under the Renewable Energies Incentives Law 57-07. Examples of other activity in SIDS include the St Lucia Energy Roadmap (2015), which presents a five-year plan of cost-effective energy efficiency programs, renewable energy, and energy storage investments, as well as the necessary

regulatory changes to set Saint Lucia on the pathway to meet its energy transition goals.

- **Improving the production and conversion of energy:** Many energy infrastructure projects are underway in the Dominican Republic to enhance production, distribution and conversion of energy. These include the Monte Plata solar park, the Larimar wind farm and San Pedro BioEnergy co-generation plant.
- **Mandatory and voluntary standards for efficient use of resources and energy in hotels and restaurants**: support the creation of mandatory standards for efficient use of resources and measurement of emissions in all hotels with more than 100 rooms. Voluntary for hotels with 50+ rooms.
- **Policy support for healthy, sustainable food sourcing, purchasing and diets**: the development of dietary guidance that promotes and supports the use of healthy, low-carbon and resource efficient menus in hotels and restaurants to reduce the greenhouse gas emissions (GHG) resulting from sourcing, menu and consumption decisions. A healthy, low-carbon and resource efficient menu minimizes the emissions released from the production, packaging, processing, transport, preparation and waste of food. Major tenets of a healthy, low-carbon diet include eating less industrial meat and dairy, eating less industrially produced food in general, eating food grown locally and seasonally, eating less processed and packaged foods and portioning of meals accordingly to the nutritional needs of visitors. Research and experience elsewhere e.g. the revised Live Well Plate ('Eating for 2 Degrees')[46] shows that it is possible to achieve a 30% reduction in greenhouse gas emissions by 2030 based on sourcing and eating this way.
- **National food waste strategy**: develop a national food waste strategy in line with UN SDG target 12.3 to halve food loss and waste by 2030, with specific components and targets for the tourism sector, including food waste reduction targets, incentives to redistribute surplus food to charitable organisations and the provision of food waste recycling infrastructure to enable the production of renewable energy from biogas and compost for use in agriculture. Implementation of the strategy could include a voluntary agreement with the tourism sector; a consumer/tourist focused behaviour change campaign in collaboration with tourism operators, hotels and restaurants; and a national food waste quantification and best practice platform.
- **National circular economy policy package**: development of a circular economy policy package that encourages and promotes the development of more sustainable, innovative products and services, including consideration of circular / sustainable product, service and business model design and procurement, the promotion of sustainability standards and certification in tourism, energy efficiency and product life extension for electrical and electronic products. This should include the creation of incentives to drive the procurement of more sustainable products and services and promoting demand for certified sustainable products.

[46] **Source:** https://www.wwf.org.uk/eatingfor2degrees

- **Enhance legislation and regulation of waste management to optimise waste management and reduce land-based, river and marine pollution**: the role of legislation and better regulation and enforcement in ensuring appropriate collection and management of waste streams was identified in workshops in the Philippines and the Dominican Republic. This could include new targets for food waste prevention.
- **Enhance legislation and regulation on drinking water quality and wastewater treatment to improve infrastructure, water security and protect tourism biodiversity resources**: the role of legislation in ensuring drinking water quality, the development of a freshwater distribution system and the appropriate collection and treatment of wastewater to improve water security in the tourism sector and protect the natural environment on which the tourism sector depends.
- **Improvements in the transportation network**: in the Dominican Republic, transportation accounted for 33.89% of national energy-related greenhouse gas emissions in 2000 (Second National Communication to the UNFCCC); and the need for a clean (electric and biofuel-based vehicles) and efficient transport system is included in the National Development Strategy and the 2011 Climate Compatible Development Plan (CCDP), which also includes a goal for the tourism sector to reduce its greenhouse gas emissions by 35% by 2030, against a business as usual scenario. The EU Sustainable Transport for Areas with Tourism through Energy Reduction (STARTER) project identifies that "the seasonality of tourism demand leads to rising demand for transport and mobility services during the high season, which impacts heavily the traffic in specific touristic regions… dealing with the challenges posed by seasonal traffic is not simply the task of the authorities: main players of the transport sector, environmental organisations and the tourism sector should join forces to resolve related issues… The concept of 'Local Travel Plan Networks (LTPN)' can be used to shift tourist travel to more sustainable mobility options".

A full list of business value chain and national-level solutions captured during the 2018 country workshop in Dominca Republic can be found in Annex F of this report.

In order to contextualise how these solutions discussed in the workshop in 2018 address the hotspots identified in the report, the following summary table has been provided.

The **Table** below summarises the long list of solutions, their sources and the relevant hotspot they are connected to. In the next stage of this project (shortlisting) we will assess their potential contribution to addressing the hotspots.

i = indirect solution for hotspot

d = direct solution for hotspot

Long list of solutions	Hotspots in Tourism Value Chain – Dominican Republic																			
	GHG					Energy					Water					Waste				
	Beef and dairy products	Electricity use and heating and cooling	Primary production of fresh produce	Landfill emissions	Beverage	Electricity used for Hotel and restaurant activities	Meat and poultry products	Fresh produce	Transportation	Preparation and cooking of food	Water used for feed and livestock	Water use in hotels and restaurants	Primary production of produce	Water supply and pollution	Water use in the energy	Food waste in hotels and restaurants	Fresh produce	Water, air and land pollution from solid and liquid waste	Landfilled organic waste	Single use items
Share best practice / visits	i	i		i	i	i	i		i	i					i	i			i	i
Provision of training for functions / across teams	i	i			i	i	i					i				i			i	i
Adopt a sustainable procurement / purchasing policy	i	i	i		i	i	i	i			i		i				i			i
Define sustainable product specifications for hotspots	i		i		i		i	i			i		i				i			i
Supplier accreditation	i	i	i		i			i					i				i			i
Champion for green procurement	i	i	i		i			i					i				i			i
Agree a replacement schedule for equipment / furniture		d		i		d														i
Replacing high impact food for low impact	d		d		i		d	d			d		d				i			
Ban single use items				i															i	d

Long list of solutions	Hotspots in Tourism Value Chain – Dominican Republic																			
	GHG					Energy					Water					Waste				
	Beef and dairy products	Electricity use and heating and cooling	Primary production of fresh produce	Landfill emissions	Beverage	Electricity used for Hotel and restaurant activities	Meat and poultry products	Fresh produce	Transportation	Preparation and cooking of food	Water used for feed and livestock	Water use in hotels and restaurants	Primary production of produce	Water supply and pollution	Water use in the energy	Food waste in hotels and restaurants	Fresh produce	Water, air and land pollution from solid and liquid waste	Landfilled organic waste	Single use items
Create cleaner production awards	i		i		i		i	i			i		i	i			i			
Create environmental protocols for suppliers	i		i		i		i	i			i		i	i			i			
Programme to encourage purchase of local crafts																				
Setting specification for room design		d				d						i			i					
Build a consortium with other businesses to enable changes in procurement practices	i	i	i		i		i	i			i		i				i			
Provision of information to guests	i	d			i	d	i				i	i			d	d			i	d
Diversify menus / Offer a local /seasonal meal to tourists	d		d		i		d	i		i	d		d				i			
Make some products available on request only	d		d	i	d		d	d		i	d		d			d	i		d	d

Long list of solutions	Hotspots in Tourism Value Chain – Dominican Republic																			
	GHG					Energy					Water					Waste				
	Beef and dairy products	Electricity use and heating and cooling	Primary production of fresh produce	Landfill emissions	Beverage	Electricity used for Hotel and restaurant activities	Meat and poultry products	Fresh produce	Transportation	Preparation and cooking of food	Water used for feed and livestock	Water use in hotels and restaurants	Primary production of produce	Water supply and pollution	Water use in the energy	Food waste in hotels and restaurants	Fresh produce	Water, air and land pollution from solid and liquid waste	Landfilled organic waste	Single use items
Monitor and measure food waste	i		i		i		i	i		i	i		i			d	i		i	
Review cooking and storage practices	i	i	i	i	i	i	i	i		d	i		i		i	d	i		d	
Communicate with customers and review portion and plate sizes	d		d	i	d		d	d		i	d		d			d	i		i	
Use of data / analytics to better predict demand for food and drink	i		i		i		i	i		i	i		i			i	i		i	
Staff training on the importance of food	i		i		i		i	i			i		i			i	i		i	
Donate uneaten food	i		i		i		i	i			i		i			i	i		i	
Food recycling programmes																			d	
Energy Audit		d				d			i	d					i					
Frequency Convertors		i				i														
Train architects in energy efficient design		d				d						i			i					
Improve access to finance		i				i			i	i		i			i					

Long list of solutions	Hotspots in Tourism Value Chain – Dominican Republic																			
	GHG					Energy					Water					Waste				
	Beef and dairy products	Electricity use and heating and cooling	Primary production of fresh produce	Landfill emissions	Beverage	Electricity used for Hotel and restaurant activities	Meat and poultry products	Fresh produce	Transportation	Preparation and cooking of food	Water used for feed and livestock	Water use in hotels and restaurants	Primary production of produce	Water supply and pollution	Water use in the energy	Food waste in hotels and restaurants	Fresh produce	Water, air and land pollution from solid and liquid waste	Landfilled organic waste	Single use items
Company GHG / Energy Policy	d	d			i	d	i		i							d		i	d	d
Own PV, biomass, wind turbines		i				i			i	i					i					
Improve efficiency and climate-friendliness of HVAC		d				d									i					
Increase efficiency of other electrical equipment		i				i				i					i					
Room energy management systems		d				d				i					i					
Laundry		d				d						d			i					
National GHG / Energy Policy	i	i			i	i	i		i	i					i			i		
Improve production / conversion of energy		i				i				i					i					
Mandatory standards for efficiency in large hotel		d				d			i	i		d			d					
National food waste strategy	i		i	i	i		i				i		i			i	i	i	i	
National circular economy policy package		i		i		i	i				i	i	i	i		i			i	i

Long list of solutions	Hotspots in Tourism Value Chain – Dominican Republic																			
	GHG					Energy					Water					Waste				
	Beef and dairy products	Electricity use and heating and cooling	Primary production of fresh produce	Landfill emissions	Beverage	Electricity used for Hotel and restaurant activities	Meat and poultry products	Fresh produce	Transportation	Preparation and cooking of food	Water used for feed and livestock	Water use in hotels and restaurants	Primary production of produce	Water supply and pollution	Water use in the energy	Food waste in hotels and restaurants	Fresh produce	Water, air and land pollution from solid and liquid waste	Landfilled organic waste	Single use items
Create incentives for purchasing more sustainable items	i	i	i		i		i	i			i	i	i	i		i	i			i
Promote the demand for certified products	i		i		i		i	i			i		i				i			
Enhance legislation on waste management to optimise waste management											i					i	i	d	i	i
Enhance legislation on water quality														d	i	i	i	i	i	i
Transportation Network									d											

Table 6: summary of recommended long list of interventions to address hotspots identified in the Dominican Republic tourism sector

8. Key Environmental Indicators

UN Environment (2017) sector identifies major environmental indicators that would help the tourism private sector to contribute to the Sustainable Development Goals (SDGs) and Paris Agreement using Life Cycle perspective. Based on the assessment of hotspots in the Philippines and Dominican Republic, Philippines and Mauritius, the following indicators are recommended:

Key Environmental Indicator	Level	Units	Evidence / Source which could be used for monitoring
Total energy use	Total and by functional unit	Megajoules, MJ	Grid electricity, renewable electricity, combustion of fuels.
Total volume of solid waste generated	By waste type, total and functional unit	Kilogrammes, kg	Surveys, national waste statistics
Total quantity of animal meat by meat type	Total and by functional unit	Kilogrammes	Purchase ledger
Corporate carbon footprint	Total and by functional unit	Kg CO_2eq	Corporate Social Responsibility Reports
Total Volume of Water Use	Total and by functional unit	Volume	Metering
Water Footprint (ISO14046)	Total and by functional unit	Volume	Databases (e.g. within LCA software)

Table 7: Recommended key environmental indicators.

Based on the surveys undertaken, data on energy use on site by hotels and restaurants is frequently collected and recorded. Data on waste and purchases are infrequently collected. Water footprinting is not undertaken on a regular basis by any organisation surveyed and corporate carbon footprint is infrequently reported. In order to use the recommended indicators there is a need for additional commitment from hotels and restaurants, along with the capacity building being provided through this project. Improvement of organisation structures for reporting ad co-ordination with public utilities and suppliers will be required to generate the required information.

Despite the limitation and size of samples of assessed hotels, there is a high degree of alignment between the hotspots indicated by (top-down) national-level databases (excluding imports) and bottom-up hotel survey data (including imports), and the contribution of tourism value chains to territorial energy demand, greenhouse gas emissions and water footprint has been quantified. The electricity gas and water sector, agriculture and food and beverages account for 53% of the GHG emissions associated with hotels and restaurants. Direct use of electricity, gas and water account for 21%. Scope 3 greenhouse gas emissions associated with rearing animals for meat and dairy products (enteric fermentation, manure)

account for 13% of the GHG emissions associated with hotels and restaurants. The national and survey data suggests that most GHG emissions are within the country.

The hotspots analysis process has identified several challenges in effectively providing a baseline for greenhouse gas emissions and resource efficiency of the all-inclusive hotels in the Dominican Republic.

Through databases such as Eora, territorial impacts can be identified for a range of environmental issues. However, whilst imports from overseas are quantified in terms of total expenditure, they are not identified as specific products. So, whilst it may be known how much has been spent by a sector on imports from a certain country, it is not possible to use the same database to identify what these imports are. Additional measures must therefore be taken to understand the importance of imported produce.

9. Conclusions

One way of addressing the limitations described above is to obtain data directly from organisations within the tourism value chain. To this end, a survey has been undertaken to gather data. However, a systematic issue is that accounts departments either do not have data available in a suitable format or are unable to provide data on purchases.

Meat and dairy products are also a hotspot in terms of water use, whilst electricity use on site is the energy hotspot for hotels and restaurants, and both electricity and meat products are hotspots for GHG emissions. Most of these impacts occur within the Dominican Republic. No data has been identified which would allow an estimate of total waste associated with hotels and restaurants. The data provided by hotels suggests that there is a wide range of waste sources, which may create several opportunities to address this issue.

Alignment between the national and hotel-specific data suggests that the omission of imports does not adversely impact on the identification of hotspots in tourism value chains, though it will inevitably affect the quantification (size) of the hotspot. Approximately 40 potential actions have been identified which can address the hotspots for the different environmental issues.

Sufficient data has been gathered to allow the project to progress to the next stage of shortlisting and prioritising interventions, which can address hotspots in the tourism value chain. In country partners will continue to collect information from individual organisations to increase the level of insights and aid quantification of impacts and opportunities. This is in preparation for the implementation phase of the project.

Governments, business and civil society in the Dominican Republic are starting to coordinate their actions to prevent climate change impacts, and pollution from tourism, but these coordinated initiatives remain limited in scope and scale and are often done in isolation. The effectiveness of policies should be enhanced by accessing relevant hotspots and by setting up structures that would allow for coordination between all stakeholders, including different ministries and public authorities, as well as by the adoption of a balanced mix of tools, including economic and legislative instruments based on a science-based approach. Platforms for coordination and exchange of best practices such as the one offered by local and regional association, and the Sustainable Tourism Programme of the 10 Year Framework of Programmes on Sustainable Production and Consumption patterns, are particularly effective to accelerate this transformation.