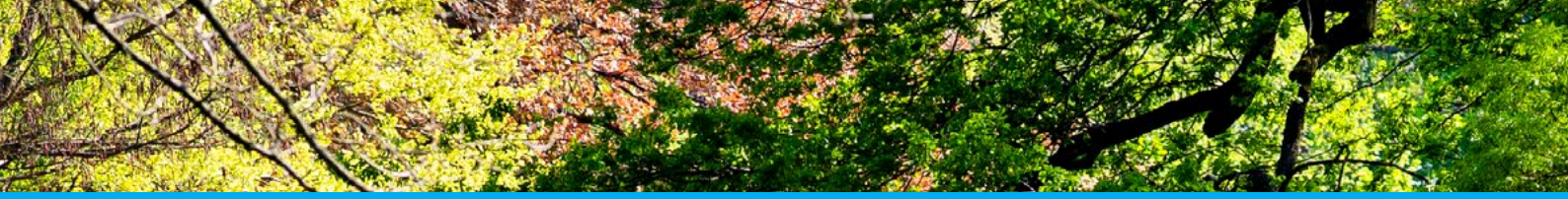

# Sustainability Research Agenda for Leisure, Tourism & Hospitality

CELTH Centre of Expertise leisure, tourism & hospitality

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# Executive summary

Urgent collaborative action is required to address the sustainability challenges of the Dutch Leisure, Tourisme, and Hospitality (LTH) sector. This research agenda therefore presents a prioritised list of potential, collaborative research projects in which researchers can collaborate with stakeholders in the sector and policymakers to strategically address specific, systemic sustainability challenges. The purpose of this research agenda is to give direction to knowledge development through research that contributes to accelerating sustainability in LTH. Compiling this research agenda, we adopted two guiding principles.

First, this research agenda acknowledges full-on the heterogenous and international character of the LTH sector. Comprising different subsectors, the LTH sector constitutes an international system that comprises tourism facilities and DMOs operating from destinations, different transport modes, and service providers such as tour operators operating from source markets. Governance of the LTH sector is thus complex because of this fragmentation and stakeholder involvement and collaboration crucial to advance sustainability. For this research agenda, a system perspective on LTH has therefore been adopted. The identified potential research projects are aimed at stimulating strategic collaborations between stakeholders of 8 identified subsectors to jointly address, in different constellations, specific sustainability challenges.

Second, this research agenda acknowledges that sustainability challenges are systemic and transcend subsector boundaries. Contemporary sustainability policies, such as the United Nations Sustainable Development Goals (SDGs), correspondingly cover a broad range of policy domains and do not distinguish between specific economic subsectors. The LTH sector will have to adapt to policies that address specific sustainability themes but that are not necessarily tailored to the situation of specific economic sectors. This research agenda has therefore adapted a comprehensive perspective on sustainability, incorporating 13 tested sustainability themes that allow the best focus on specific issues relevant to the LTH sector and that are grounded in daily practice and policymaking.

We composed this research agenda using a two-step approach. As a first step, we conducted a literature review and expert assessment (chapter 2). The literature review thematically maps sustainability-related policies and issues relevant to the LTH sector for each of the identified sustainability themes. The expert assessment evaluates the sustainability impacts of the different subsectors and the sustainability policy impacts on the different subsectors. We find that the sustainability impacts of fossil-fuel dependent tourism transport modes are most critical. The related subsectors are also most affected by sustainability policies.

The second step involved interviewing 13 stakeholders of the LTH sector to trace perceived issues in relation to the sustainability themes and to generate solution-oriented research questions (chapter 3). The interviews produced 270 research questions. We find that most research questions related to aviation, tourism destinations, and service providers (tour

operators). The most common sustainability themes concerned greenhouse gas emissions, energy use, and social quality in terms of the distribution of scarce resources (e.g. sustainable fuels) across subsectors. Categorisation of the research questions based on geographical scope; type of project activity; and knowledge field resulted 24 possible research projects and a list of possible graduation thesis projects for bachelor and master students.

Subsequently we identified the most urgent research projects based on a comparison of expert and stakeholder priorities (chapter 4). This resulted in the following shortlist of 6 priority projects:

- Communication for sustainable consumption measures, predicts and influences the behaviour of the general public in the Netherlands to make more sustainable consumption choice in LTH.
- Implementation of sustainable fuels across transport modes and production sectors identifies and tests effective measures that can help policymakers to effectively distribute limited stocks of sustainable fuels across tourism transport modes and production sectors.
- Sustainable cities addresses a range of urban environmental issues and related knowledge gaps to provide solutions that make cities more sustainable.
- Tourism as a catalyst for sustainability in other environmental policy domains sets up collaborations across the Dutch LTH subsectors to use tourism as tool to address the nitrogen crisis and enhance biodiversity in the Netherlands.
- Business models and products for more sustainable consumption supports LTH businesses to create better and more sustainable holidays for (Dutch) holidaymakers in the Netherlands and abroad.
- Circular economy destinations and events boosts circularity by reducing waste, water use, and energy consumption of tourism destinations and events in the Netherlands and other EU destinations frequented by Dutch holidaymakers.

A lack of effective stakeholder collaboration is often considered as the Achilles heel of the Dutch LTH sector. All projects in this research agenda therefore focus on stimulating stakeholder cooperation. They address issues that are relevant across subsectors. By fostering strategic partnerships across cross-sectoral boundaries, we hope that this research agenda will not only accelerate sustainability but also contribute to a more collaborative - and therefore resilient - Dutch LTH sector.

# 1. Introduction

This report presents the Sustainability Research Agenda for Leisure, Tourism, and Hospitality, developed under the oversight of CELTH. Sustainable development is high on local, national, and international political agendas. Just think of the climate crisis, biodiversity crisis, the nitrogen crisis, the health crisis, the demise of silence and quiet areas, unequal distribution of wealth and extreme poverty, and the stagnating development of the circular economy and challenges of a zero-emissions future. Sustainable development consists of aspects in the field of the environment, people, and the economy, of which some are limiting and some need balancing. The tourism, hospitality & recreation sector (hereafter LTH sector) plays a dual role in this: on the one hand, it creates value from natural resources such as the quality of nature, biodiversity, landscape, silence, clean air, and cultural heritage. On the other hand, the LTH sector has an impact on climate change, nitrogen oxides, loss of biodiversity and silence, and increasingly also on local communities at destinations. The LTH sector is sometimes a frontrunner in providing solutions to crises, but in many cases also lags. For instance, where emissions of carbon dioxide are now slowly reducing in most sectors, those of LTH are still on the rise (Scott & Gössling, 2021).

The question is: why is this the case? Is there a lack of knowledge, are legislative incentives pointing in the wrong direction, is the dominant growth paradigm in the LTH sector an issue? And if the latter, what exactly is 'growth'? Is it about the growth ambitions of individual entrepreneurs, about scaling up, or about growth of the entire sector? And growth of what? Turnover, profit, number of visitors, number of nights, eco-efficiency, or social impacts? The challenge, in line with the practice of the LTH sector, is to find not only novel economic models and paradigms, but also actions and adaptations that effectively reduce the negative environmental and social impacts of the sector, enhance the positive impacts, help to respond adequately to a rapidly changing policy environment, while maintaining an economically sound sector. Attention also needs to be paid to, among others, the role of digitization in both the emergence of sustainability challenges and their resolution, and the implications of possibly structural changes in travel behaviour as a result of the Covid-19 pandemic, societal change, and altering environmental awareness for the LTH sector.

Attempts to address these urgent questions picked up pace in 2018, when NBTC launched the national vision Perspective 2030 (NBTC Holland Marketing, 2019). It sketches the sustainable development of destination Netherlands and the changing role of tourism therein. The most important goal is that every Dutch citizen should profit from the LTH sector by 2030. Based on this widely supported vision, branch organisations, knowledge institutes and national, regional as well as local governments have translated this into an action agenda (EZK, 2019a). It contains concrete actions to achieve the goals set. During the COVID 19 pandemic the Taskforce Cooperation LTH Economy (Taskforce Samenwerking Gastvrijheidseconomie) was started by Gastvrij Nederland, NBTC, CELTH, IPO, VNG and the Ministry of Economic Affairs and Climate (EZK). After a revision of the action agenda early 2021 (EZK, 2021), the

Taskforce has started executing these actions. One of these, overseen by CELTH, concerned the drafting of a knowledge agenda on sustainability. The result is this report.

This research agenda presents a prioritised list of potential, collaborative research projects in which researchers can collaborate with stakeholders in the Dutch LTH sector and policymakers to address specific sustainability challenges. The purpose of this research agenda is to give direction to knowledge development through research that contributes to accelerating sustainability in LTH.

Compiling this research agenda, we adopted two guiding principles. First, this research agenda acknowledges full-on the heterogenous and international character of the LTH sector. Comprising different subsectors – providers of accommodation, activities, catering, tourism facilities, and different modes of transport that serve both inbound, domestic, and outbound tourism flows – the Dutch LTH sector has many relations with the rest of the world, be it destinations, international companies, and source markets. Governance of the LTH sector is thus complex because of its fragmentation and stakeholder consultation and collaboration across subsector boundaries is thus crucial to advance sustainability (see e.g. Guix & Font, 2022). A holistic perspective on LTH is therefore adopted. The research agenda distinguishes 8 LTH subsectors (table 1). And the potential research projects it identifies are aimed at stimulating strategic collaborations between stakeholders across subsectors in addressing sustainability challenges.

**Table 1. Leisure, Tourism, and Hospitality (LTH) subsectors.**

| |
|---|
| Accommodation |
| Restaurants / Cafes |
| Tourism facilities / Destination Management Organisations (DMOs) |
| Aviation |
| Rail / Public Transport (PT) |
| Car transport |
| Cruise |
| Service providers (including intermediaries) |

Second and related, this research agenda acknowledges that sustainability challenges are generally systemic, transcending subsector boundaries. Sustainability policies are correspondingly dispersed: they cover a broad range of policy domains. Take for instance the 2030 Agenda for Sustainable Development (United Nations, 2015). The Sustainable Development Goals provide particular themes to sustainability challenges. They are useful for goal-setting but do not distinguish specific economic sectors. The LTH sector will thus have to adapt to a range of international and national policies that address specific sustainability themes but that are not necessarily tailored to the situation of specific economic sectors. This research agenda has therefore adapted a comprehensive perspective on sustainability,

incorporating 13 sustainability themes based on the SASTDES project[1], because they allow the best focus on specific issues relevant to the LTH sector and because they are more grounded in daily practice and policymaking (see table 2).

**Table 2. Sustainability themes.**

| No. | Theme |
|---|---|
| 1 | Greenhouse gas (GHG) emissions |
| 2 | Energy use |
| 3 | Air quality |
| 4 | Water use |
| 5 | Water quality |
| 6 | Noise quality |
| 7 | Biodiversity quality |
| 8 | Safety |
| 9 | Landscape quality |
| 10 | Sustainable mobility access |
| 11 | Littering & waste pollution |
| 12 | Waste quantity |
| 13 | Social quality |

We composed this research agenda using a two-step approach. We first conducted a literature review in which we thematically mapped sustainability-related policies and issues relevant to the LTH sector. On 12 November 2021 we presented the results of this literature review during an online stakeholder meeting.

As a next step it was decided to conduct interviews with stakeholders of the LTH sector to 1) trace perceived issues in relation to the sustainability themes and 2) to generate solution-oriented research questions addressing these issues. Analysis of the interviews resulted in a list of 24 possible research projects.

The remainder of this report is organised as follows. Chapter 2 presents the literature review. Chapter 3 presents the results of the interviews and the possible research projects. Chapter 4 concludes with a possible prioritisation of these research projects and provides a number of recommendations for implementation.

1 See https://pure.buas.nl/en/projects/smart-assessment-sustainable-tourist-destinations-sastdes

# 2. Thematic literature review

The literature review is organised around the 8 subsectors and 13 sustainability themes (see figure/table 1 & 2). A panel of experts – consisting of the authors of this report and other CSTT researchers – have assessed the impacts of the different subsectors on the sustainability themes and the impacts of relevant sustainability policies on the different subsectors. The literature review is organised as follows. First we outline some of the main international sustainability policies. Then we look at the translation of these policies into national policymaking and implications for tourism accommodation, activities, and transport. We conclude the literature review with a synthesis of the specific sustainability and policy-related impacts affecting the 8 LTH subsectors for each of the 13 sustainability themes.

## 2.1 International sustainability policies

### 2.1.1 UN Sustainable Development Goals

In 2012, the UN Conference on Sustainable Development was the birth of the Sustainable Development Goals (SDGs) in which UN member countries defined the "future we want" and in 2015 created an action plan on how to transform the world, the 2030 Agenda for Sustainable Development. The Division for Sustainable Development Goals (DSDG) aims to "provide substantive support and capacity-building for the goals and their relate thematic issues" (UN, 2021). The SDGs directly address tourism in SDGs 8, 12 and 14, but LTH affects and is affected by all SDGs (see UNWTO-UNDP, 2017):

- SDG 8 (Decent Work and Economic Growth): "By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products"
- SDG 12 (Responsible consumption and production): "Develop and implement tool to monitor sustainable development impacts for sustainable tourism which creates jobs, promotes local culture and products".
- SDG 14 (Life below water): "by 2030 increase the economic benefits to SIDS and LDCs from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism".

Beyond, the UNWTO sees opportunities in tourism for innovation and resource-efficiency in relation to the sustainability themes *GHG emissions/energy use; water use; biodiversity quality; landscape quality;* and *sustainable mobility.* Tourism businesses can mitigate negative impacts and raise awareness amongst tourists about a more sustainable operation (UNWTO, 2021). For example, spatial planning in coastal areas under the blue economy growth paradigm acknowledges usage conflicts between navy transport, renewable energy production offshore, some local economics activities such as fisheries and tourism, but does not provide pathways or regulations on spatial planning yet. Therefore, the SDGs can be interpreted as potential pathways in line with international agreements. Those are to be interpreted by national governments for sectors and goals and in response to local

environmental, social and economic challenges in relation to tourism (for some first analyses of such national policy reports, see UNWTO-UNDP, 2017; UNWTO-UNEP, 2019).

The SDGs, in other words, are not regulatory trajectories for tourism sectors or firms. Research furthermore shows how the SDGs tend to be adopted in tourism to further justify 'business as usual', i.e. to prolong the incumbent growth-through-innovation paradigm (see e.g. Hall, 2019). The SGDs are poorly equipped to accomplish paradigm shifts or identify core issues and actions, but may be used as inspiration for national, regional, local, and sector & firm-based goal-setting exercises. Examples include so-called 'roadmap' initiatives. A key issue such initiatives however face is accomplishing implementation and concrete progress (see e.g. Scott & Gössling, 2021).

**Potential research questions are:**

- How are the SDGs implemented in tourism businesses and are they useful to decrease environmental and social impacts of those businesses?
- How have SDGs been translated into national tourism policies? By whom and with what intention?

### 2.1.2 EU policies

Several relevant EU policy initiatives are emerging or have recently been completed, notably the EU Green Deal (EC, 2019) and the Transition Pathway for Tourism (EC, 2022), affecting most or all sustainability themes[2]. EU directives are not binding for EU citizens until they are translated into national law. In most cases, EU directives are eventually adapted into national law in an adapted format. It is therefore relevant to investigate EU directives as a way of forecasting national policy changes and the implications for the (long-term) investments of sectors and firms.

**Potential research questions are:**

- How do tourism-related EU policy directives get reworked in national policy processes?
- To what extent are LTH stakeholders included in these translation processes?
- What are the impacts of tourism-related EU policy directive-led national policies on LTH stakeholders?
- How are the SDGs implemented in tourism businesses and are they useful to decrease negative environmental and social impacts of those businesses?

### 2.1.3 Circular Economy Transition

The circular economy transition comprises most or all of the sustainability themes. In contrast to traditional linear production and consumption systems, a 'circular' production and consumption system replaces "the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes" (Kirchherr et al., 2017, p. 224). Strictly understood, circularity also implies the

2 For this review, a working report of the Transition Pathway for Tourism was used: EC. (2021b). Scenarios towards co-creation of transition pathway for tourism for a more resilient, innovative and sustainable ecosystem. Commission staff working document. SWD(2021) 164 final. European Commission. https://ec.europa.eu/docsroom/documents/45977 .

transition to renewable energy sources. The circular economy concept seems promising for tourism to reduce its impacts and reach its emission goals. First explorative studies have been conducted on how the circular economy paradigm can be adapted in tourism (e.g., UNECE, PbL)[3]. The circular concept, in contrast to the growth paradigm, demands systematically rethinking operations, supply and tourism transport.

**Potential research questions are:**

- How do tourism businesses implement current policies and regulations on environmental and climate issues?
- How do tourism businesses prepare for the energy transition, particularly regarding buildings on one side and the increase in energy (and other materials) prices on the other?
- How is tourism affected by circular changes?
- How can tourism co-create policies for a more resilient, innovative, and sustainable future?
- How can tourism involve the local community in its effort to become regenerative?

## 2.2 National policymaking for sustainability

The changing role of tourism in relation to sustainable development is clearly expressed in the vision paper Perspective Destination Netherlands 2030 (NBTC Holland Marketing, 2019). Focus is put on destination attractiveness, accessibility, and sustainability. Regarding the latter, it stresses the large carbon footprint of Dutch tourism, and the role of aviation as well as inbound visitors therein. It also notes that visitor growth will result in increases of emissions, consumption, food waste, pollution, and impacts on nature. It further refers to the climate target of the current government, stating that "though not explicitly mentioned in the agreement, the visitor economy can structurally contribute to this goal by prioritising the making of transport, accommodation, and entertainment more sustainable. This is not so much a responsibility as an opportunity" (NBTC Holland Marketing, 2019, p. 16). Other national policy initiatives, such as the 'Civil Aviation Policy Memorandum' (I&W, 2020), can restrict tourism flows as it limits airport expansion to curb environmental impacts (GHG emissions; noise).

At provincial or municipal levels, the relation between tourism and sustainable development issues have received limited attention, but there are notable exceptions in key tourism destinations. Examples include but are not limited to Schouwen-Duiveland and Provincie Fryslân (2020). Beyond a few specific cases, there is limited designated policy action to address tourism and sustainability related issues at local or regional level.

Translations of aforementioned international policy initiatives into national tourism-related policies with clear objectives and implementation plans have however been marginal so far.

3 See https://pure.buas.nl/en/projects/applying-principles-of-circular-economy-to-sustainable-tourism & https://pure.buas.nl/ws/portalfiles/portal/15719182/PBL_Circular_economy_the_impact_of_circular_choices_in_holidaymaking_and_mobility.pdf

In Dutch interpretations of the SDGs, such as SDGNederland.nl, tourism does not feature yet. And critics have observed that budgets and responsibilities for tourism growth and sustainability goals are separated in terms of their governance, which shows to be ineffective in controlling over-tourism or tourism impacts (Koole, 2019). Large scale, generic EU policy initiatives and related investments, such as the EU Green Deal, will ultimately result in aligned national policies across economic production sectors. More specific, tourism-related policy initiatives, such as the Transition Pathway for Tourism mainly serve as a source of inspiration for policymakers when it comes to agenda setting and prioritisation of policy actions. And, as the Netherlands aims to become fully circular by 2050 (I&M & EZ, 2016), the circular economy transition will systematically impact the LTH sector.

**Potential research questions are:**

- To what extent is the impact of tourism on sustainable development issues incorporated in regulation and policy?
- How are these policymaking processes reinforcing and what opportunities does tourism have to co-create environmental and circular policies on one side and caring that tourism reinforce the socio-cultural heritage of a destination on the other?
- Who is responsible for the policies?
- What indicators are used to determine the success of the policy?

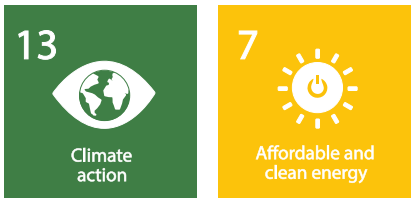
## 2.3 Policy impacts per sustainability theme

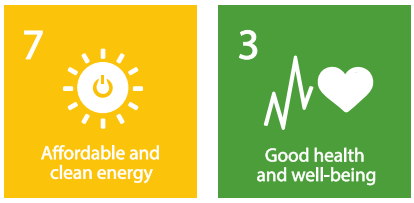
The sections in this paragraph present a detailed description of definition/description of each theme; its relation to tourism and to relevant SDGs; and the most relevant national and international policies and their likely effects on tourism.

# 1 Greenhouse gas (GHG) emissions

| Item | Description |
|---|---|
| **Definition** | Greenhouse gas (GHG) emissions cause the temperature on earth to increase as compared with pre-industrial times (19th century). The most well-known GHG-emission is carbon dioxide (CO2), but there are several others like Methane, Nitrous Oxygen, certain CFCs and HFCs. Since the industrial revolution, the CO2 concentration has risen from 270 ppm to 410 in 2020 (Lindsey, 2020). CO2 and other GHGs cause the atmosphere to capture more energy from sunlight before it is dissipated to space again, which causes the temperature rise. The current temperature anomaly, the change with respect to pre-industrial levels, is 1.15° C (IPCC, 2021), but regional differences are large. Climate change has become one of the worst and most existential environmental issues for humanity (McPherson, 2021). The scientific evidence was already clear and became political by the address of dr. Hansen of NASA to the US Senate in 1988, which contained a strong warning against climate change (Besel, 2013). Currently, the situation develops gravely, because tipping points, which destabilise the global climate system, now emerge (Lenton et al., 2019). At the same time, the Paris Agreement on Climate Change (UNFCCC, 2015), triggered reduction of GHG emissions to hold the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels. |
| **Relation tourism** | Tourism causes globally about 5-8% of CO2-emissions (Scott, 2021) by burning fossil fuels for transport, heating and cooling accommodation and all sorts of tourism activities. Roughly, transport causes 75% of the emissions, accommodation some 20% and other parts of tourism 5% (UNWTO-UNEP-WMO, 2008). The emissions per trip vary extensively depending in the first place on the distance between home and destination, but also on the transport mode used and the type of accommodation. Detailed calculations of the carbon footprint of Dutch holidaymakers show the carbon footprint per trip to range from, for instance, 73 kg CO2 for a domestic three-day trip by public transport, up to 4.900 kg for a four-week holiday to Australia. Though air travel globally serves only some 22% of all trips, it causes >50% of all emissions due to the long distances covered.<br>Tourism is also much affected by climate change because increasingly, currently popular destinations like the Mediterranean become too hot, the number of snow days for winter sports are now quickly declining, and destinations are increasingly destroyed by floods (Eifel, Ardennes), fires (all of the Mediterranean), droughts, storms, and other extreme weather events. |
| **SDGs** | |

| Item | Description |
|---|---|
| **National policies** | Klimaatakkoord (EZK, 2019b) (Nationally Determined Contribution, NDC), transport and aviation policies. Goals: -49% emissions in 2030 with respect to 1990 levels (for aviation 0% reduction with respect to 2005 level), energy transition (gas will be exchanged with renewable energy forms). |
| **International policies** | UN Paris Agreement (UNFCCC, 2015), EU Green Deal (EC, 2019) and 'Fit for 55' package (EC, 2021a), ICAO CORSIA (ICAO, 2019). Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). |
| **Impact on Tourism industry** | GHG Emission policies will affect accommodation because these will have to decarbonise through the climate agreements for buildings. Transport where electric car shares are expected to be 20% by 2030 (PwC, 2021), after which only electric new cars can be sold, leading to around 100% by 2050. More charging infrastructure around tourism accommodations and attractions. Weight reduction in campervans, caravans, etc. Also important for accommodation, public transport use further promoted, walking, cycling and railways and increasing share of public transport busses are existing zero-emission options, mandate to mix 14% expensive sustainable alternative fuels at Dutch airports by 2030 and a carbon cap for all emissions per airport in 2030 at the level of 2005. In general, high-energy, high-carbon parts of tourism will become more expensive; low-carbon options may become more popular as the public increasingly supports reductions. The popular climate compensation or off-setting of emissions by buying credits from others who reduce their emissions, is increasingly criticised as offsets can never reduce overall emissions and the reliability of most offset projects is doubted (Cames et al., 2016). |
| **Main policy impacts** | Increased energy cost, increased cost for car travel and aviation, potential constraints to aviation growth, relative better competitive position of public transport and rail travel, further pressure to not apply offsets. |
| **Links other themes** | Energy, air quality, sustainable mobility access. |

| Item | Description |
|---|---|
| **Definition** | Energy use is strongly linked to GHG emissions, as most energy use in the Netherlands is still largely dependent on fossil fuels. Renewable energies represented 11% of Dutch energy consumption in 2020 (CBS). In the Netherlands, gas is very important for heating, amongst others, but gas extraction has led to earthquakes and other drilling damages. Henceforth, production on the mainland will be strongly reduced in the coming years. At the same time, several low-carbon options like synthetic fuels made from renewable energy and $CO_2$ from the atmosphere, require large amounts of those renewables. This high energy-use is problematic in a world with a growing shortage of renewable energy and a growing demand from all sectors. |
| **Relation tourism** | All of tourism is dependent on energy, and virtually all energy use in tourism is derived from fossil fuels. The distribution of energy use over the different tourism elements is not much different from that of GHG emissions. Total energy use in tourism was estimated at 16,697 PJ in 2010, and forecasted to increase to 44,110 PJ by 2050 (Gössling & Peeters, 2015). Embedded energy, such as in food, is an additional issue. This high energy dependency makes tourism vulnerable in view of the required energy transition. It is already vulnerable to fluctuating energy prices. |
| **SDGs** |  |
| **National policies** | Klimaatakkoord (EZK, 2019b) (Nationally Determined Contribution, NDC), transport and aviation policies. Information an many NDC's can be found on Climate and Energy College (2018). Goals: -49% emissions in 2030 with respect to 1990 levels (for aviation 0% reduction with respect to 2005 level), energy transition (gas will be exchanged with renewable energy forms). Aviation Memorandum (I&W, 2020): Blending obligation for sustainable fuels (14% in 2030, 100% in 2050). Production Sustainable Aviation Fuels and eFuels. |
| **International policies** | Paris Agreement. EU Green Deal: Climate Law (EP & Council of the EU, 2021); Climate neutral in 2050, (-55% in 2030) through contribution from all sectors. Transition to a safe, sustainable, affordable, and secure energy system. EU Green Deal: Mobility Strategy (EC, 2020d); Towards emission-free transport. Eu Green Deal: Offshore renewable energy (EC, 2020b). Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). |
| **Impact on Tourism industry** | See 'GHG emissions': Transport, Accommodations, Restaurants, Attractions. |
| **Main policy impacts** | See 'GHG emissions' |
| **Links other themes** | GHG emissions, air quality, sustainable mobility access. |

| Item | Description |
|---|---|
| **Definition** | Air quality relates to the absence or presence, i.e. the concentration of air pollutants. Too high concentrations are linked to health issues and eutrophication. It is here limited to outdoor air. The main air pollutants are NOx, $NO_2$, $SO_2$, ammonia, Volatile Organic Compounds (VOCs), carbon monoxide (CO) and Particulate Matter (PM). In the Netherlands, the largest sources for these pollutants are: NOx – transport, followed by industry; $NO_2$ – foreign origin and road transport; $SO_2$ – shipping, refineries and energy production; ammonia – animal husbandry; VOCs - (road) transport; PM10 – transport, followed by industry and agriculture (RIVM, n.d.). |
| **Relation tourism** | Tourism transport is one element in the various air quality issues that transport causes. Road transport has large shares of carbon monoxide (CO), nitrogen oxides (NOx), and particulate matter (PM) emissions, while cruise ships are a part of international shipping (NOx, PM, and sulphur oxides (SOx)). Aviation is mainly visible through NOx, whereas rail travel plays a negligible role compared to these other modes. Airplanes NOx and PM emissions play a role in air quality and health issues around airports. Except for shipping and aviation, air pollutants have decreased for all transport modes in the EU since 1990 (EEA, 2021). |
| **SDGs** |  |
| **National policies** | Nitrogen crisis/Nitrogen Act (LNV, 2021): Gain nitrogen space, only then spend a limited amount on social and economic activities. Cabinet investments in, among other things, electric taxiing of aircraft and in catalytic converters and shore power facilities. |
| **International policies** | EU Ambient Air Quality Directives (2013), under revision (2022)[4]. Various European legal mechanisms are used to address air quality. Low-emission zones in cities, congestion charges, car emission standards, fuel quality requirements, setting of limit or target values for ambient concentrations of pollutants, etc. |
| **Impact on Tourism industry** | Possible construction restrictions (accommodations), but also possible development of recreation/tourism in transitional areas: new nature (see Advisory Committee on Nitrogen Problems). Possibly less or no growth in inbound flights, lower emissions from cruise ships during port visits. Shift from air to rail on distances under 750/1000km. Shift from car to rail in getting to airports. Electric car shares are expected to be 20% by 2030 (PwC, 2021), after which only electric new cars can be sold, leading to around 100% by 2050. More charging infrastructure around tourism accommodations and attractions. Weight reduction in campervans, caravans, etc. |

4 See https://ec.europa.eu/environment/air/quality/revision_of_the_aaq_directives.htm

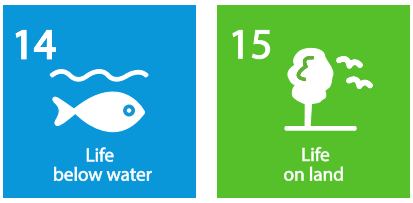
| Item | Description |
| --- | --- |
| **Main policy impacts** | Increased energy cost, increased cost for car travel and aviation, potential constraints to aviation growth, relative better competitive position of public transport and rail travel. |
| **Links other themes** | GHG emissions, energy, sustainable mobility access. |

| Item | Description |
|---|---|
| **Definition** | Quantitative use of rain-, surface- and groundwater. According to the UN, 2.3 billion people lived in water-stressed countries in 2018. |
| **Relation tourism** | Fresh water is an essential resource for tourism. Next to direct consumption, it is used for hygiene, cleaning, swimming, irrigation, artificial snowmaking, landscaping, certain leisure activities, construction processes, and for the production of (bio)fuels. Tourism almost certainly increases overall water consumption. Though in most countries, water use by tourism is less than 5% of domestic water use. Water use in tourism is problematic in a range of destinations due to travel taking place in warm countries during dry seasons, but also for instance in the production of artificial snow for winter tourism (Gössling, 2015). In recent years, the Netherlands has seen regional water shortages during drought spells, with occasional measures taken that limit water consumption. These measures may also affect tourism (mainly pool and shower use). Droughts have also affected the landscapes that tourists visit (e.g. vegetation). |
| **SDGs** | |
| **National policies** | National Water Plan 2016-2021 (I&M & EZ, 2015). Planning against flooding with water-robust design, developing nature, shipping, agriculture, energy, housing, recreation, cultural heritage, and economy in line with water tasking. |
| **International policies** | EU Water Framework Directive (EC DG Environment, 2014). In the Netherlands, the larger water bodies (>50ha) and rivers fall under the Directive ('KRW waterlichamen'). Water scarcity is increasing, advice for the public: reduce consumption, reuse, recycle, buy organic; states: introduce water policy for tourism (among others), apply polluter pays principle, nature-based solutions, governance, research & innovation. Future European Agenda for Tourism 2030/2050 (transition pathway for tourism). |
| **Impact on Tourism industry** | Accommodations, restaurants, activities (catering for transport modes): lower water consumption, higher water price, subject to water management plans. |
| **Links other themes** | GHG emissions, landscape quality, water quality. |

# 5 Water quality

| Item | Description |
|---|---|
| **Definition** | Water quality refers to chemical (33 substances) and ecological characteristics of surface and groundwater. In 2019, the chemical quality of Dutch Framework Directive water bodies was insufficient in 75% of all cases, ecological quality between moderate and poor. The latter mainly due to the biological quality being insufficient in 94% of all cases (CLO, 2020). A large citizen science project found similar poor results for the water quality of small, non-Framework waters (Natuur & Milieu, 2021). |
| **Relation tourism** | Good water quality is essential for a range of tourism needs, such as drinking water, recreational use, indirectly through sustaining biodiversity and landscapes, etc. Tourism can affect water quality through insufficient wastewater management, the use of chemicals and pesticides (from gardening to artificial snowmaking), overconsumption and so on. The poor surface water quality in the Netherlands is explicitly noticeable in tourism through bathing restrictions in summer for many water bodies. Water quality is also affecting biodiversity, which has effects on (tourism) landscapes, attractive species, etc. |
| **SDGs** | |
| **National policies** | Waterwet (Rijksoverheid, 2009). |
| **International policies** | EU Water Framework Directive (EC DG Environment, 2014). In the Netherlands, the larger water bodies (>50ha) and rivers fall under the Directive ('KRW waterlichamen'). The Netherlands must ensure 'good' water quality by 2027. See water quantity. Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). |
| **Impact on Tourism industry** | Restrictions on wastewater discharge, for example for pleasure boats, marinas, but also recreation & sport facilities. |
| **Main policy impacts** | Increased costs for filtering/cleaning wastewater. Improved conditions for bathing water and biodiversity. |
| **Links other themes** | Air quality, landscape quality, water use. |

| Item | Description |
|---|---|
| **Definition** | The World Health Organization (WHO) classified traffic noise, including road, rail and air traffic, as the second most important cause of ill health in Western Europe, behind air pollution caused by very fine particulate matter (WHO & JRC, 2011). In the Netherlands, some 70% of all homes suffers an average exposure of more than 50 dB(A) per 24 hours, largely due to road- and air transport. Continuous exposure to noise leads to stress reactions and a heightened chance of cardiovascular diseases, as well as to sleep disturbance. Aviation noise also negatively impacts children's learning (Gezondheidsraad, 2006). |
| **Relation tourism** | Transport is the main source of environmental noise in Europe. Aviation causes noise hindrance, mainly around airports, but also on low-level flight paths. The amount of people affected depends on measurement criteria, on which there is a lot of discussion. 113 million people in Europe (the 33 EEA countries) are exposed to day-evening-night noise levels of 55 dB or higher due to road traffic. Railway noise affects 22 million people, aircraft noise 4 million. Aviation noise pollution is also noted in Silence Areas (Stiltegebieden; conflict with tourism air travel e.g. Maastricht Aachen Airport and Zuid-Limburg, (Peeters et al., 2020)). Some 40% of Dutch respondents perceives traffic noise in natural areas as problematic. Without government action, some 30 to 40 per cent of official quiet areas and nature reserves and recreation areas could be affected by noise over time, especially road traffic and aircraft noise (Gezondheidsraad, 2006). |
| **SDGs** | |
| **National policies** | Wet Geluidshinder (Rijksoverheid, 2017). Wet Milieubeheer (Rijksoverheid, 2022). Aviation Memorandum (I&W, 2020): aviation memorandum allows further growth but must be without hindrance to residents (growth earnings model). Stiltegebieden: preferred limit value and maximum exemption value vary from source and situation. |
| **International policies** | EU Environmental Noise Directive (EC, 2002). No strict regulations yet, current stage: determining noise exposure with sound maps and the public involved. WHO Noise Guidelines (WHO, 2018). |
| **Impact on Tourism industry** | Incoming/Outbound: slower growth, possible decline, or change composition of incoming markets due to effect on airlines. Domestic: possible positive effect due to less noise. |
| **Links other themes** | Energy, air quality, sustainable mobility access. |

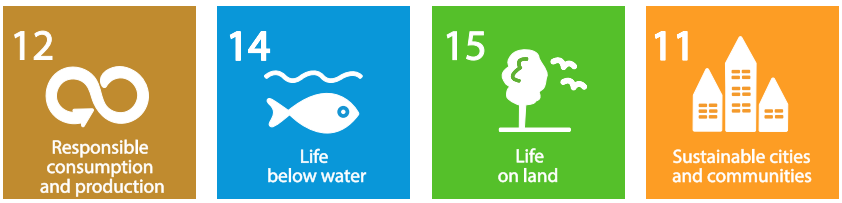
| Item | Description |
|---|---|
| **Definition** | Biodiversity provides a wide range of ecosystem services, such as food crops, freshwater, and clean air & other essential elements for tourism, e.g. aesthetic landscape or charismatic species. Biodiversity is deemed essential for the continued development of the tourism industry (Christ et al., 2003). |
| **Relation tourism** | Tourism contributes to biodiversity loss through land conversion, habitat fragmentation, indirectly through its share in greenhouse gas emissions, overexploitation of natural resources, the spread of invasive species and various types of pollution (UNWTO, 2010). |
| **SDGs** |  |
| **National policies** | Nature conservation Act (Rijksoverheid, 2019). Landowners who preserve their estate and open it to public get tax benefits. Farmers, nature organisations and private landowners get grants to manage the land in a nature-friendly way. |
| **International policies** | EU Green Deal: Climate Law (EP & Council of the EU, 2021) - Improving adaptive capacities to minimize the impacts of climate change in a socially balanced way with nature-based solutions. EU Green Deal: Biodiversity Strategy 2030 (EC, 2020a) - Expansion of Natura 2000 areas with strict protection, nature management plan, funding for governance in biodiversity management. Post-2020 global biodiversity framework. UN Convention on Biological Diversity. Upcoming global treaty (UNEP CBD, 2021) - Upcoming Paris-style convention on biodiversity, with potentially far-reaching implications. Objectives include increasing marine/land protected areas to 30% of the global surface, large-scale mitigation of climate change by nature, eliminating US$500 billion in harmful environmental subsidies per year, greatly reducing pollution and biodiversity loss. Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). |
| **Impact on Tourism industry** | Increase or decrease in nature reserves accessible to tourism, stricter rules for tourism in nature reserves. Stricter regulations for accommodations etc. Lower subsidies for car and air transport. |
| **Links other themes** | GHG emissions, air quality, noise quality, water quality, landscape quality, littering & waste. |

| Item | Description |
|---|---|
| **Definition** | Safety relates to a whole range of risks for persons or sectors, that occur from engaging in a certain activity to simply being in a certain place: from terrorism and crime, to accidents, to diseases and other health impacts, to the effects of economic or environmental crises. |
| **Relation tourism** | As part of general transport, tourism transport faces the same safety/accident risks. Hypermobility is also associated with physiological, emotional and social consequences (Cohen & Kantenbacher, 2019). Some tourism activities show relatively high health/safety risks. Conflicts between users of different activities can occur. Food safety is a well-known issue in tourism. Safety can also be an issue where large concentration of visitors occur, varying from accident to crime to terrorism risks. Both tourism transport and high tourist concentrations carry the risk of pathogens spread. Climate change has increased health and safety risks for tourists through more frequent extreme weather events, droughts, extreme heat, flooding, etc. Safety also refers also to LTH staff safety. Here concern varies from use of chemical substances for cleaning to emotional labour to sexual harassment. |
| **SDGs** | |
| **National policies** | General travel advice, ad-hoc regulations such as Dutch (COVID-19) travel regulations. |
| **International policies** | EU: coverage of hospital admissions within EU for all EU citizens; consular cooperation; Crisis Readiness Report (WTTC & Global Rescue, 2019); ad-hoc regulations such as COVID-19 travel regulations |
| **Impact on Tourism industry** | Travel regulations hinder tourism flows and reliability. Can lead to more bureaucracy and fewer guests in accommodations, restaurants, or overall. Can spur domestic and decrease international tourism. |
| **Links other themes** | Sustainable mobility access, social impacts, GHG emissions. |

| Item | Description |
|---|---|
| **Definition** | Human alteration of the Earth's land surface is one of the causes and consequences of Global Environmental Change. It mainly refers to man-made changes in land cover and land use by humans (for whatever purpose). Land use changes are strongly linked to climate change, biodiversity loss, water issues, etc. |
| **Relation tourism** | "The use and conversion of lands is central to tourism. Direct uses of land for tourism and recreation purposes include airports, roads, railways, paths, trails, pedestrian walks, shopping areas, parking, campsites, vacation homes, golf courses, marinas, ski areas, and indirect land use for food production, burying grounds for solid wastes, lands to treat wastewater, and industrial areas required for production (computers, TVs, beds, etc.). The area affected by tourism is thus significantly greater than the directly built area. Land use for tourism represents one of the areas where research is insufficient and where considerable refinement is needed in the future" (Gössling & Peeters, 2015, p. 645). The increase in tourism land use between 2010 and 2050 may even be higher than that of tourism energy use or GHG emissions (Gössling & Peeters, 2015). Tourism land use is partly concentrated in more vulnerable areas, notably coasts. |
| **SDGs** | |
| **National policies** | Kustpact (I&M, 2017). |
| **International policies** | No specific policy (but Natura2000 expansion, policies for renewable energies, etcetera, certainly play a role in landscape) |
| **Impact on Tourism industry** | Particularly stronger regulations for accommodations, restaurants, and facilities. No new constructions near coastal Natura2000 areas. Kustpact (I&M, 2017) (signed by governmental bodies, recreation and nature orgs) divides the Dutch coast in zones where construction is allowed and under what conditions. |
| **Links other themes** | Biodiversity quality, water quality, air quality |

| Item | Description |
|---|---|
| **Definition** | Sustainable mobility access relates to low-impact transport modes and connections to get to and from destinations, as well as within them. |
| **Relation tourism** | Tourism is based on transport, and most travellers to and from the Netherlands currently rely on car and air transport. More sustainable alternatives like train and bus are underused in tourism. Travel within Dutch destinations is a mix of car, public transport, and bicycle, and could move more towards the latter two along with an improved offer. |
| **SDGs** | |
| **National policies** | Dutch Mobility Strategy. Climate Agreement (EZK, 2019b). |
| **International policies** | Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). EU Green Deal: Mobility Strategy (EC, 2020d): At least [70%] of the local and domestic tourism offer is based on climate neutral travel options, including collective travel. |
| **Impact on Tourism industry** | Policy-induced shifts towards cleaner (zero-emission) transport will also require adaptation of tourism offers. Destination accessibility without cars. |
| **Main policy impacts** | New urban mobility concepts. From 2025, all new public transport buses must be zero-emission. (2030) emission-free cars, 100 climate-neutral cities, double high-speed train traffic, collective travel under 500 km must be CO2-neutral, automated mobility, emission-free seagoing vessels, and aircraft (2035) are market-ready: (2050) all street transport emission-free; (n.d.) zero-emission airports and ports, carbon pricing, connected and automated multimode mobility, capacity increase inland waterways and railways. |
| **Links other themes** | GHG emissions, energy use, air quality |

# 11 Littering and waste pollution

| Item | Description |
|---|---|
| **Definition** | Littering and waste pollution refers to uncontrolled or unmanaged waste production and disposal, leading to various pollution, social impacts, and management issues. |
| **Relation tourism** | In 2011, UNEP estimated that international tourism alone was responsible for 14% of total global municipal solid waste. Tourism waste can stress the local waste management infrastructure, particularly during the high season and in destinations where facilities are still underdeveloped. Tourists play a large role in take-away/one-time-usage products and their (uncontrolled) disposal in various environments (cities, beaches, forests, etc.). |
| **SDGs** |  |
| **National policies** | The Netherlands Circular in 2050 (I&M & EZ, 2016) - Towards 2050 less and less waste, more and more recyclable. Impact in the field of resource use, plastics, mattresses, etc. |
| **International policies** | EU Waste Directive (EP & Council of the EU, 2008) - Improve waste management, stimulate innovation in recycling, limit landfilling, reduce food waste by 30% by 2025, separate collection of bio-waste, prevent packaging waste. EU Green Deal - circular economy (EC, 2020c). EU single-use plastics (EP & Council of the EU, 2019). Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). |
| **Impact on Tourism industry** | Operational changes for accommodations and restaurants. Waste infrastructure requirements for destinations, transport locations, etc. |
| **Links other themes** | Waste quantity, water quality, landscape quality. |

| Item | Description |
|---|---|
| **Definition** | Waste quantity is linked to overconsumption and overproduction, where an activity produces more waste than is necessarily needed and leads to a large range of issues (disposal, recycling, burning, resource shortages). |
| **Relation tourism** | Food consumption in tourism, with an estimated 75 billion meals a year, leads to a range of sustainability issues (Gössling et al., 2011). For instance, food waste in the tourism food service industry is considerable (Martin-Rios et al., 2018). The food waste share of hospitality waste and of restaurant waste is 40 and 60% respectively (Pirani & Arafat, 2014). In 2011, UNEP estimated that international tourism alone was responsible for 14% of total global municipal solid waste. Tourism waste can stress the local waste management infrastructure, particularly during the high season and in destinations where facilities are still underdeveloped. |
| **SDGs** | |
| **National policies** | The Netherlands Circular in 2050 (I&M & EZ, 2016) - Towards 2050 less and less waste, more and more recyclable. Impact in the field of resource use, plastics, mattresses, etc. |
| **International policies** | EU Waste Directive (EP & Council of the EU, 2008) - Improve waste management, stimulate innovation in recycling, limit landfilling, reduce food waste by 30% by 2025, separate collection of bio-waste, prevent packaging waste. EU Green Deal - circular economy (EC, 2020c). EU single-use plastics (EP & Council of the EU, 2019). Future European Agenda for Tourism 2030/2050 (transition pathway for tourism) (EC, 2021b). |
| **Impact on Tourism industry** | Operational changes for accommodations and restaurants (planning, buying, offer, recycling). |
| **Links other themes** | Littering & waste pollution |

| Item | Description |
|---|---|
| **Definition** | Social quality in linked to the positive and negative impact of tourism, including hospitality, on staff, guests, and the surrounding community |
| **Relation tourism** | **Staff**: According to a study published by ABN AMRO Bank in September 2019, before the COVID-19 pandemic, the Dutch Food Service and Hotel Industries (HORECA) suffered from an annual 47% employee turnover rate leading to an estimated cost of 1.4 billion euros (Driessen, 2019). The report argued that employees in the Netherlands were leaving the industry because of low pay, workload, lack of career opportunities, and inadequate guidance. That HORECA has difficulty in finding and retaining employees is a fact that has been signalled already decades ago. The pre-COVID growth of tourism made finding and retaining staff difficult, but after COVID vacancy rates increased dramatically, while the difficulty to find new staff is exacerbated because laid-off staff found (better) jobs elsewhere and are unwilling to return (Duin, 2020). It is estimated that the Dutch HORECA sector has approximately 14,000 published job vacancies, which is considered a significant shortage of staff (Perachi, 2021). Job pay is increasing consequently. This is a relatively good news for the staff but will inevitably lead to increase in prices for the guests and tourists. A side question hereby is whether the HORECA is prepared for this rise.<br>A second set of issues related to SDG 5 and 8 is gender equality in career opportunities and salary where gender goes further than the dichotomy male/female; emotional labour; working conditions (long hours, low pay, seasonal jobs, sexification of – mainly female – body, on the problematic side). On the bright side, HORECA is champion in training on the job; an expertise that could be better highlighted.<br>**Guests/tourists**: Related to SDG 3, and particularly for F&B operation, is engaging with healthy and sustainable food in the context of two trends: increased consumption of food out of door; slowly but steadily increasing request for healthy and sustainable (including vegetarian and vegan) options. These trends connect and reinforce both the so-called protein transition and the choice for circularity in food production (Geurts et al., 2017).<br>**Community**: Tourism and hospitality improve the socio-economic perspectives of a community and may contribute to its safety when properly managed. Not properly managed (e.g. overtourism; strong seasonality; displacement of local community for tourists by for example increasing house prices; loss of community services such as food shops and kindergarten) they can lead to deteriorating socio-economic conditions, health, and safety (Fried, 2017)). |
| **SDGs** | |

| Item | Description |
|---|---|
| **National policies** | **Guests/healthy food**: 1) Covenant on fight against obesitas (see Rijksoverheid, n.d.). Can be translated into policy when progress is slow. 2) Transition from animal-based to plant-based protein (LNF, 2020).<br>**Community**: Perspective 2030: balance tourism-liveability residents (NBTC Holland Marketing, 2019).<br>Plan of action - supporting the transition to circular agriculture (LNF, 2019). |
| **International policies** | **Staff**: gender pay gap and equal pay: According to article 157 of the Treaty on the Functioning of the European Union (TFEU) each EU Member State must ensure the application of the principle of equal pay for men and women for equal work or work of equal value.<br>**Staff**: labour standards: ILO international labour standards, particularly the Declaration on Fundamental Principles and Rights at Work (1998) outlines the four main principles of freedom of association and the right to collective bargaining, elimination of all forms of forced labour, effective abolition of child labour and non-discrimination in respect of employment and occupation (ILO, 2010); the Tripartite declaration of Principles concerning ME and social policies (amended 2017) on inclusive, responsible, and sustainable workplace practices (ILO, 2017); the Resolution concerning decent work in global supply chain (ILO, 2016).<br>'Just transition': is a concept recognized in the Paris Agreement and implies that de-carbonisation should consider social impacts, including impacts on labour. ILO has embraced this agenda and established in 2017, an ILO Global Forum on Just Transition. Though not yet institutionalized in laws, this development is expected to increasingly affect collective labour bargains (Bugada et al., 2020).<br>The EU is moving from guiding declarations to bindings laws. See e.g. the Communication on Corporate Social Responsibility: a new EU strategy for the period 2011-2014, on respect for core labour standards, including child labour, forced labour, human trafficking, gender equality, non-discrimination, freedom of association and the right to collective bargaining (EC, 2011).<br>Though the impact of COVID-19 has slowed down further steps to enforce responsible business practices, it is expected the EU efforts will resume soon. |
| **Impact on Tourism industry** | **Staff**: review of the job packages and other relevant HRM processes in accordance with i.a. TFEU 157 and (upcoming) EU policy on core labour standards. Build scenario for integration of environmental protection clauses into labour agreements.<br>**Guests**: respond to and engage with new (sustainability) development and guests' expectations partly to prevent further legislation on e.g. use of animal protein.<br>**Community**: Spread tourists over Netherlands. |

| Item | Description |
|---|---|
| **Main policy impacts** | **Staff**: Gender pay gap and equal pay: According to a recent ruling of the European Court of Justice, TFEU 157 is one of the founding principles of the EU. Therefore, according to the judgment (C-624/19) by the European Court of Justice on 3 June 2021, employees can directly invoke the EU law principle of equal pay in disputes between private parties for both 'equal work' and work of 'equal value' (Kliemt.HR, 2021).<br>Dutch policies on e.g. obesitas and protein transitions are either non legally binding or focuses on national government's purchasing. In the past, though, when too limited progress was achieved, non-binding covenants become law while guidelines on purchasing were extended from the lower governance layer and impacted widely the sector. |
| **Links other themes** | Safety, air quality, biodiversity quality |

## 2.4 Implications for the LTH sector

We conclude the literature review with a brief reflection on the sustainability and policy implications for the LTH sector and raise a number of initial, possible research questions. Table 3 synthesises the sustainability related impacts of the different subsectors. The sustainability policy impacts on the different subsectors are summarised in table 4.

**Table 3. Overview of the approximate impact (expert assessment) per visitor from eight tourism sub-sectors on the sustainability themes.**

| | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility | Littering/pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accommodation | 3 | 2 | 1 | 4 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 2 |
| Aviation | 5 | 5 | 3 | 1 | 1 | 4 | 1 | 1 | 2 | 5 | 1 | 1 | 3 |
| Car transport | 4 | 3 | 2 | 1 | 2 | 3 | 3 | 3 | 4 | 5 | 1 | 1 | 3 |
| Cruise | 5 | 5 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 5 | 2 | 4 | 3 |
| Rail/PT | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| Restaurants/cafes | 2 | 2 | 1 | 4 | 2 | 2 | 4 | 3 | 2 | 1 | 2 | 4 | 2 |
| Service providers | 4 | 4 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 4 | 3 | 2 | 3 |
| Tourism facilities/DMO's | 4 | 4 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 2 | 3 | 4 | 3 |

1 means low impact, 5 high impact..

**Table 4. Overview of the approximate impact per policy on the eight tourism sub-sectors.**

| | Accommodation | Restaurants/cafes | Tourism facilities | Aviation | Rail/PT | Car transport | Cruises | Service providers |
|---|---|---|---|---|---|---|---|---|
| National Climate Agreement | 3 | 3 | 3 | 5 | 4 | 5 | 3 | 2 |
| EU Green Deal: Climate law | 3 | 3 | 3 | 5 | 5 | 5 | 3 | 2 |
| EU Green Deal: Mobility strategy | 1 | 1 | 2 | 4 | 5 | 5 | | 3 |
| EU Green Deal: Biodiversity Strategy 2030 | 2 | 4 | 2 | 1 | 1 | 2 | 4 | 1 |
| EU Green Deal - circular economy | 3 | 4 | 3 | 2 | 2 | 3 | 3 | 2 |
| Aviation Memorandum | 1 | 1 | 1 | 5 | 3 | 1 | 1 | 2 |
| ICAO CORSIA, Standard, Climate Neutral Growth | 1 | 1 | 1 | 5 | 1 | 1 | 1 | 2 |
| EU Ambient Air Quality Directives | 2 | 2 | 2 | 4 | 3 | 5 | 2 | 1 |
| Wet stikstofreductie en natuurverbetering | 3 | 2 | 2 | 4 | 2 | 4 | | 3 |
| EU Water Directive | 3 | 2 | 2 | 1 | 1 | | 3 | |
| National Water Plan 2016-2021 | 2 | 2 | 2 | | | | 1 | |
| Stiltegebieden, geluidswetgeving, MERs | 2 | 2 | 2 | 4 | 3 | 3 | 1 | 2 |
| National Policy on Infrastructure and Spatial Planning | 3 | 3 | 3 | 1 | 4 | 4 | 1 | |
| EU single-use plastics | 4 | 5 | 5 | 4 | 4 | 1 | 4 | 4 |
| Perspectief 2030/Rli Waardevol toerisme | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 |
| Kustpact | 3 | 2 | 2 | 1 | 1 | 2 | 1 | 2 |

1 means low impact, 5 high impact. White cells show undefined or non-existent relations.

Climate and environmental policies affect accommodations and restaurants through regulations on operations and construction. Due to high nitrogen emissions, construction is expected to become increasingly difficult, while extreme weather events increase the need for resilient measures in construction. Stronger regulations on biodiversity and coastal management complicate new constructions and expansions. Also, operations are expected to be affected by environmental laws. The shift to renewable energies demands new energy infrastructure (e.g., less gas, more solar). Water management plans may restrict water available for consumption by hotel guests and operations. To reduce emission and water consumption, new technologies will need to be implemented. Regulations on (food) waste put pressure on waste management and product sourcing. New structures of travel behaviour (e.g., by train and electric cars) demand adapted services such as charging stations and shuttle services. On the social side, integration of buildings in and outreach to the existing community is an aspect increasingly considered by municipalities. COVID 19 has proven that an increasing number of existing and prospective employees do no longer

accept the challenging working condition in the hospitality sector. Moreover, guests are increasingly asking for more sustainable and healthier food choices.

**Potential research questions are:**

- What are accommodations and restaurants currently doing to decrease their direct and indirect environmental impact?
- What opportunities and concerns do tourism stakeholder see in environmental regulations?
- What are tourism stakeholders doing in terms of technological and service transitions?
- What are accommodations and restaurants currently doing to reach out to the surrounding community?
- What are accommodations and restaurants currently doing to accommodate staff wishes for a healthier work balance, fair payment, development paths, inclusivity, gender equity and similar HR /social issues?
- What are accommodations and restaurants currently doing to accommodate for and positively reinforce the increasing wishes of staff and guests for a more sustainable and healthier food choice?

Providers of tourism and recreation activities can expect gradual changes in their operations. New maritime spatial plans and the development of nature areas for biodiversity protection may change spaces in which tourism stakeholders operate. This can have both positive effects, e.g., new activities, and negative effects, e.g. restrictions. Changes in landscape (e.g., wind turbines) may affect the attractiveness of the destination and subsequently its activities. Depending on the activity, regulations on waste management, energy and water consumption affect operations of stakeholders. Moreover, there is an expectation that tourism recovery after COVID 19 should avoid those negative impacts on the community caused i.e. by overtourism. Overall, activities are expected to adapt to climate change impacts, new regulations, and digitalization by transformation.

**Potential research questions are:**

- What are the expected effects of environmental and social policy changes and accompanying developments on tourism stakeholder operations?
- What are the expected effects of actors' expectations that post-Covid 19 recovery will avoid negative impacts on the community on tourism stakeholder operations?

In terms of tourism transport, diverse policies on emission reduction and decreasing negative environmental impacts will lead to increased (tourism-related) travel costs for consumers. Therefore, it is expected that the demand for domestic tourism will increase while outbound tourism numbers decrease slightly. In the meanwhile, supply-side investments in tourism transport will shift to carbon-neutral technologies and less environmental impact, low carbon fuels, electric vehicles and noise reduction technologies. Cruise ships and public transport will most likely see an increase in demand and capacity as short-haul flights are restricted and its subsidies reduced. Cruise ships will need to adapt to maritime spatial

plans, reduce their negative environmental impact, and address pressings social issues such as discrimination and sexual harassment. The Dutch mobility strategy is based on a number of sub-sector policies and in general tries to align with SDGs, climate policy, etc (I&W, 2019). The National Climate Agreement, for instance, provides specific targets and transitions (EZK, 2019b). An update of the mobility strategy is thus to be expected.

**Potential research questions are:**

- How can touristic transport providers engage in co-creating the new mobility strategy?
- What mobility alternatives are considered by the consumer?
- What are the most sustainable transport modes from a life-cycle-perspective?
- What are the most sustainable transport modes from a social perspective (e.g., less invasive, less noisy, more inclusive)?
- How can distances between markets and destinations been reduced? How can markets at short distances be developed over those at longer distance?
- What are tourism businesses and destinations doing to prepare for changing demand?
- What are tourism businesses and destinations doing to prepare for changing travel conditions, including possible de-growth?

# 3. Stakeholder interviews

We interviewed 13 stakeholders representing the LTH sector (see table 5). The interviews lasted 45-99 minutes; were conducted in Dutch or in English; and were recorded using MS Teams. For each identified sustainability theme, the interviewers probed respondents to formulate key issues and related research questions. All stated issues and research questions were manually entered in an excel database that comprised the following parameters: sustainability theme (13 themes and one 'general' theme for questions affecting all sustainability themes); challenge/issue; research question; respondent; and the main subsector addressed in the research question (see Appendix 2: All challenges, research questions & projects). So, in other words, the attribution of subsector labels was issue-based (i.e. the subsector(s) affected most by the issue) and not respondent-based (i.e. the subsector that stakeholders represented).

**Table 5. Overview interviews and respondents.**

| Date | Respondent | Interviewer |
|---|---|---|
| 09-12-2021 | ANWB | BUas |
| 13-12-2021 | Koninklijke Horeca Nederland | NHL Stenden |
| 13-12-2021 | NBTC | BUas |
| 16-12-2021 | NKC | BUas |
| 20-12-2021 | Stichting Natuur & Milieu | BUas |
| 21-12-2021 | European Passenger Federation | BUas |
| 23-12-2021 | ANVR | BUas |
| 11-01-2022 | CLCVECTA | BUas |
| 11-01-2022 | Joint Projects | NHL Stenden |
| 17-01-2022 | Accor | NHL Stenden |
| 19-01-2022 | HISWA RECRON | BUas |
| 01-02-2022 | SUNWEB group | BUas |
| 22-03-2022 | The Hague & Partners | BUas |

To identify potential research projects, two of the authors first independently categorised the generated research questions. They then compared and contrasted their findings to compose a single project list. The following criteria were used in this analysis:

**Geographical scope & focus:** some research questions address international, EU level issues or concern international destinations frequented by Dutch outbound markets. Other research questions address national or regional issues and/or deal with specific destination areas in the Netherlands (i.e. rural, urban, nature-based, etc.).

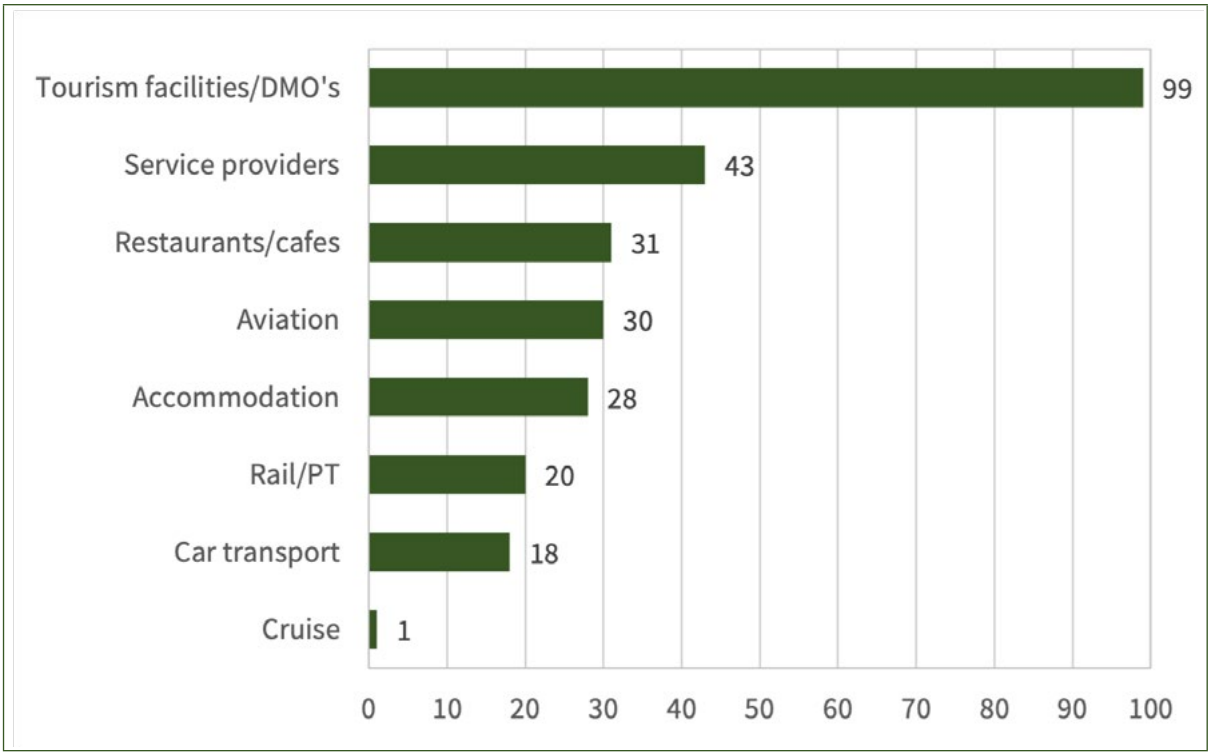
**Type of project activity:** the listed research questions comprise different types of projects in terms of the nature of research & development activities involved. These activities include: assessment of policy/strategy options; examining/predicting/influencing consumer behaviour; technology development; and measuring/predicting impact/effect.

**Knowledge field:** the listed research questions address issues in different fields, i.e. domains of expertise. These include business strategy; marketing & communication; operational management; product innovation; and policy & governance.

## 3.1 Research questions, subsectors, & sustainability themes

In total, the interviews produced 270 research questions (see appendix 2). Figure 1 shows the distribution of questions across subsectors. Most questions relate to tourism destinations (i.e. destination-based tourism facilities and DMO's). Service providers (tour operators) and aviation also generated many questions, while rail/public transport and car transport were covered least.

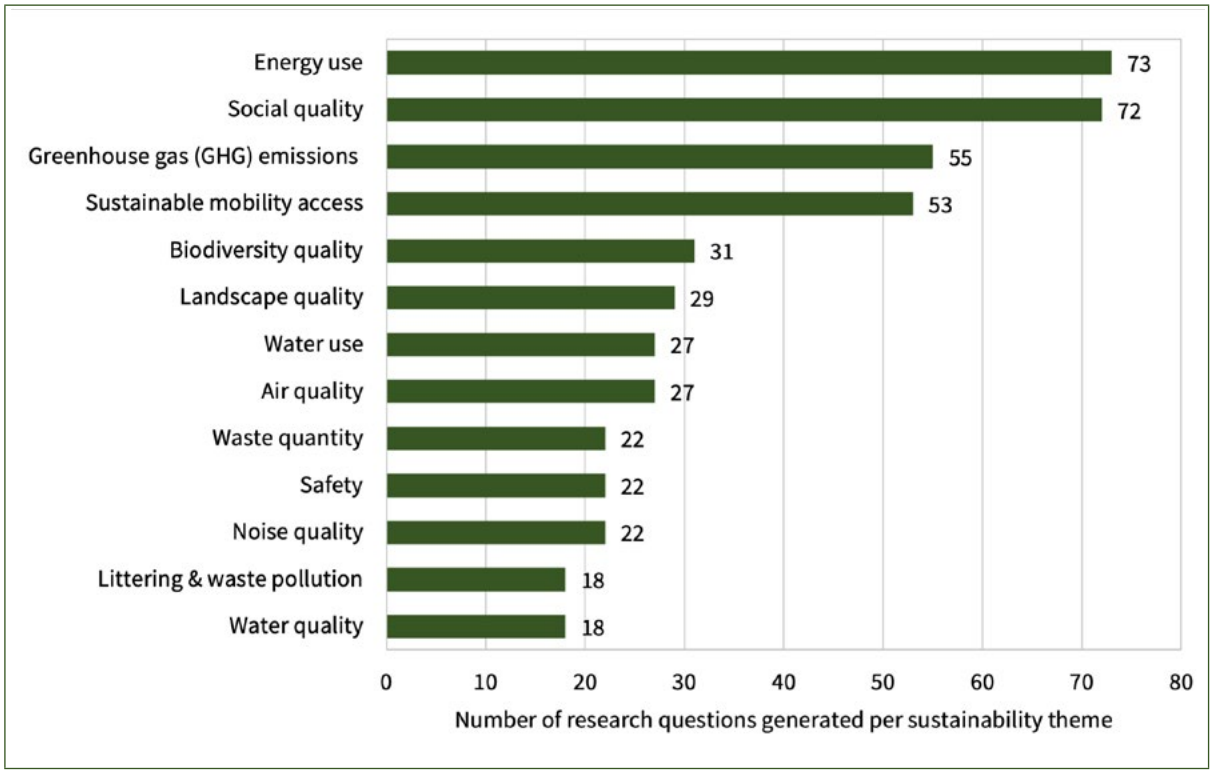
**Figure 1. Number of research questions per tourism subsector.**




We also counted the number of identified sustainability themes (501) involved in the 270 research questions. This number of themes is higher because many questions cover more than one theme. Figure 2 shows that Energy use and GHG emissions are the first and third most-mentioned issues, while Social quality-related issues come second. It is important to note that in the interviews the definition (or interpretation) of Social quality had a broader

scope than in the literature review: respondents reached beyond tourism-related impacts on staff, guests, and community, and also identified issues pertaining the distribution of resources – notably energy – for tourism purposes across different subsectors and related questions of access and redesign of tourism products and services for different social groups and income classes. Sustainable mobility came in fourth and was often mentioned as solution rather than as problem.

**Figure 2. Distribution of themes involved in the research questions.**




## 3.2 Identification of potential research projects

25 possible research projects were identified that each combine related research questions (see table 6). Project no. 4 'theses' groups research questions that address issues of a very specific or explorative nature and/or research questions situated in a specific knowledge field. These research questions are therefore ideally suited for undergraduate or postgraduate thesis tracks in tourism studies and affiliated fields.

**Table 6. Research projects.**

| Projectnumber | Project | Number of research questions | Geographical scope/focus | Type of project activity | Knowledge fields | Subsectors |
|---|---|---|---|---|---|---|
| 1 | Communication for sustainable consumption | 26 | NL | assessment of policy/ governance options; carbon measurement tool; examining/ predicting/influencing consumer behaviour; operations ; standards & certification | Marketing & communication; Policy & governance | Accommodation<br>Aviation<br>Car transport<br>Rail/PT<br>Restaurants/cafes<br>Service providers |
| 2 | Implementation and distribution of sustainable fuels across transport modes and production sectors | 22 | EU | assessment of policy/ governance options; measurement/prediction impact/effect | Policy and governance | Aviation<br>Car transport<br>Service providers |
| 3 | Sustainable cities | 25 | NL & EU | assessment of policy/ governance options; business management; customer experience; examining/ predicting/influencing consumer behaviour; logistics; measurement/prediction impact/effect; operational management; operations ; standards & certification | Policy and governance; Marketing & communication; Business strategy; Operational management; Product innovation | Car transport<br>Rail/PT<br>Tourism facilities/ DMO's |
| 4 | Thesis project | 24 | NL & EU | assessment of policy/ governance options; business management; business strategy; customer experience; examining/predicting/ influencing consumer behaviour; measurement/ prediction impact/effect; operational management; operations ; philosophy & law; technological innovation; value chain development | n/a | Accommodation<br>Aviation<br>Restaurants/cafes<br>Service providers<br>Tourism facilities/ DMO's |
| 5 | Sustainable nature-based tourism & recreation | 11 | NL | assessment of policy/ governance options; examining/ predicting/influencing consumer behaviour; measurement/prediction impact/effect; operational management; operations ; standards & certification | Policy & Governance; Marketing & Communication; Operational Management. | Accommodation<br>Tourism facilities/ DMO's |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | Management of climate change related disasters in nature-based tourism areas | 3 | EU | assessment of policy/ governance options; ict; measurement/prediction impact/effect | Policy & Governance; Marketing & Communication | Tourism facilities/ DMO's |
| 7 | Towards integrated management of rural landscape quality, land use, and land ownership | 11 | NL | assessment of policy/ governance options; measurement/prediction impact/effect; value chain development | Policy & Governance; Marketing & Communication | Accommodation<br>Tourism facilities/ DMO's |
| 8 | Improving the competitiveness of international rail transport in europe | 9 | EU | assessment of policy/ governance options; examining/ predicting/influencing consumer behaviour; value chain development | Policy & Governance; Marketing & Communication; Business strategy; Product innovation | Rail/PT |
| 9 | Tourism as catalyst for sustainability in other environmental policy domains | 13 | EU | assessment of policy/ governance options; carbon management | Policy & Governance; Business strategy. | Aviation<br>Restaurants/cafes<br>Tourism facilities/ DMO's |
| 10 | Energy transition of tourism-related facilities | 13 | NL | assessment of policy/ governance options; operations ; value chain development | Policy & Governance; Operational Management | Accommodation<br>Cruise<br>Restaurants/cafes<br>Tourism facilities/ DMO's |
| 11 | Measurement and reduction of ghg emission for businesses and destinations | 13 | NL | assessment of policy/ governance options; carbon management; carbon measurement tool; design & adjustment of facilities; measurement/prediction impact/effect | Policy & Governance; Operational Management; Business strategy; Marketing & Communication | Accommodation<br>Restaurants/cafes<br>Service providers<br>Tourism facilities/ DMO's |
| 12 | Business models and products for more sustainable consumption | 17 | EU | assessment of policy/ governance options; business management; examining/ predicting/influencing consumer behaviour; marketing & sales; product innovation; strategy; supply chain management | Policy & Governance; Business strategy; Product innovation; Marketing & Communication | Accommodation<br>Aviation<br>Rail/PT<br>Service providers |
| 13 | Towards optimal socio-ecological value of inbound tourism for the netherlands | 4 | NL | examining/predicting/ influencing consumer behaviour | Policy & Governance; Marketing & Communication | Tourism facilities/ DMO's |
| 14 | Sustainable transport in destinations | 9 | EU | assessment of policy/ governance options; examining/ predicting/influencing consumer behaviour; operations ; value chain development | Policy & Governance; Product innovation | Accommodation<br>Car transport<br>Rail/PT<br>Restaurants/cafes |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15 | Present and future of aviation-dependent tourism destinations | 5 | EU | assessment of policy/ governance options; measurement/prediction impact/effect | Policy & Governance | Aviation<br>Service providers<br>Tourism facilities/ DMO's |
| 16 | Environmental impacts of saf production and use for/in aviation | 2 | EU | measurement/prediction impact/effect | Policy & Governance | Aviation |
| 17 | Aviation-related environmental impacts of tourism in destinations with rich biodiversity | 3 | EU | assessment of policy/ governance options; measurement/prediction impact/effect | Policy & Governance | Aviation |
| 18 | Circular economy destinations & events | 29 | EU | assessment of policy/ governance options; business management; design & adjustment of facilities; examining/predicting/ influencing consumer behaviour; measurement/ prediction impact/effect; operations ; sustainability certification; technological innovation; value chain development | Policy & Governance; Operational Management; Product innovation | Accommodation<br>Restaurants/cafes<br>Service providers<br>Tourism facilities/ DMO's |
| 19 | Comprehensive communication of safety & security related information for destinations & events | 3 | EU | assessment of policy/ governance options | Policy & Governance | Accommodation<br>Restaurants/cafes |
| 20 | Responsible employment | 12 | NL | assessment of policy/ governance options; business management; examining/ predicting/influencing consumer behaviour; operations ; value chain development | Policy & Governance; Business strategy; Marketing & Communication | Restaurants/cafes<br>Tourism facilities/ DMO's |
| 21 | Joint guest safety protocol for outbound tour opeorators | 2 | EU | assessment of policy/ governance options; operational management | Operational Management | Service providers |
| 22 | Inclusive safety & security protocols | 2 | | assessment of policy/ governance options | Operational Management | Service providers<br>Tourism facilities/ DMO's |
| 23 | Spreading tourism demand | 3 | EU | assessment of policy/ governance options | Policy Governance | Service providers |
| 24 | Comprehensive legislation and guidelines for safety & sustainability | 4 | EU | assessment of policy/ governance options; examining/ predicting/influencing consumer behaviour | Policy Governance | Car transport<br>Restaurants/cafes |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | Towards comprehensive travel restriction policies and safety & security protocols in (post) pandemic europe | 5 | EU | assessment of policy/ governance options; measurement/prediction impact/effect; operations | Policy & Governance; Marketing & Communication | Service providers Tourism facilities/ DMO's |

Zooming in on the research projects, most common is the project type 'assessment of policy/strategy options', indicating the importance of comprehensive policies that enhance sustainability in the LTH sector. 'Measuring/predicting impact/effect' also featured prominently: it suggests a need for (more accurate) environmental impact measurement to enhance sustainability performance across subsectors. Common too was 'Examining/ predicting/influencing consumer behaviour'. Although this highlights the role of consumers in sustainability transitions, it should not divert attention from the responsibility of businesses to adjust their product offer, business models, and distribution. Although comparatively few research questions address supply-side changes, the questions that respondents raised in the field 'business strategy' and 'product innovation' are quite fundamental (i.e. indicating paradigm shifts) and therefore of great importance (see e.g. project no. 12 'business models and products for more sustainable consumption').

Table 7 shows the number of times an identified sustainability theme features in a potential project. The colour presents the intensity of themes involved in a project. 'Energy use' (18 times) scores highest, in project no. 2 'Implementation and distribution of sustainable fuels across transport modes and production sectors'. The focus on water and waste-related themes in project no. 18 'circular economy destinations and events' makes sense. Air quality and sustainable mobility – considered as solution – also score high in project no. 3 that focuses on Dutch cities and that has a clear link to 'GHG emissions' and 'energy use'.

**Table 7. Heatmap of the number of times a theme is mentioned per project.**

| | Project | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility access | Littering & waste pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Communication for sustainable consumption | 8 | 8 | 3 | 5 | 2 | 1 | 1 | 0 | 1 | 3 | 0 | 1 | 6 |
| 2 | Implementation and distribution of sustainable fuels across transport modes and production sectors | 12 | 15 | 4 | 0 | 0 | 2 | 1 | 0 | 0 | 7 | 0 | 1 | 3 |

**Table 7. Heatmap of the number of times a theme is mentioned per project.**

| | Project | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility access | Littering & waste pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Sustainable cities | 4 | 3 | 11 | 0 | 0 | 7 | 1 | 1 | 4 | 12 | 1 | 0 | 7 |
| 4 | Thesis project | 2 | 1 | 0 | 0 | 2 | 4 | 7 | 1 | 5 | 2 | 2 | 1 | 6 |
| 5 | Sustainable nature-based tourism & recreation | 0 | 0 | 0 | 1 | 0 | 2 | 5 | 2 | 5 | 1 | 1 | 1 | 5 |
| 6 | Management of climate change related disasters in nature-based tourism areas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| 7 | Towards integrated management of rural landscape quality, land use, and land ownership | 1 | 6 | 0 | 1 | 2 | 0 | 7 | 0 | 9 | 0 | 0 | 0 | 1 |
| 8 | Improving the competitiveness of international rail transport in europe | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 2 |
| 9 | Tourism as catalyst for sustainability in other environmental policy domains | 3 | 2 | 1 | 0 | 1 | 0 | 3 | 0 | 3 | 2 | 0 | 0 | 0 |
| 10 | Energy transition of tourism-related facilities | 1 | 7 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 2 |
| 11 | Measurement and reduction of ghg emission for businesses and destinations | 5 | 6 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 |
| 12 | Business models and products for more sustainable consumption | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 8 |
| 13 | Towards optimal socio-ecological value of inbound tourism for the netherlands | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | Sustainable transport in destinations | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 1 |
| 15 | Present and future of aviation-dependent tourism destinations | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 3 |

**Table 7. Heatmap of the number of times a theme is mentioned per project.**

| | Project | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility access | Littering & waste pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | Environmental impacts of saf production and use for/in aviation | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | Aviation-related environmental impacts of tourism in destinations with rich biodiversity | 2 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 0 |
| 18 | Circular economy destinations & events | 2 | 2 | 0 | 14 | 7 | 0 | 1 | 1 | 0 | 1 | 12 | 15 | 4 |
| 19 | Comprehensive communication of safety & security related information for destinations & events | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 1 |
| 20 | Responsible employment | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 21 | Joint guest safety protocol for outbound tour opeorators | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 22 | Inclusive safety & security protocols | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| 23 | Spreading tourism demand | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 24 | Comprehensive legislation and guidelines for safety & sustainability | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 25 | Towards comprehensive travel restriction policies and safety & security protocols in (post) pandemic europe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 |
| | **Total** | **53** | **63** | **26** | **26** | **16** | **20** | **28** | **17** | **29** | **46** | **18** | **21** | **61** |

# 4. Conclusions: a prioritisation of research projects

To prioritise the identified research projects, we investigated the extent to which the identified research projects address knowledge gaps. Knowledge gaps are present in the identified research project whenever there are differences between the expert impact priorities (see chapter 2) and stakeholder impact priorities (chapter 3) regarding the sustainability theme addressed. Below, we first investigate the knowledge gaps present in the identified research projects. Then, we looked at the systemic relevance of projects, i.e. the extent to which research projects include research questions addressing multiple sustainability themes. Based on these criteria, we present two lists of possible priority projects, based on different threshold values. We conclude with a reflection on possible next steps.

## 4.1 Knowledge gaps

It can be argued that when the difference between expert impact priorities (chapter 2) and stakeholder impact priorities (chapter 3) is comparatively large, the research project is more important. Here we therefore first determine the differences between expert impact priorities and stakeholder priorities. Starting with the expert priorities, in chapter 2 we presented a heatmap indicating the importance of (the impact of or the relevance for) each subsector on each sustainability theme according to experts (see table 8). The most critical – or highest – are tourism transport-related impacts that also affect service providers (notably tour operators), followed by impacts on tourist facilities (notably GHG emissions; Energy use; and Waste quantity).

**Table 8. Heatmap of the impact of each subsector on each sustainability theme according to experts.**

| | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility | Littering/pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accommodation | 3 | 2 | 1 | 4 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 2 |
| Aviation | 5 | 5 | 3 | 1 | 1 | 4 | 1 | 1 | 2 | 5 | 1 | 1 | 3 |
| Car transport | 4 | 3 | 2 | 1 | 2 | 3 | 3 | 3 | 4 | 5 | 1 | 1 | 3 |
| Cruise | 5 | 5 | 4 | 4 | 2 | 2 | 3 | 3 | 3 | 5 | 2 | 4 | 3 |
| Rail/PT | 2 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | 2 |
| Restaurants/cafes | 2 | 2 | 1 | 4 | 2 | 2 | 4 | 3 | 2 | 1 | 2 | 4 | 2 |
| Service providers | 4 | 4 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 4 | 3 | 2 | 3 |
| Tourism facilities/DMO's | 4 | 4 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 2 | 3 | 4 | 3 |

'1' means no or low impact and '5' a large impact.

Moving to the subsector priorities, we created an identical heatmap, this time based on the inputs of the interviewed stakeholders (see table 9). At first sight, when comparing table 8 and 9, the listed priorities of experts and stakeholders partly overlap.

**Table 9. Heatmap of priorities of the different sustainability themes for the subsectors based on stakeholder inputs. Note that for the sustainability theme 'sustainable mobility, priority is based on the urgence to apply sustainable transport as a solution, not to mitigate its impacts.**

| | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility | Littering/pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accommodation | 1 | 1 | 0 | 4 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 4 | 2 |
| Aviation | 5 | 4 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 0 | 2 |
| Car transport | 4 | 3 | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 2 | 0 |
| Cruise | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Rail/PT | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 |
| Restaurants/cafes | 1 | 3 | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 4 | 4 | 2 |
| Service providers | 2 | 1 | 0 | 3 | 2 | 1 | 1 | 5 | 1 | 1 | 3 | 3 | 3 |
| Tourism facilities/DMO's | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 5 |

'1' means no or low impact and '5' a large impact.

To facilitate the comparison, we show the difference between expert impact priorities and subsector impact priorities. Table 10 shows the results when no threshold value is applied: expert impact scores and subsector impact scores are weighed equally and all cases are included. We find that 67 cases, the majority of the 104 combinations, show a lower subsector priority than the initial expert- asserted impact priority. For 21 cases the subsector impact priority was higher than the expert impact priority and only in 16 cases the scores are equal.

**Table 10. Heatmap for the difference between expert importance and subsector priority. Case with zero threshold for equality of scores, and all cases included.**

| | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility | Littering/pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accommodation | -1 | -1 | -1 | 0 | 1 | -1 | 0 | 1 | -1 | 0 | 0 | 1 | 0 |
| Aviation | 0 | -1 | -1 | 0 | -1 | -1 | 0 | -1 | -1 | -1 | -1 | -1 | -1 |
| Car transport | 0 | 0 | 1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 |
| Cruise | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| Rail/PT | 0 | -1 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | -1 | -1 | -1 |
| Restaurants/cafes | -1 | 1 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | 1 | 0 | 0 |
| Service providers | -1 | -1 | -1 | 0 | 0 | -1 | -1 | 1 | -1 | -1 | 0 | 1 | 0 |
| Tourism facilities/DMO's | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| | |
|---|---|
| -1 | Higher expert importance than subsector priority |
| 0 | Equal expert importance and subsector priority (+/- threshold) |
| 1 | Lower expert importance than subsector priority |

To zoom in on cases where differences between expert impact priority scores and stakeholder impact priority scores are comparatively large, we applied thresholds. We used a 'tolerance threshold' of 1 and an 'expert impact priority threshold' of 2. The tolerance threshold of 1 implies that a difference of 1 between the expert impact priority scores and subsector impact priority scores is still considered equal. The expert impact priority threshold of 2 means that only cases with an expert priority score of 2, 3, 4, or 5 are included; cases below 2 will generate a 'n/a' score. Table 11 shows the results. We now find 31 cases with higher expert impact priority than subsector impact priority; 50 cases are equal; and 6 cases with higher subsector impact priority than expert impact priority.

**Table 11. Heatmap for the difference between expert importance and subsector priority. Case with a threshold of 1 for equality of scores, and only cases with an expert-indicated importance of 2, 3, 4 or 5 are included.**

| | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility | Littering/pollution | Waste quantity | Social quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accommodation | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -1 | 0 | 0 | 0 | 0 |
| Aviation | 0 | 0 | -1 | 0 | 0 | -1 | 0 | 0 | 0 | -1 | 0 | 0 | 0 |
| Car transport | 0 | 0 | na | 0 | na | -1 | -1 | -1 | -1 | -1 | 0 | 0 | -1 |
| Cruise | -1 | -1 | -1 | -1 | na | na | -1 | -1 | -1 | -1 | na | -1 | -1 |
| Rail/PT | 0 | na | 0 | 0 | 0 | -1 | na | 0 | na | na | 0 | 0 | 0 |
| Restaurants/cafes | 0 | 0 | 0 | -1 | 0 | na | -1 | -1 | na | 0 | na | 0 | 0 |
| Service providers | -1 | -1 | na | 0 | 0 | -1 | -1 | na | -1 | -1 | 0 | 0 | 0 |
| Tourism facilities/DMO's | 0 | 0 | na | 1 | na | 1 | 1 | 1 | na | 0 | 1 | 0 | 1 |

| | |
|---|---|
| -1 | Higher expert importance than subsector priority |
| 0 | Equal expert importance and subsector priority (+/- threshold) |
| 1 | Lower expert importance than subsector priority |

## 4.2 Research project prioritisation

To prioritise the identified projects, we first looked at their relative importance. We ranked a project as more important when it contained more questions featuring differences between expert and subsector priorities. When these differences are more prevalent, it can be argued that consensus between sectors and experts is weaker; when there are less differences, it can be argued that consensus between sectors and experts is stronger. Table 12 shows the scores for the case of 'no thresholds' (compare with table 10). '0' means lower expert than sector priority score; '1' means equal expert and sector priority score, and '2' means higher expert than sector priority score. 'General' concerns research questions comprising all sustainability themes. For this category we calculated half of the sum of all other priority scores for the respective subsector. 'Multisector' concerns research questions relating to all subsectors. For this category we divided the total score per theme by the number of subsectors (8). For each of the 270 research questions, we used the sum-product of the values for each sustainability theme relevant to that question. Finally, per research question,

all individual research question priority scores are summed. We omitted the container of thesis-projects as in for these each question is a potential thesis-project.

**Table 12. Values assigned to each theme to set the research project's priority without thresholds (conform table 10).**

| | GHG emissions | Energy use | Air quality | Water use | Water quality | Noise quality | Biodiversity quality | Safety | Landscape quality | Sustainable mobility | Littering/pollution | Waste quantity | Social quality | General |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accommodation | 2 | 2 | 2 | 0 | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 6.5 |
| Aviation | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 13 |
| Car transport | 2 | 1 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 0 | 0 | 9 |
| Cruise | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 1 | 2 | 2 | 0 | 1 | 0 | 8 |
| Rail/PT | 0 | 2 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 10.5 |
| Restaurants/cafes | 0 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 10 |
| Service providers | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6.5 |
| Tourism facilities/DMO's | 0 | 0 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 10 |
| Multisector | 1.1 | 1.5 | 1.3 | 1.1 | 1.5 | 1.9 | 1.4 | 1.6 | 1.9 | 1.5 | 1.3 | 1.3 | 1.1 | 9.2 |

'0' means lower expert than sector priority score; '1' means equal expert and sector priority score, and '2' means higher expert than sector priority score.

Second, we looked at systemic relevance, i.e. the number of sustainability themes that each research question covers. If a research question covers more sustainability themes, it can be argued that its systemic relevance is higher. For each of the 270 research questions, we listed a '1' for each sustainability theme addressed by the question and a '0' for each unaddressed sustainability theme. We added the sum of these systemic relevance scores to the relevant importance scores.

Table 13 shows the projects based on priority score (projects with highest priority in the first row and the lowest priority in the last one).

**Table 13. List of priority projects (no thresholds applied; thesis projects excluded).**

| # | Project | Priority knowledge gap |
|---|---|---|
| **1** | **Communication for sustainable consumption** | **94** |
| **9** | **Tourism as catalyst for sustainability in other environmental policy domains** | **65** |
| **12** | **Business models and products for more sustainable consumption** | **64** |
| **3** | **Sustainable cities** | **58** |
| **18** | **Circular economy destinations & events** | **52** |
| 2 | Implementation and distribution of sustainable fuels across transport modes and production sectors | 51 |
| 11 | Measurement and reduction of ghg emission for businesses and destinations | 34 |
| 24 | Comprehensive legislation and guidelines for safety & sustainability | 34 |
| 7 | Towards integrated management of rural landscape quality, land use, and land ownership | 30 |
| 5 | Sustainable nature-based tourism & recreation | 23 |
| 10 | Energy transition of tourism-related facilities | 22 |
| 20 | Responsible employment | 19 |
| 15 | Present and future of aviation-dependent tourism destinations | 18 |
| 23 | Spreading tourism demand | 14 |
| 14 | Sustainable transport in destinations | 13 |
| 8 | Improving the competitiveness of international rail transport in europe | 12 |
| 25 | Towards comprehensive travel restriction policies and safety & security protocols in (post)pandemic europe | 12 |
| 17 | Aviation-related environmental impacts of tourism in destinations with rich biodiversity | 10 |
| 13 | Towards optimal socio-ecological value of inbound tourism for the netherlands | 8 |
| 16 | Environmental impacts of saf production and use for/in aviation | 4 |
| 19 | Comprehensive communication of safety & security related information for destinations & events | 4 |
| 6 | Management of climate change related disasters in nature-based tourism areas | 3 |
| 22 | Inclusive safety & security protocols | 3 |
| 21 | Joint guest safety protocol for outbound tour opeorators | 2 |

Finally, we have also calculated the difference in priorities using the tolerance threshold of 1 and the expert priority threshold of 2 (see 4.1). Table 14 shows the results. The projects "Communication for sustainable consumption"; "Business models and products for more sustainable consumption"; "Implementation and distribution of sustainable fuels across transport modes and production sectors", "Tourism as a catalyst for sustainability in other

environmental policy domains", "Sustainable cities" and "Circular economy destinations & events" constitute the top-6 in both tables, albeit in different order. Appendix I presents the top-6 priority projects in further detail. Note that the theme 'sustainable transport' features a low 'importance' by the experts, because the importance is measured in terms of a sustainability problem, not 'solution'.

**Table 14. List of project priorities for tolerance threshold of 1 and expert priority threshold of 2 and thesis projects excluded.**

| # | Project | Priority knowledge gap |
|---|---|---|
| **1** | **Communication for sustainable consumption** | **53** |
| **12** | **Business models and products for more sustainable consumption** | **46** |
| **3** | **Sustainable cities** | **29** |
| **9** | **Tourism as catalyst for sustainability in other environmental policy domains** | **27** |
| **2** | **Implementation and distribution of sustainable fuels across transport modes and production sectors** | **24** |
| 18 | Circular economy destinations & events | 23 |
| 24 | Comprehensive legislation and guidelines for safety & sustainability | 17 |
| 11 | Measurement and reduction of ghg emission for businesses and destinations | 15 |
| 5 | Sustainable nature-based tourism & recreation | 14 |
| 20 | Responsible employment | 12 |
| 23 | Spreading tourism demand | 12 |
| 7 | Towards integrated management of rural landscape quality, land use, and land ownership | 11 |
| 10 | Energy transition of tourism-related facilities | 8 |
| 15 | Present and future of aviation-dependent tourism destinations | 8 |
| 25 | Towards comprehensive travel restriction policies and safety & security protocols in (post)pandemic europe | 7 |
| 14 | Sustainable transport in destinations | 4 |
| 17 | Aviation-related environmental impacts of tourism in destinations with rich biodiversity | 4 |
| 6 | Management of climate change related disasters in nature-based tourism areas | 3 |
| 16 | Environmental impacts of saf production and use for/in aviation | 2 |
| 19 | Comprehensive communication of safety & security related information for destinations & events | 2 |
| 22 | Inclusive safety & security protocols | 2 |
| 8 | Improving the competitiveness of international rail transport in europe | 0 |
| 13 | Towards optimal socio-ecological value of inbound tourism for the netherlands | 0 |
| 21 | Joint guest safety protocol for outbound tour opeorators | 0 |

## 4.3 Reflectie op vervolgstappen

De analyse laat zien dat kennislacunes, d.w.z. verschillen tussen impactprioriteiten van experts en impactprioriteiten van belanghebbenden, aanzienlijk en veel voorkomen, ondanks toenemende duurzaamheidsretoriek. Bijzonder zorgwekkend zijn gevallen waarin de impactprioriteiten van belanghebbenden lager scoren dan de impactprioriteiten van experts, wat aangeeft dat er in deelsectoren behoefte is aan verdere kennisontwikkeling op het gebied van duurzaamheid, wat het belang en de relevantie van deze onderzoeksagenda benadrukt.

Deze onderzoeksagenda erkent volledig het heterogene en internationale karakter van de LTH-sector, aangezien deze alle LTH-subsectoren omvat. Gerelateerd, deze onderzoeksagenda erkent ook dat duurzaamheidsuitdagingen systemisch zijn. Ze bestrijken een breed scala van beleidsdomeinen. Te veel nadruk op specifieke, op maat gesneden, subsectorale beleidsacties kan daarom onnodig gecompliceerd blijken in het licht van de vereiste urgentie. Maar misschien nog belangrijker: door deze verwevenheid te erkennen, ontstaat er ruimte voor strategische samenwerkingen over subsectorgrenzen heen. Deze onderzoeksagenda biedt daarvoor handvatten.

### 4.3.1 Focus on utilising collaborative potential

Sustainable development is high on local, national, and international political agendas, but the implementation of sustainability policies in the LTH sector needs to be accelerated. The latest warning of the IPCC (2022) is a case-in-point. To further prepare and implement research projects that address the sustainability issues identified in this research agenda, it is in our view important to focus on the collaborative potential present in the identified research projects. Collaborative potential is likely to be greater when a single research project comprises research questions addressing issues relevant to a larger number of subsectors. Appendix 2 illustrates that most projects we identified address issues relevant to a broad range of subsectors.

Focusing on the top-6 priority projects presented (see appendix I), we identify support of the following consortia.

**Project no. 1 Communication for sustainable consumption** includes research questions provided by ACCOR, ANVR, ANWB, EPF, KHN, NBTC, NKC, and SUNWEB. Project no. 1 addresses issues in almost all subsectors: Accommodation, Aviation, Car transport, Rail/PT, Restaurants/cafe, and Service providers.

ANVR, ANWB, N&M, NBTC, NKC, and SUNWEB provided the research questions of **project no. 2 Implementation and distribution of sustainable fuels across transport modes and production sectors**. This project has a more specific focus as it addresses issues in Aviation, Car transport, and Service providers and focuses primarily on energy-related issues.

**Project 3 Sustainable cities** addresses a range of urban environmental issues and related knowledge gaps to provide solutions that make cities more sustainable. Questions are provided by ANWB, CLC-VECTA, EPF, JP, KHN, and THP. It addresses issues in Car transport, Rail/PT, and Tourism facilities/DMO's.

**Project no. 12 Business models for sustainable consumption** contains research questions provided by ANVR, EPF, N&M, NBTC, and SUNWEB. It addresses issues in the Accommodation, Aviation, Rail/PT and Service providers

**Project no. 18 Circular economy destinations and events** contains research questions delivered by ACCOR, CLC-VECTA, EPF, HISWA-RECRON, JP, KHN, N&M, SUNWEB, and THP. It addresses issues in the subsectors Accommodation, Restaurants/cafes, Service providers and Tourism facilities/DMO's.

Finally, **project no. 9 Tourism as catalyst for sustainability in other environmental policy domains** covers research questions provided by N&M, NBTC, and SUNWEB, and tackles issues in the subsectors Tourism facilities/DMOs and Aviation.

When collaborative potential is present, stakeholder collaboration across subsectors is a viable option. In this way, participating subsectors and stakeholders can share costs (time, resources) of participation. Also, it may be easier to secure project funding for projects that entice strategic collaborations across sectors. We hope that this research agenda can make a modest contribution to this endeavour.

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# Appendix 1 Project fiches top-6 priority projects

| Number | Project |
|---|---|
| 1 | Communication for sustainable consumption |
| 2 | Implementation and distribution of sustainable fuels across transport modes and production sectors |
| 3 | Sustainable cities |
| 9 | Tourism as catalyst for sustainability in other environmental policy domains |
| 12 | Business models and products for more sustainable consumption |
| 18 | Circular economy destinations & events |

**Project definition**
This project addresses a range of knowledge gaps related to measuring, predicting, and influencing the behavior of the general public in the Netherlands (consumers; end users) across different LTH sub-sectors when it comes to their LTH related consumption patterns.

**Addressed challenges and bottlenecks**
It is a challenge to encourage the general public to behave more sustainably during holidays and close the attitude-behavior gap. Subsectors often lack a single, coherent narrative for consumers when it comes to sustainability. In relation to GHG emissions, it is not only challenging – for instance for hotels – to measure their emissions and to inform their guests about sustainability-related matters in an effective way. GHG emissions are also a matter of social quality: long-haul holidays will become unfeasible because of environmental impacts but high-end markets (elites) do not lead by example and lower social classes copy their behavior (keeping up with the Jonesy's). Also, for travel within Europe, there is a myth among consumers that international train travel is always more expensive than air travel. During peak holiday seasons, early departures/late arrivals – particularly by holiday charter flights – contribute to noise issues around Dutch airports. Alongside the attitude-behavior gap there is also a lack of knowledge and information. Campervan owners, restaurants and hotels do not know their GHG emissions and possibilities for reduction. Campervan sites offer limited sustainability-related information. Campervan producers are often not transparent about the GHG emissions of campervans and increasingly introduce heavier/larger campervans. In relation to energy use: the production of renewable energy (solar & wind) requires land and affects landscape quality in the Netherlands, with implications for tourism (highlighting the need for economical energy consumption). In relation to water use, Mediterranean destinations are heating up and facing increased water scarcity, particular during the European peak season. Hotels are careful in their communications about water use/quality because they do not want to affect guest comfort. Guests are often accustomed to drinking bottled water and hotels have limited knowledge about the reduction of embedded water use. In relation to biodiversity and hotel and restaurant menus, there is limited knowledge (cooks, procurement) about offering guests more sustainable ingredients/dishes.

**Research questions**

1. How can LTH sectors mobilise the general public in addressing sustainability challenges?
2. How can LTH sectors make consumers aware of their GHG emissions so that consumers also reduce their emissions?
3. How can LTH sectors develop a uniform, government accredited, and publicly accessible carbon footprint calculator for consumers?
4. How can consumers be influenced to opt for sustainable transport modes when making trips over distances that have more sustainable alternatives available (i.e. train instead of plane)?
5. How can consumers be made more aware that – in Europe - trains are in many cases a more attractive international transport mode than air travel?
6. Does a long-haul holiday make people happier than a domestic weekend break?
7. How can people be seduced to stay closer to home when holidaying abroad?
8. How can the general public be made more aware of the urgency to reduce their energy consumption during their holidays?
9. How can LTH sectors make the general public more aware of water scarcity and what actions can the general public take to address this issue challenge?

10. What is the profile or formula for the ideal sustainability label that results in more sustainable consumer behaviour?
11. How can a societal debate be created that entices high end markets and elites to become role models for lower social classes when it comes to their holiday consumption patterns?
12. How can hotel chains effectively communicate about carbon emissions to hotels and guests?
13. How can hotels develop a tool that provides them with insights into and that can be used to inform guests about the embedded water use in F&B outlets?
14. Is it possible to develop a label for embedded water use in hotels and restaurants?
15. What is the most effective way to make guests aware of water quality and drink tap water instead of bottled water when this is possible?
16. What are guest preferences when it comes to a more sustainable menu?
17. How can hotels deal with the preferences and expectations of guests when it comes to more sustainable menus?
18. Is it possible to develop a basic carbon label for hotels and restaurants?
19. How can campervan owners/drivers be encouraged and supported to drive more sustainably?
20. How can campervan producers ensure the provision of clear consumer information about the GHG emissions and energy use of the campervans they produce?
21. How can the trend towards heavier/larger campervans be curbed, also in view of heavier battery packages for electric campervans?
22. What sustainability-related information should be provided Through campervan web platforms (i.e. camper contact)?
23. How can the Dutch outbound travel industry speak with one voice to the general public and disseminate a single, coherent narrative about sustainability?
24. How can consumers of outbound holiday packages be encouraged to pay a more sustainable (higher) price for their holidays?

**Sustainability themes**
Greenhouse gas (GHG) emissions; Energy use; Air quality; Water use; Water quality; Noise quality; Biodiversity quality; Landscape quality; Sustainable mobility access; Waste quantity; Social quality

**LTH Subsectors**
Accommodation; Aviation; Car transport; Rail/PT; Restaurants/cafes; Service providers

# 2 Implementation and distribution of sustainable fuels across transport modes and production sectors

**Project definition**

This project addresses a range of knowledge gaps related to EU and national level policy efforts to reduce energy demand, using existing energy stocks more efficiently; and making energy stocks more sustainable. In particular, it addresses the allocation and prioritization issues that policymakers – most notably those dealing with aviation – face when distributing limited supplies of sustainable fuels across transport modes and production sectors.

**Addressed challenges and bottlenecks**

Availability of sustainable fuels (bio-fuels and e-fuels) for all transport modes is limited. Questions remain about the environmental effects of emissions of sustainable fuel emissions – i.e. beyond $CO_2$ – for instance on air quality. Compared to other transport modes aviation is a bottleneck when it comes to accomplishing more sustainable (tourism) transport. Aviation – despite being a contested policy field – will remain an important international transport mode even if demand for aviation drops, for instance when consumer behavior changes. Knowledge about concrete measures that can make aviation more sustainable is limited. Aviation claims a considerable volume of the limited stock of sustainable fuels. This is important because the Paris Climate Agreement is focused on the climate and not on specific sectors. Aviation is part of that focus but CORSIA is not (yet) climate-proof. The consequences of a possible reduction of the number of flights for consumers and the travel industry are unclear. But also other modes of transport face challenges (i.e. car transport including long-distance buses). A related challenge concerns speeding up the transition to cleaner road transport. Car manufacturers are for instance slow in the transition to self-sufficient, electric vehicles (including user-friendly electric campervans). Supplying (more remote) accommodations with loading infrastructure and generating the electricity for it is a challenge. And different policy challenges remain in relation to the type, availability, and pricing of sustainable fuels for road transport. The impacts of the EU Green deal on campervan sector are unclear. The lifespan of campervans has increased under progressively stricter emission rules and regulations.

**Research questions**

1. How can the limited stock of sustainable fuels be distributed across different transport sectors in the EU?
2. What are the environmental effects of sustainable fuel emissions (beyond CO2) on air quality (i.e. nitrogen, particulate matter)?
3. To what extent is 100% emission reduction (compared with 100% CO2 emission reduction) a feasible policy option for different transport and mobility sectors (i.e. low emission zones in EU cities)?
4. What are feasible policy options that make aviation more sustainable?
5. What is the climate impact of aviation beyond CO2 emissions (CO2 equivalents)?
6. What steps need to be taken to make CORSIA Paris-proof and what are the consequences of a Paris Proof CORSIA agreement for aviation and tourism?
7. What is the projected available stock of sustainable fuels and to how much of this stock is aviation legally entitled to use / can aviation legally claim?
8. How can the supply of sustainable aviation fuels (SAF) and energy demand of aviation be aligned so that sustainable aviation is possible?
9. How can sustainable fuels be made more attractive for aviation compared to other transport modes (i.e. biofuels and hydrogen for cruise ships vs aviation)?

10. How should synthetic fuels (e-fuels) be distributed across production sectors (for example aviation vs Tata Steel), given the fact that some production sectors (i.e. Tata Steel) have committed to the Paris Agreement and aviation has not?
11. To what level can energy demand of Dutch aviation decrease so that the economic importance of aviation is maintained and 100% sustainable aviation is possible by 2050 (taking into account shifts from aviation to alternative modes of transport, such as plane>train; tourism closer to home; etc.)?
12. How realistic is the maintenance of frequent leisure travel to long-haul destinations (i.e. Aruba; Bali; Thailand) towards 2050?
13. How can the development of hydrogen as a viable energy source for long-distance road transport be accelerated?
14. How do energy-related technologies (supply and source) develop in the campervan sector?
15. How can campervan manufacturers be stimulated to accelerate the transition to electric campervans?
16. How can campervan manufacturers be stimulated to adequately equip campervans for energy self-sufficiency in destinations (i.e. on campsites)?
17. What is the most optimal advice to be provided to campervan owners about future fuels? (studied as well by BOVAG in 2022).
18. How fast is the development of international infrastructure for new Diesel type campervans?
19. Will the EU (i.e. within the Green Deal policy context) put pressure on campervan manufacturers?
20. How can older campervans maintain in operation under current and anticipated campervan-related environmental policy regimes?
21. What is the business model of Amsterdam Schiphol and KLM under a policy regime of growth restrictions and 0-growth and what are the implications for the travel industry?
22. How can aviation be maintained in the future, taking into account different environmental limits (emissions; energy; noise; air quality)?

**Sustainability themes**
Greenhouse gas (GHG) emissions; Energy use; Air quality; Noise quality; Biodiversity quality; Sustainable mobility access; Waste quantity; Social quality

**LTH Subsectors**
Aviation; Car transport; Service providers

**Project definition**
This project addresses a range of urban environmental issues and related knowledge gaps to provide solutions that make cities more sustainable.

**Addressed challenges and bottlenecks**
Cities face a range of environmental issues. Urban transport makes a considerable claim on limited urban space. Extensive private car use (urban residents owning multiple cars, employer-provided cars, and but also electric vehicles) causes high vehicle volumes and related congestion problems. Urban space dedicated to this mode of transport (i.e. roads, parking facilities) comes with considerable opportunity costs as this space could also be used for alternative purposes. New areas and infrastructure (e.g. facilities for electric cars and green & park areas) need to be planned and designed in ways that make them accessible for everyone. Cities need alternative solutions for logistics as transport of goods relies mainly on vehicles and road transport, causing traffic jams and congestion. Increasingly, road cargo faces environmental restrictions. In the Netherlands, for instance, lorries built prior to 2015 are no longer allowed to enter some cities. It is therefore important to consider alternative ways for organizing logistics within cities: for example by identifying alternatives for point-to-point delivery of individual suppliers (an interesting case mentioned in this respect is 'Beurs van Berlage', Amsterdam).
As cities will increasingly implement 0-emissions zones in urban centers, there are consequences for (leisure, tourism, and hospitality) businesses operating in urban centers, notably the event sector. Major (business) events often take place in cities. But there is limited knowledge of the environmental impacts of events in urban settings. This includes 1) insights into the GHG emissions of specific events. Related, event venues lack knowledge on how to reduce energy use and make energy use more cost efficient. This is considered important given the current Covid-19 context. Such information is crucial as it is increasingly important for event venues to offer their customers a 'green' proposition. It is often unclear what the air quality of cities is and how the air quality can be improved. Comprehensive information about the air quality in cities often lacks. At present tourists usually lack information about air quality in cities. A single mode of communicating air quality information of/by European cities could aid the urban destination choice of tourists. Noise levels in certain areas pose challenges, particularly for people sensitive to noise exposure. Noise hindrance in cities is often location specific and incidental (think for instance about festivals and concerts). In terms of sustainable mobilities, it is unclear what the costs and benefits are of different modes of urban (public) transport when it comes to the environment (this was mentioned in the context of a possible subway connection between The Hague CS and Scheveningen). Shared scooters use a lot of urban space (whereas for some users it makes more sense to use a bicycle instead). When it comes to waste, there is limited knowledge about effective ways to reduce littering in urban spaces. Recent market research indicates that Dutch visitors from outside the Randstad consider the bigger Dutch cities as comparatively unsafe. Finally, in terms of social quality, visitor pressure (i.e. overcrowding) affects the quality of life of residents
Addressing aforementioned challenges requires careful planning and design of interventions that enhance the livability and economy of cities while effectively addressing environmental impacts.

**Research questions**
1. Can cities be made more liveable/attractive by redesigning the space that is currently used for parking facilities?
2. How can European cities publish unambiguous figures on their air quality and thus make their air quality transparent to a European audience?

3. How can car-sharing better take into account the holiday needs of families as a car is often needed for holidays?
4. What is the current situation when it comes to the capacity of companies - especially given the effects of Covid-19 - to adapt their business operations and business models to emission-related environmental requirements of cities (when it comes to environmental zones etc.) ?
5. How can you better align ambitions and the capacity of companies to adapt to changing requirements of cities so that there is more support for emission-related environmental requirements in cities?
6. How can the GHG (CO2) emissions of specific events be measured in a simple way?
7. How can event locations (large areas of real estate in urban areas) be encouraged to effectively use roof surfaces for solar energy generation?
8. How can you reduce the negative effects (emissions) of transport flows to and from event locations in urban areas?
9. How can the event sector be structurally supported (e.g. with the help of incentives) to make logistics (supply and removal to event locations in cities in particular) more efficient, cleaner and quieter?
10. How can the use low emission transport be encouraged at events?
11. How can local warehousing and smart transport structurally reduce emissions from logistics (supply and removal) around events?
12. Where are we going in the future in terms of mobility in cities, especially in relation to working differently (more work from home/less office work)?
13. How do you organize supply if inner cities become zero-emission zones?
14. How can areas be designed in such a way that they are accessible to everyone?
15. What are best practices in the field of setting up infrastructure such that it is also accessible to people with disabilities?
16. How can the air quality at different locations in the city be effectively measured?
17. What are the effects of different modes of transport on air quality in the city?
18. To what extent do planted areas contribute to improved air quality?
19. How can incidental noise pollution be taken into account?
20. How can a distinction be made, for example when granting permits, between incidental and continuous noise pollution?
21. To what extent do perceptions of safety in large cities correspond to reality?
22. What are the costs and benefits of different modes of transport in the city when it comes to environmental benefits?
23. What are the social costs and benefits of shared scooters when it comes to environmental & health benefits?
24. What are best practices in other cities when it comes to reducing litter?
25. What is the absorption capacity of cities with regard to number and types of visitors?

**Sustainability themes**
Greenhouse gas (GHG) emissions; Energy use; Air quality; Noise quality; Biodiversity quality; Safety; Landscape quality; Sustainable mobility access; Littering & waste pollution; Social quality

**LTH Subsectors**
Car transport; Rail/PT; Tourism facilities/DMO's

# 9 Tourism as catalyst for sustainability in other environmental policy domains

**Project definition**
This project focuses on addressing policy and governance obstacles when it comes to the formation and implementation of specific collaborations across the Dutch LTH subsectors that use tourism as a catalyst for sustainability in different environmental policy domains, notably, GHG emissions (nitrogen) and biodiversity.

**Addressed challenges and bottlenecks**
Developing comprehensive sustainability policy for and in collaboration with the LTH sector is considered complex. Sustainability challenges that need addressing are cross-sectoral and systemic, transcending the different and specific domains in which different policy actors can exert their respective influence. Policy and governance challenges subsequently occur. This is evident, for instance, in the current nitrogen crisis in the Netherlands. Policy actors often view tourism as a possible 'escape hatch' for an agricultural sector under pressure: an alternative source of income in cases where agriculture is phased out. They however find themselves confronted with several policy and governance-related challenges in tackling such a transition. Another key domain is biodiversity: addressing biodiversity challenges will become more urgent and important in the near future. So will water quality. Policy actors often lack knowledge in relation to the status quo of landscape quality and biodiversity at local and regional level, which complicates the formulation and implementation of area-specific policies. At the same time, biodiversity is seen as a major theme in tourism: tourism has the potential to be an engine that accelerates biodiversity recovery, contributing to the improvement of nature and ecosystems. There is interest and pressure from the market: nature and landscape comprise an important criterion for Netherlands-based consumers when deciding on their international holiday destination. Although aviation is often viewed as the elephant in the room when it comes to tourism-related policy discussions, there is scope for strategic collaboration. The Dutch outbound travel industry, for instance, can play an important role in strengthening the biodiversity and landscape quality of popular international and domestic destinations. A potential approach is through co-financing biodiversity initiatives. At present, for example, $CO_2$ offsetting schemes are often seen as controversial, supporting international projects with unclear carbon compensation impacts.

**Research questions**
1. How can tourism cocreate policies for a more resilient, innovative, and sustainable future?
2. How can tourism involve the local community in its efforts to become regenerative?
3. How are tourism-related policy processes reinforcing and what opportunities does tourism have to cocreate environmental and circular policies while ensuring that tourism reinforces the sociocultural heritage of a destination?
4. Who is responsible for tourism-related policies?
5. What indicators are used to determine the success of a policy?
6. What general, systemic sustainability challenges that have a relation to LTH require national coordination and how can LTH actors make a substantial contribution and have an active role in the policy process?
7. What challenges do Dutch national parks face in relation to biodiversity and landscape quality and what roles can tourism play to improve biodiversity and landscape quality of Dutch national parks?

8. How can aviation as policy domain be effectively integrated in the 'NBTC roadmap tourism climate action' initiative in terms of governance, given the involvement of two different government departments (I&W & EZK), the importance of coordination, and a consistent European policy approach?
9. How can tourism be a driver for the recovery of local biodiversity (at destination level) and, in this way, also contribute tourism itself?
10. What is a good alternative for CO2 offsetting, so that offsetting becomes a meaningful investment (linked to tour operator product portfolios) in or close to the Netherlands?
11. How can CO2 offsetting budgets be used to mitigate the negative impacts of climate change on destinations in ways that 1) enhance the current tour operator product portfolios; 2) that are scalable; 3) that are authentic; and 4) that are climatologically / ecologically responsible?
12. How can the Dutch outbound travel industry avoid that alternative investments of CO2 offsetting budgets become an object of competition?

**Sustainability themes**
Greenhouse gas (GHG) emissions; Energy use; Air quality; Water quality; Biodiversity quality; Landscape quality; Sustainable mobility access

**LTH Subsectors**
Aviation; Restaurants/cafes; Tourism facilities/DMO's

# 12 Business models and products for more sustainable consumption

**Project definition**
This project examines the potential of structural business model, product, and distribution modifications to address profound sustainability challenges that affect the license to operate and current business practices of the LTH sector in a European context.

**Addressed challenges and bottlenecks**
Lack of concerted action to address climate change related challenges is often explained using the argument of fragmentation, i.e. a large number of small players operating across LTH subsectors. Without discarding this argument, it obscures that the sector is also home to large players (e.g. Expedia; booking.com; large tour operators; airlines) with a considerable potential positive sustainability impact if they change their established modus operandi. Starting with aviation, even in the face of a demand drop, air travel will remain an important transport mode. Knowledge of concrete measures that can make aviation more sustainable is however limited whereas the potential of aviation to make a considerable contribution to sustainability is considerable. Moving to service providers, intermediaries often do not feel directly responsible for the purchase decisions of their customers and sustainable travel behavior. And they face considerable business and operational challenges. Including the environmental effects in ticket and holiday package prices can lead to more expensive holidays and exclude certain, budget-sensitive market segments. Taxation is thus often regarded as a measure that should only be deployed when sufficient and feasible green alternatives are available. Still, service providers (notably tour operators) have an important role to play when it comes to integrating more sustainable transport modes in their product offer (i.e. replacing air travel with green alternatives). Alternative transport modes – particularly rail transport – face distribution challenges. It is often difficult – particularly compared to air travel – for consumers to independently book international train tickets (involving consultation and use of multiple websites). Crucial to the improvement of online distribution of train tickets is improving access to data of railway companies in Europe (open data). Related, the supply of alternative transport modes, particular north-south connections to the Mediterranean, are currently insufficient in terms of connections and volume/frequency. Moving to the situation in popular tourism destinations for Dutch holidaymakers, in particular the Mediterranean, there are considerable volume & health related impacts on these destinations (i.e. overcrowding coupled to climate change related impacts such as heat stress, droughts, and forest fires). Service providers can make a considerable contribution to alleviating these impacts. They can, for example, use their power and influence to direct tourist flows and volumes to (alternative) destinations. At the same time, they face challenges related to established patterns of consumer behavior that they have historically helped create and corresponding attitude-behavior gaps. What remains is a profound business challenge: sustainability linked to social quality comes with considerable product and distribution model modifications and possibly a price tag that consumers will notice. Providers face a dilemma: remaining competitive (price) while putting pressure on their suppliers to address social, climate, and health related challenges.

**Research questions**

1. What actions are booking platforms (including online travel agents) willing and able to implement to structurally improve their sustainability performance (i.e. variable commission rates more sustainable/less sustainable hotels)?
2. How can the sales strategy of dumping cheap flight tickets be curbed?
3. To what extent is it possible to entice consumers to use local, more sustainable transport modes (train, bike, taxis) and to what extent are more sustainable transport modes available in destinations and what can suppliers to do make this offer more attractive to their customers?
4. What instruments do intermediaries in the outbound travel industry have to build a more sustainable product portfolio?
5. What is required in terms of policy and industry practices to compose the ideal sustainable holiday (package)?
6. In relation to 5, what policies and what actions by which private sector actors are required, according to (European) policy experts, to make the ideal sustainable holiday (package) possible?
7. What obstacles and challenges do intermediaries face in relation to offering greener holiday packages (i.e. products including an alternative transport component)?
8. What do intermediaries require to offer greener holiday packages (i.e. products including an alternative transport component) within the foreseeable future?
9. How can tour operators make the journey to the destination part of the holiday experience rather than a necessary evil?
10. What green alternatives can intermediaries offer the 'bottom of the market' (consumers that are just able to afford to go on holiday by airplane)?
11. How can tour operators offer their customers (particularly those in budget-sensitive market segments) alternative (greener) products that are of the same quality as the current offer?
12. How can seasonal redistribution and scaling-down of facilities be used to reduce the pressure on major mass tourism destinations?
13. When it comes to GHG emissions, how can the different ethical, business, and political pathways be aligned in order to maintain a viable travel business?
14. What are effective and attractive ways that intermediaries can use to encourage sustainable practices of suppliers in a situation when consumers do not yet demand more sustainable products and services?
15. How can the average, budget-conscious consumer be motivated to opt for more sustainable holiday products?
16. What are ways to effectively address the 'race to the bottom' in the Dutch outbound travel industry?
17. How can intermediaries include social quality aspects in the selection of travel service suppliers without losing customers?
18. How can intermediaries improve the (social) sustainability of their travel service providers?

**Sustainability themes**

Greenhouse gas (GHG) emissions; Energy use; Sustainable mobility access; Social quality

**LTH Subsectors**

Accommodation; Aviation; Rail/PT; Service providers

**Project definition**
This project tackles bottlenecks across the LTH subsectors to accelerate circularity in tourism in the Netherlands and other EU destinations frequented by Netherlands-based consumers.

**Addressed challenges and bottlenecks**
Circularity is a major theme in LTH. The reduction and re-use/recycle of waste has cost-advantages and can directly add value to the guest experience, but significant challenges persist when it comes to reduction, re-use, and recycling of materials, water, and waste. Water consumption of hotels is comparatively high; particularly in periods of water scarcity that often coincide with peak tourist seasons. There is limited knowledge about the waste production of tourists compared to the average waste production of local inhabitants of a destination. The structural re-use of water is an incidental practice at present. Reduction of water use is difficult to realise because suppliers lack an incentive to limit their supply. Within the events sector, structural policies to reduce water use are rare. Turning to waste, knowledge of waste flows during events is limited. There is limited re-use of exposition materials (i.e. furniture, decoration) whereas such practices have a clear business-case: event venues – particularly larger ones – can increase their capacity and host more events by speeding up the construction and deconstruction times of events. Also in ski destinations, energy and water use (i.e. for ski lifts; artificial snow production) is considerable. Moving to swimming pools, for instance in Mediterranean beach holiday destinations, the use of water (and chemicals) is high. The quality of drinking water is also an issue: the use of plastic bottles for drinking water is very high as viable alternatives are scarce. Bottled drinking water producers lack incentives to address this serious waste issue. When it comes to food waste (particularly of all-inclusive resorts), the waste production of consumers during their holidays is considerably higher compared to the waste production of consumers while at home. In the Netherlands, accommodation providers face a lot of practical challenges in relation to waste separation and processing. Restaurants and cafes find it challenging to adjust menus. There is a persistent belief that guests eat out in restaurants because of the availability of meat dishes. When it comes to interventions addressing food spillage (e.g. by means of apps), it is challenging to entice restaurant and cafe owners to participate. Health and hygiene rules and regulations are considered at odds with rules and regulations stimulating the reduction of plastics-use. New rules and regulations for the plastic packing materials (particularly on-the-go items) are considered costly and space-consuming. Related to inclusivity, there is limited information whether consumers with a disability use more water than able consumers, for instance in reference to their daily care. In terms of construction of new facilities (i.e. buildings), there is limited information about the latest developments in the field of circular construction practices as well as waste management. There is limited knowledge about the long-term consequences of droughts, for instance when it comes to water supply of tourist facilities in rural areas of the Netherlands.

**Research questions**
1. How can waste production be reduced or become circular and make a positive contribution to the tourism experience?
2. How can tourism accommodations be stimulated to disclose their water consumption to consumers, possibly in relation to the average water use in the destination as part of an awareness-raising effort?
3. What is the share of tourism accommodations in the total waste production of a destination area and what is the volume of this waste production compared to the volume of waste produced by the average permanent resident of a destination area?

4. How can event organizers collaborate with suppliers to stimulate the re-use of materials and resources (i.e. water)?
5. What effective incentives can policymakers use to stimulate the events sector to reduce water use during events?
6. How can surplus water be stored during wet periods (during European winters) to be used during events in dryer periods (European summers)?
7. Is it feasible to ban the use of specific materials in hotels, restaurants, and cafes?
8. How can wholesale food packages be adjusted (easy to store and move) so that re-use and recycling becomes more attractive?
9. How can the use of exposition materials in the supply chains of large event locations be organized so that re-use of materials becomes the norm?
10. How can the re-use of exposition materials by large operators be encouraged without frustrating the entire supply chain?
11. How can water and energy use in ski areas become circular?
12. How can a certification be realized that evaluates ski areas on their performance in the field of circularity (water & energy) so that circularity performance becomes visible for service providers and consumers?
13. How can, technologically speaking, the quality of water in swimming pools be safeguarded without using chemicals?
14. How can be ensured that tap water in destinations is drinkable?
15. How can service providers create plastic-free holidays and safeguard the available of good-quality drinking water?
16. How can service providers ensure that sufficient drinking water refill points (taps) are available in the destinations they offer?
17. What are the business models and value chains of plastic bottled drinking water providers and what alternative business model and value chain can be designed to compete with this business?
18. How can hotels in destinations ensure that food waste becomes more circular (including separation of waste flows)?
19. Is it practically feasible to separate waste in hotel rooms?
20. How can hotels organize collaboration, for instance with municipalities, neighborhoods, or communities, in the processing of waste?
21. How can hotels, restaurants, and cafes, with the help of easy-to-apply tools, reduce food waste?
22. How can hotels, restaurants, and cafes adjust to new rules and regulations in relation to plastic package materials and efficiently separate plastic waste?
23. What is the water consumption of disabled consumers compared to abled consumers of LTH products and services?
24. In term of universal design (accessible to all), how can water use of consumers with a disability be taken into account?
25. How can tourism facilities be built and operated in more circular ways and where can operators find information about circular practices in these fields?
26. What is the long-term impact of droughts on the water supply of tourism facilities and accommodations?
27. What (new and different) options are available to entrepreneurs in the recreation sector to reduce waste?
28. In what ways can tourism facilities, restaurants, cafes, and accommodation providers reduce the use of package materials in a responsible way (i.e. in terms of hygiene and safety)?

**Sustainability themes**
Greenhouse gas (GHG) emissions; Energy use; Water use; Water quality; Biodiversity quality; Safety; Sustainable mobility access; Littering & waste pollution; Waste quantity; Social quality

**LTH Subsectors**
Accommodation; Restaurants/cafes; Service providers; Tourism facilities/DMO's