



Economic and Social Council

Distr.: General
2 September 2021

Original: English

Economic Commission for Europe

Committee on Environmental Policy

Conference of European Statisticians

Joint Task Force on Environmental Statistics and Indicators

Eighteenth session

Geneva, 18 and 19 October 2021

Item 5 of the provisional agenda

Ongoing developments with relevance for
the work of the Joint Task Force

Draft assessment of applying principles of circular economy to sustainable tourism in the pan-European region*

Note by the Secretariat

Summary

At its twenty-fifth session (Geneva, 13–15 November 2019), the Committee on Environmental Policy requested the secretariat and the United Nations Environment Programme, working in close cooperation with the European Environment Agency, to prepare a limited indicator-based and thematic pan-European environmental assessment.

This document sets out the draft content of one section of the assessment, covering applying principles of circular economy to sustainable tourism, which is one of the two themes of the upcoming Ninth Environment for Europe Ministerial Conference (Nicosia, 5–7 October 2022).

The Joint Task Force is invited to review and comment on this section.

* An agreement was reached to publish the present document after the standard publication date so as to include the most recent information.



I. Introduction

1. At its twenty-fifth session (Geneva, 13–15 November 2019), the Committee on Environmental Policy requested the secretariat and the United Nations Environment Programme, working in close cooperation with the European Environment Agency, to prepare a limited indicator-based and thematic pan-European environmental assessment.¹ The Committee also welcomed document ECE/CEP/AC.10/2019/6, which identified the environmental topics to be addressed by the assessment, together with the two themes of the Ninth Environment for Europe Ministerial Conference (Nicosia, 5–7 October 2022).

2. This document sets out the draft content of one section of the assessment, covering applying principles of circular economy to sustainable tourism.

II. Draft assessment of applying principles of circular economy to sustainable tourism in the pan-European region

A. A note on subregions

3. Throughout the assessment, where feasible and relevant, the following subregions are referred to:

(a) European Union, comprising 27 member States, i.e. without the United Kingdom of Great Britain and Northern Ireland;

(b) Western Europe, comprising non-European Union high-income countries and including Israel;

(c) Central Asia, comprising Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan;

(d) Eastern Europe, including the Caucasus and the Russian Federation;

(e) South-Eastern Europe, comprising Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, Serbia and Turkey.

B. Applying principles of circular economy to sustainable tourism

1. Key messages and recommendations

Key messages

4. Circular thinking in tourism is still in its infancy, apart from some individual cases. Opportunities may be most straightforward in building and (food) waste management. Also, opportunities exist in sustainable aviation fuels (e-fuels). Many sharing economy initiatives currently have too many non-circular counter effects.

5. Sustainable development in tourism is still to achieve momentum. With the rapid growth of tourism, its impacts are growing despite efficiency improvements. Key areas with a strong relation to both Sustainable Development Goals and the circular economy are energy use and emissions in transport, accommodation and restaurants, waste management of accommodation and restaurants (including food waste), water consumption and production of wastewater in general, and resource usage in building, for interiors, and in amenities.

6. Due to its cross-sectoral nature, a circular approach in tourism is complex but also holds opportunities to become driven through other sectors.

¹ ECE/CEP/2019/15, para. 37 (k) (ii).

7. Indicator development for sustainable tourism is still evolving. Digitalization holds promise for better and more uniform measurement and monitoring.

8. A pan-European circular tourism economy will be more resilient to and better equipped to cope with future crises, be they economic, health-related, or derived from the environmental challenges that face the region.

Recommendations

9. Governments should increase efforts to help reduce energy use and greenhouse gas emissions from tourism transport, as large gains can be achieved with relevance for climate policy and the 2030 Agenda for Sustainable Development. Actions include, amongst other things, the scaling-up of international, long-distance rail infrastructure and travel, electric charging infrastructure in tourism destinations, facilitating the transition towards renewable energy use by accommodation, and the sharing of good practices.

10. The Governments of the pan-European region should take the opportunity when elaborating coronavirus disease (COVID-19) recovery plans to prioritize domestic tourism and international tourism from nearby countries, as these are more resilient to crises, have lower impacts on climate, and product loops are closer and easier to make circular than those of medium and long-distance international tourism products.

11. Decision-makers and entrepreneurs in the region should apply circular economy principles across the tourism value chain. A value chain approach could accelerate the transformation to more circularity in tourism and increase its long-term health and resilience. Tourism has the potential for long-lasting positive impacts beyond the sector itself, due to its interlinkages with other economic activities and the direct producer-consumer interaction.

12. The member States and governing bodies of the United Nations Economic Commission for Europe (ECE) should select a number of specific key-impact tourism indicators to be included in ECE statistical databases. Indicators for circular economy in tourism should be aligned with those being developed for the monitoring of sustainable development in tourism (particularly with the most promising) and be compatible with Sustainable Development Goals. Circular economy indicator development could follow the approach adopted by the initiative of the United Nations World Tourism Organization (UNWTO) towards a Statistical Framework for Measuring the Sustainability of Tourism (SF-MST),² i.e.: (a) further integration of established measurement frameworks (Tourism Satellite Accounts, System of Environmental-Economic Accounting, European Tourism Indicator System and MST) to provide a platform for the measurement of sustainable and/or circular tourism; (b) further engagement with the definition and measurement of Sustainable Development Goal indicators, including the development of a complementary set of circular tourism indicators; and (c) advancing the development of subnational tourism statistics recognizing the importance of location-specific information in decision-making on tourism.

2. Context

13. Over the past half-century the extraction of minerals has tripled, with the extraction and processing of natural resources accounting for over 90 per cent of biodiversity loss and water stress and about 50 per cent of climate change impacts.³ Critical resources are already becoming scarce, while ecosystem services are increasingly degraded, and man-made pollution and waste have become increasingly difficult to absorb.⁴ Over the past decades, tourism has become a major industry, reaching 1.5 billion international tourist arrivals in

² United Nations World Tourism Organization (UNWTO), “SDG Indicators for ‘Sustainable tourism’: A UNWTO contribution to the IAEG-SDG”, 2 March 2016, available at https://webunwto.s3-eu-west-1.amazonaws.com/2019-08/unwtosdgtourismindicators02032016_unlocked.pdf.

³ Bruno Oberle and others, *Global Resources Outlook 2019: Natural Resources for the Future We Want*, (Nairobi, United Nations Environment Programme, 2019), available at www.resourcepanel.org/reports/global-resources-outlook.

⁴ Will Steffen and others, “Planetary boundaries: Guiding human development on a changing planet”, *Science*, vol. 347, No. 6223 (13 February 2015), with abstract available at <http://science.sciencemag.org/content/347/6223/1259855.abstract>.

2019.⁵ It consists of various resource-consuming practices including flights, accommodation, restaurants and attractions. These practices follow the traditional linear economy paradigm that has an impact on climate and environment. The environmental issues mentioned most for tourism are energy use and emissions, biodiversity loss, water use, overconsumption and waste. Tourism currently represents 10 per cent of global employment and 10 per cent of global gross domestic product (GDP).⁶

14. Tourism's share of global fossil energy consumption and associated emissions of carbon dioxide (CO₂) was already 5 per cent in 2008, of which tourism transport was responsible for 75 per cent.⁷ Using a wider scope, the contribution of tourism to climate change has been estimated to be 8 per cent.⁸ Under a business-as-usual scenario, worldwide tourism may cause more emissions than were agreed in the Paris Agreement for all sectors and households by 2060–2070.⁹ This relates to the high energy use in tourism, notably in transport and accommodation, increasing with luxury.

15. Travel distance and modal choice are the key determining factors in tourism transport emissions. UNWTO and the International Transport Forum (ITF) forecast the number of domestic and international arrivals to reach 15.6 billion and 1.8 billion by 2030 respectively. Tourism arrivals by surface modes of transport will grow by 70 per cent between 2016 and 2030 (almost 5 billion trips more), but emissions from these trips will grow by 12 per cent (691 million to 775 million tonnes of CO₂), representing 44 per cent of the total (compared to 50 per cent in 2016). In contrast, in 2030, tourism arrivals by air (both international and domestic) are expected to represent 33 per cent of the total arrivals but to produce 56 per cent of emissions.¹⁰

16. 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.¹¹ Food consumption in tourism, with an estimated 75 billion meals a year, leads to a range of sustainability issues.¹² For instance, food waste in the tourism food service industry is considerable.¹³ The food waste share of hospitality waste and of restaurant waste is 40 per cent and 60 per cent, respectively.¹⁴ In 2011, the United Nations Environment Programme (UNEP) estimated that international tourism alone was responsible for 14 per cent 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. Tourism contributes to biodiversity loss through land conversion, indirectly through its share in greenhouse gas emissions, overexploitation of natural resources, the spread of invasive species and various types of pollution.¹⁵ Land-use for tourism is not regarded as an issue in absolute terms, but tourism is identified as one of a

⁵ UNWTO, "International Tourism Growth Continues to Outpace the Global Economy", 20 January 2020, available at www.unwto.org/international-tourism-growth-continues-to-outpace-the-economy.

⁶ UNWTO and the International Transport Forum (ITF), *Transport-related CO₂ Emissions of the Tourism Sector – Modelling Results* (Madrid, 2019).

⁷ UNWTO and UNEP, *Climate Change and Tourism: Responding to Global Challenges* (Madrid, 2008).

⁸ Manfred Lenzen and others, "The carbon footprint of global tourism", *Nature Climate Change*, vol. 8 (May 2018), pp. 522–528.

⁹ P.M. Peeters, "Tourism's impact on climate change and its mitigation challenges: How can tourism become 'climatically sustainable'?", doctoral thesis, Delft University of Technology, 2017.

¹⁰ UNWTO and ITF, *Transport-related CO₂ Emissions*.

¹¹ Stefan Gössling, "New performance indicators for water management in tourism", *Tourism Management*, vol. 46 (February 2015), pp. 233–244.

¹² Stefan Gössling and others, "Food management in tourism: Reducing tourism's carbon 'footprint'", *Tourism Management*, vol. 32, No. 3 (June 2011), pp. 534–543.

¹³ Carlos Martin-Rios and others, "Food waste management innovations in the foodservice industry", *Waste Management*, vol. 79 (September 2018), pp. 196–206.

¹⁴ Sanaa I. Pirani and Hassan A. Arafat, "Solid waste management in the hospitality industry: A review", *Journal of Environmental Management*, vol. 146 (December 2014), pp. 320–336.

¹⁵ UNWTO, *Tourism and Biodiversity – Achieving Common Goals Towards Sustainability* (Madrid, 2010).

few competitive sources for very high-value land, particularly (fragile) coastal areas.¹⁶ Local competing use can be at stake here.

17. Next to these environmental issues is the relatively recent problem of overtourism, which describes situations “in which the impact of tourism, at certain times and in certain locations, exceeds physical, ecological, social, economic, psychological, and/or political capacity thresholds”.¹⁷ The underlying factors of overtourism are often related to those causing some of the above-mentioned environmental problems. In this respect, and in this day and age, it is also necessary to mention that tourism can be a direct and indirect vector of pandemics, primarily through transport.¹⁸

18. Modelling shows that the resource use of energy and emissions, water, land and food will double within 25 to 45 years.¹⁹ This will contribute to already significant anthropogenic stress on a number of planetary boundaries,²⁰ and is in conflict with policy objectives such as those formulated in the Paris Agreement and the Sustainable Development Goals. Many of these stresses already have, or will have, impact on tourism itself, like climatic changes that may lead to shifts in the attractiveness of destinations, causing tourist flows to change, increasing water and snow shortages impacting the tourism offer, or weather extremes damaging tourism infrastructure.

19. While the transformation to a more sustainable development of tourism has been pursued at all levels for at least two decades, attempts have not succeeded on a broad scale. The circular economy is regarded as very promising for contributing to the achievement of a number of Sustainable Development Goals, particularly Goal 7 on energy, Goal 8 on economic growth, Goal 11 on sustainable cities, Goal 12 on sustainable consumption and production, Goal 13 on climate action, Goal 14 on oceans and Goal 15 on life on land. UNWTO acknowledges that approaches “such as the circular economy – promoting business models based on renewable resources, longer and diverse product life cycles, shared consumption and interconnected value chains – can play a significant role when designing and improving resource management systems not only in the tourism sector, but also for the sustainable development of destinations”.²¹ The United Nations Development Programme (UNDP) and UNEP identify tourism as one of a few sectors that are key to the economic development of all countries and also providing opportunities for climate change mitigation through resource efficiency and increasing circularity.²² They recommend a circular or value chain approach to tourism, to allow for the identification and assessment of its interdependencies with other sectors, for example those defined for climate action. Under a circular economy approach, responses could be developed that would drive (climate) action across all the various sectors on which tourism depends. Tourism’s strong relation to food production, distribution and disposal is named as an example. In particular, UNDP sees potential for a circular economy approach in tourism in countries where tourism is a large economic force.²³

20. The main policy challenge related to circular economy is to ensure its effective definition and implementation in the tourism sector, specifically because the tourism sector

¹⁶ Ward Anseeuw and others, *Land rights and the rush for land: Findings of the Global Commercial Pressures on Land Research Project* (Rome, International Land Commission, 2012).

¹⁷ Paul Peeters and others, “Research for TRAN Committee - Overtourism: impact and possible policy responses. European Parliament, Policy Department for Structural and Cohesion Policies”, (Brussels, European Parliament, Policy Department for Structural and Cohesion Policies, 2018), p. 22.

¹⁸ Stefan Gössling, Daniel Scott and C. Michael Hall, “Pandemics, tourism and global change: a rapid assessment of COVID-19”, *Journal of Sustainable Tourism*, vol. 29, No. 1 (April 2021), pp. 1–20.

¹⁹ Stefan Gössling and Paul Peeters, “Assessing tourism’s global environmental impact 1900–2050”, *Journal of Sustainable Tourism*, vol. 23, No. 5 (March 2015), pp. 639–659; See also UNEP and UNWTO, *Tourism in the Green Economy – Background report* (Madrid, 2012).

²⁰ Steffen and others, “Planetary boundaries: Guiding human development on a changing planet”.

²¹ UNWTO and United Nations Development Programme (UNDP), *Tourism and the Sustainable Development Goals – Journey to 2030* (Madrid, 2018). See p. 94.

²² UNDP, *A 1.5°C World Requires a Circular and Low Carbon Economy* (New York, 2020).

²³ Ibid.

is an amalgam of parts of other sectors – from building to transport – and is mainly a service sector.

3. State, main trends and recent developments

21. The *Circularity Gap Report 2020*²⁴ estimates the global circularity rate at 8.6 per cent, down from 9.1 per cent in the 2018 edition of the same report. Progress in the development of a circular economy in the pan-European region is varied.

22. ECE reports an increase in the efficiency of resource use in the ECE region from 2000 to 2017. While domestic material consumption per unit of GDP decreased by about 10 per cent, aggregate output increased by 40 per cent. Again, there are large differences between ECE countries, with an average 3.1 per cent decrease of domestic material consumption by European members of the Organisation for Economic Co-operation and development (OECD) versus an increase in eastern ECE States. In the same period, the material footprint continued to grow by 18 per cent in the ECE region, partly due to the import of raw materials, substituting domestic production. ECE also points to the major role of ECE countries in global material demand and a consequent responsibility (in a transition towards more sustainable consumption and production) beyond the ECE region.²⁵ This issue is also extremely present in international tourism. Material resource use in the ECE region is very much a mirror of the economic level of States: in less advanced economies, growth is accompanied by high resource use, whereas in more developed (service) economies material use is less intensive.

23. In the European Union, the circular material use rate (recovered materials as a percentage of overall materials used) increased from 8.2 per cent in 2004 to 11.2 per cent in 2017, though with little change since 2012.²⁶ The Netherlands, for instance, is regarded as a global circularity front-runner (rate of 24.5 per cent), whereas a country like Norway (2.4 per cent) lags far behind the global average.²⁷

24. The European Commission, as part of its European Green Deal²⁸ and for aligning to new strategies, presented a new circular economy action plan in March 2020,²⁹ following an earlier version.³⁰ In its circular economy action plan, the European Commission notes that “Scaling up the circular economy from front-runners to the mainstream economic players will make a decisive contribution to achieving climate neutrality by 2050 and decoupling economic growth from resource use, while ensuring the long-term competitiveness of the [European Union] and leaving no one behind”. In order to achieve this, the “[European Union] needs to accelerate the transition towards a regenerative growth model that gives back to the planet more than it takes, advance towards keeping its resource consumption within planetary boundaries, and therefore strive to reduce its consumption footprint and double its circular material use rate in the coming decade”. The action plan includes proposals on product design, circular production processes, waste reduction and consumer empowerment. The European Parliament followed up with a resolution on the action plan, demanding

²⁴ Marc de Wit, Jelmer Hoogzaad and Caspar von Daniels (n.p., Circle Economy, 2020), available at www.circularity-gap.world/2020.

²⁵ E/ECE/1495, paras. 2–3.

²⁶ de Wit, Hoogzaad and von Daniels, *Circularity Gap Report 2020*.

²⁷ Laxmi Adrianna Haigh, “Countries: The crucial piece to finish the circular economy puzzle”, Circle Economy, 2 November 2020, available at www.circle-economy.com/blogs/countries-the-crucial-piece-to-finish-the-circular-economy-puzzle.

²⁸ European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, The European Green Deal, COM(2019) 640 final.

²⁹ European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, A new Circular Economy Action Plan. For a cleaner and more competitive Europe, COM(2020) 98 final.

³⁰ European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, Closing the loop – An EU action plan for the Circular Economy, COM(2015) 614 final.

additional measures aiming for a fully circular economy by 2050.³¹ The resolution underlines the major contribution that the circular economy make give to reaching the goals of the Paris Agreement and the Convention on Biological Diversity, as well as to achieve the Sustainable Development Goals.

25. Circular approaches have yet to make it into direct European Union tourism policy, the Commission's current framework being from 2010.³² The Council of the European Union encourages European Union member States to consider a number of challenges and opportunities when developing tourism strategies and policies, of which "sustainability, including resource efficiency, circular economy, seasonality and the management and distribution of increasing tourism flows" is one. Policies are to contribute to European Union climate goals, the Paris Agreement and the Sustainable Development Goals.³³

26. The development of circular economy in tourism in ECE countries is still very limited. The COVID-19 pandemic crisis does offer opportunities for a reset of contemporary tourism, reducing impacts and increasing resilience.³⁴ The COVID pandemic has had a devastating effect on international tourism in particular. UNWTO reports that, in 2020, international arrivals dropped by 74 per cent due to travel restrictions and various socioeconomic challenges.³⁵ This collapse of international tourism alone is estimated to represent a loss of \$1.3 trillion in export revenues and around 120 million direct jobs at risk. UNWTO acknowledges that the COVID-19 crisis "has raised awareness of the importance of local supply chains and the need to rethink how goods and services are produced and consumed, both key elements of a circular economy. Integrating circularity and further advancing resource efficiency in the tourism value chain represent an opportunity for the tourism sector to embrace a sustainable and resilient growth pathway".³⁶ Thus, for a circular economy transition in tourism, UNWTO recommends investing in transforming tourism value chains, integrating circular economy processes, prioritizing sustainable food approaches for circularity, and shifting towards a circularity of plastics in tourism. Even though UNWTO concludes that there is growing consensus among tourism stakeholders that recovering from the pandemic must also involve tackle the underlying reasons and sustainability challenge, the time for a genuine transition appears short now that many tourism-dependent countries and businesses are desperate to reopen after various lockdowns, and consumers are longing for holidays away from home. A return to business-as-usual seems likely, with implications for (additional) investments in sustainable or circular tourism development. In terms of energy use (and emissions), the faster recovery of domestic tourism that some countries experienced is positive in circular economy terms.

³¹ European Parliament, European Parliament resolution of 10 February 2021 on the New Circular Economy Action Plan, (2020/2077(INI)).

³² European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions, Europe, the world's No 1 tourist destination – a new political framework for tourism in Europe, COM(2010) 352 final.

³³ Council of the European Union, Outcome of Proceedings, The competitiveness of the tourism sector as a driver for sustainable growth, jobs and social cohesion in the EU for the next decade, 9707/19 TOUR 10 IND 186 COMPET 434.

³⁴ Gössling, Scott and Hall, "Pandemics, tourism and global change: a rapid assessment of COVID-19"; Organisation for Economic Co-operation and Development (OECD), "Tourism Policy Responses to the coronavirus (COVID-19)", 2 June 2020, available at www.oecd.org/coronavirus/policy-responses/tourism-policy-responses-to-the-coronavirus-covid-19-6466aa20/; UNWTO, "One planet vision for a responsible recovery of the tourism sector", available at www.unwto.org/covid-19-oneplanet-responsible-recovery-initiatives; and United Nations Sustainable Development Group, "Policy Brief: COVID-19 and Transforming Tourism", August 2020, available at <https://unsdg.un.org/resources/policy-brief-covid-19-and-transforming-tourism>.

³⁵ UNWTO, "2020: Worst Year in Tourism History with 1 Billion Fewer International Arrivals", 28 January 2021, available at www.unwto.org/news/2020-worst-year-in-tourism-history-with-1-billion-fewer-international-arrivals.

³⁶ UNWTO, *Recommendations for the Transition to a Green Travel and Tourism Economy* (Madrid, 2021).

4. Indicators

27. As the literature on circular economy in tourism is still in its infancy, there are very few direct references to indicators for measuring the circular economy in tourism. Their use is recommended, but typical indicators are not specified. UNWTO and UNEP assert that “embracing circularity implies robust measurement and monitoring of the sustainable development impacts of economic activities”.³⁷ Effective indicators need to be relevant to core issues, (statistical) data for evaluation need to be available and should be comparable over time. Others recommend not making indicator (sets) too ambitious.³⁸ This may be politically and scientifically appealing but is not necessarily practicable. They also advise against a “choice overload”, suggesting that the focus be on a small set of meaningful indicators. Indicators to monitor the sustainable development of tourism could be generated as a result of policymaking related to the establishment of the pan-European Shared Environmental Information System.³⁹ Digital platforms are widely seen as an opportunity to harmonize indicators, allowing for a comprehensive outlook taking into account the economic, sociocultural and environmental aspects.

28. Circular economy indicators themselves are still being developed. A simple and effective monitoring framework was called for in the first European Union circular economy action plan, supported by both the Council of the European Union and the European Parliament. In 2018, the European Commission presented a new set of measures including a Monitoring Framework for the Circular Economy,⁴⁰ which was operationalized by Eurostat.⁴¹ The framework consists of 10 indicators, some of which are broken down into subindicators, and aims at measuring progress towards a circular economy in a way that encompasses its various dimensions at all stages of the lifecycle of resources, products and services. Indicators cover four thematic areas: (a) production and consumption; (b) waste management; (c) secondary raw materials; and (d) competitiveness and innovation. The list is constructed to be short and focused. It uses available data while also earmarking areas where new indicators are in the process of being developed, in particular for green public procurement and food waste. The European Commission indicators are largely restricted to the circulation of materials and focused on waste, partly due to the availability and reliability of data, and the lack of other options.⁴² In its 2021 resolution, the European Parliament calls on the Commission to propose binding European Union targets for 2030, to be monitored with new indicators to be adopted by the end of 2021, as part of an updated Monitoring Framework for the Circular Economy. The European Commission relates these new indicators to the focus areas in its action plan, but it also desires interlinkages between circularity, climate neutrality and the zero pollution ambition.

29. To propose relevant indicators for measuring and monitoring circular economy development in tourism in ECE member States, a starting point is to identify the key issues in tourism that are both relevant in terms of their impacts, contribution to the Sustainable Development Goals and potential for circular processes. This is rather similar to the

³⁷ UNWTO and UNEP, *Baseline Report on the Integration of Sustainable Consumption and Production Patterns into Tourism Policies* (Madrid, 2019), p. 66.

³⁸ Elizabeth Agyeiwaah, Bob McKercher and Wantanee Suntikul, “Identifying core indicators of sustainable tourism: A path forward?” *Tourism Management Perspectives*, vol. 24 (October 2017), pp. 26–33.

³⁹ *Sharing our vision for the pan-European region: Setting strategic goals and objectives for the Working Group on Environmental Monitoring and Assessment* (United Nations publication, ECE/CEP/187).

⁴⁰ European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on a Monitoring framework for the circular economy, COM(2018) 29 final.

⁴¹ Eurostat, Circular Economy – Monitoring Framework, available at <https://ec.europa.eu/eurostat/web/circular-economy/indicators/monitoring-framework>.

⁴² Opinion of the European Economic and Social Committee on the ‘Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a monitoring framework for the circular economy’, *Official Journal of the European Union*, C 367 (2018), pp. 97–102; and Gustavo Moraga and others, “Circular economy indicators: What do they measure?”, *Resources, Conservation and Recycling*, vol. 146 (July 2019), pp. 452–461.

identification of hotspots as part of the Hotspot Analysis framework advocated in the UNEP Lifecycle Initiative.⁴³ UNEP considers an environmental impact to be a hotspot if it contributes to more than 50 per cent of total lifecycle impact across all of the product or service lifecycle stages in any given impact category (for example, greenhouse gas emissions, energy or water use, and waste), ensuring that most of the impact is considered.⁴⁴

30. In the remainder of this section, a simplified approach is taken to arrive at indicators at the national level, where the main elements of tourism are compared with the key environmental impact categories. Indicators could then follow from these hotspots, i.e. where the contribution of a certain tourism element to an impact category is significantly larger or more relevant than that of other tourism elements. In warm spots, this contribution is average, and in cold spots below average or even irrelevant. Through this analysis, based on the impact literature summarized in the preceding subsection on context, several hotspots are identified for accommodation operations, origin-destination transport, and events and activities (see table 1 below).

Table 1
Validating and prioritizing tourism hotspots

<i>Impact category</i> <i>Tourism element</i>	<i>Energy use</i>	<i>Water use</i>	<i>Other resource use or over-consumption</i>	<i>Waste</i>	<i>Climate change</i>	<i>Bio-diversity</i>
Accommodation: Buildings	Warm	Warm	Warm	Warm	Warm	Warm
Accommodation: Operations	Hot	Hot	Hot	Hot	Hot	Cold
Restaurants and bars: Buildings	Warm	Warm	Cold	Warm	Cold	Cold
Restaurants and bars: Operations	Warm	Warm	Warm	Hot	Warm	Cold
Transport: Local	Warm	Cold	Cold	Cold	Warm	Warm
Transport: Origin to destination	Hot	Cold	Hot	Cold	Hot	Warm
Activities: Events, attractions and festivals	Warm	Warm	Hot	Hot	Cold	Warm
Services (tour operators, travel agencies, financial and booking services)	Cold	Cold	Cold	Cold	Cold	Cold

Notes: Cold spot Warm spot Hotspot

31. Tourism strongly contributes to waste production, energy consumption, climate change and, to a smaller extent, water issues, through a variety of non-circular processes within its value chain. These four hotspots correspond to the four core accounts identified by UNWTO in its initiative towards a Statistical Framework for Measuring the Sustainability of

⁴³ Mark Barthel and others, *Hotspots Analysis: An overarching methodological framework and guidance for product and sector level application* (UNEP, 2017).

⁴⁴ One Planet Network, "How to map tourism value chains and identify key actions: Online training #1 – Sustainable Tourism Programme", video, 29 March 2019, available at www.oneplanetnetwork.org/webinar-tourism-value-chains.

Tourism.⁴⁵ For biodiversity, only warm spots were identified, thus it was not selected as a key indicator area for circular economy in tourism, even though speed of travel and global connectiveness of aviation play a significant role in the spread of invasive species and pathogens,⁴⁶ and land conversion, greenhouse gas emissions and the overexploitation of natural resources lead to biodiversity loss. Overconsumption is a clear issue with transport to the destination. The combination of strong increases in transport speed and low fares through the development of air transport were the main drivers of overconsumption of travelled distances.⁴⁷ All the impact categories in table 1 above can be linked to relevant Sustainable Development Goals and have strong links to circular processes. These are shown in table 2 below, next to some first coarse indicator topics for each impact category.

Table 2

Tourism impact categories and Sustainable Development Goals

<i>Impact category</i>	<i>Relevant Sustainable Development Goals</i>	<i>Coarse indicator topics</i>
Energy use and climate change	13 – Climate action	Energy use
	7 – Affordable and clean energy	Renewable energy use
		Greenhouse gas emissions
		Transport mode shares
Biodiversity loss		Arrival and departure numbers
	15 – Life on land	Protected area
	14 – Life below water	Transport infrastructure
Water (shortage)	6 – Clean water	Water consumption
		Water management
Waste (production)	12 – Responsible consumption and production	Waste production
		Waste management
		Construction materials
Resource use and overconsumption	12 – Responsible consumption and production	Resource consumption

32. The final step is to define core indicators and measure their performance, to determine the current state of circularity in tourism. In the discussion on indicators in the following subsections, preliminary indicators for monitoring circular economy in tourism are presented, including the origin of or a database for each indicator. Each indicator is discussed in terms of the state and trends in ECE member States, data comparability and data availability.

33. Due to data limitations, sometimes only selected ECE countries from each subregion (European Union, Western Europe, Eastern Europe, South-Eastern Europe and Central Asia) are compared to show how circularity has developed over the past decade. A European Union bias could mostly, but not always, be avoided, due to data availability.

Waste generation

34. Reducing waste is a focal point in aiming for circularity, and tourism contributes significantly to local waste production. Tourism inflows significantly increase municipal solid waste generation, up to a turning point where more arrivals contribute to lowering

⁴⁵ UNWTO, *Linking the TSA and the SEEA: A technical note* (Madrid, 2019).

⁴⁶ T. Kelly and J. Allan, “Ecological effects of aviation”, in *The Ecology of Transportation: Managing Mobility for the Environment*, John Davenport and Julia L. Davenport, eds. (n.p., Springer, 2006).

⁴⁷ Peeters, “Tourism’s impact on climate change and its mitigation challenges”.

municipal waste per capita.⁴⁸ More tourism arrivals lead to more tourists per resident and, consequently, more waste per resident.

35. The European Tourism Indicator System suggests determining percentage waste recycled per tourist compared to total waste recycled per resident per year.⁴⁹ However, the example of the Netherlands, Norway and Turkey shows that waste disposal shares differ greatly from country to country. While the Netherlands disposes of 2.6 per cent of its total generated waste, Norway disposes of 9.7 per cent and Turkey 88.4 per cent. And whereas the Netherlands has cut its disposal rate in half since 2010, Norway has increased its disposal share, mainly due to an increasing amount of waste. To determine the real impact of tourism on national waste production, more specific indicators must be measured.

36. Future policies may use tourism income to invest in recovery plants, or to introduce a maximum tourism capacity where necessary to manage the amount of waste. Furthermore, tourism businesses may be asked to actively reduce waste production by banning non-recyclable packaging and encouraging restaurants and hotels to donate food leftovers.

Water consumption

37. There is strong evidence that tourists use considerably more water than they do when at home and compared to local inhabitants.⁵⁰ Water consumption in tourism is closely linked to energy and food production, and best addressed in accommodation, where much of the consumption in tourism takes place.⁵¹

38. To make water usage circular, all demand must be covered by renewable water sources. Therefore, no fossil water sources (groundwater, ice) should be used. As tourism concentrates in the warm and dry season, many (summer) tourism destinations suffer from water shortages. In destinations with concerns about the availability of water to support tourism activity, it will not be sufficient to record only the levels of water use by tourism activities.⁵² Information on the stock of water and changes in this stock also need to be recorded.

39. The preliminary indicator proposed for water circularity in tourism is derived from Gössling and others⁵³ and consists of two (national) subindicators: the share of water used for tourism; and the share of renewable water in overall supply (the stock). Figures in the pan-European region differ, with frequently high tourism water shares in Mediterranean countries, while shares of renewable water vary. The share of water extracted from renewable sources depends on water scarcity and therefore differs greatly between countries.

40. Using national figures can mask water scarcity at the regional and local scales.⁵⁴ Simultaneously, trends show an increasing demand for fresh water in destinations, which puts pressure on renewable resources, and water scarcity is becoming an increasing problem due to climate change.

41. Future policy responses may focus on demanding the use of water-saving technologies and a water management plan in dry regions that accounts for the allocation of water between tourism, agriculture and the local inhabitants. Furthermore, research has shown that informing tourists about their water consumption footprint and water shortage issues can have

⁴⁸ Italo Arbulú, Javier Lozano and Javier Rey-Maqueira, “Tourism and solid waste generation in Europe: A panel data assessment of the Environmental Kuznets Curve”, *Waste Management*, vol. 46 (December 2015), pp. 628–636.

⁴⁹ European Union, *The European Tourism Indicator System: ETIS toolkit for sustainable destination management* (Luxembourg, Publications Office of the European Union, 2016).

⁵⁰ Stefan Gössling and others, “Tourism and water use: Supply, demand, and security. An international review”, *Tourism Management*, vol. 33, No. 1, pp. 1–15.

⁵¹ Gössling, “New performance indicators for water management in tourism”.

⁵² UNWTO, *Statistical Framework for Measuring the Sustainability of Tourism. Consultation Draft. Draft prepared for discussion with the Working Group of Experts on Measuring the Sustainability of Tourism* (October 2018).

⁵³ Gössling and others, “Tourism and water use: Supply, demand, and security”.

⁵⁴ *Ibid.*

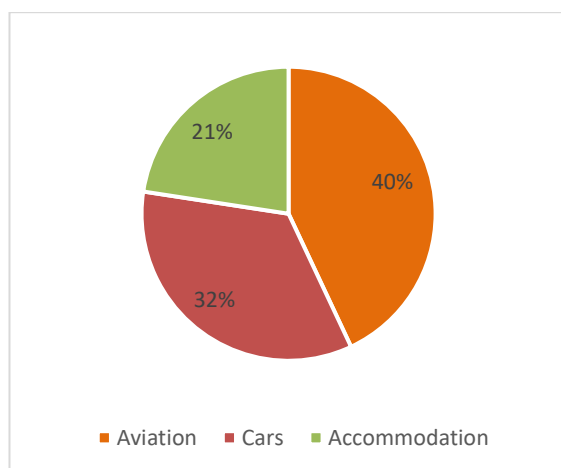
a positive impact on lowering water demand.⁵⁵ Advanced water generation methods may also become indispensable for tourism in the coming decades.

Energy use in tourism

42. Figure I below shows the share of CO₂ emissions from tourism. The largest contribution comes from transport by air or car. Accommodation and restaurants account for one fifth of the emissions.

Figure I

Share of CO₂ emissions from tourism



Source: UNWTO and UNEP, *Climate Change and Tourism: Responding to Global Challenges*.

Energy use by accommodation and restaurants

43. Accommodation and restaurants account for 21 per cent of tourism emissions and are tourism's main energy consumer at the destination.⁵⁶ Substantial differences in the energy consumption of tourists and inhabitants can occur, notably depending on the level of luxury and facilities of accommodation. On the other hand, the amount of emissions caused by energy use can be reduced by using renewable energy sources and energy-saving technologies.

44. The European Tourism Indicator System suggests measuring the annual amount of energy consumed from renewable sources compared to overall energy consumption at the destination level per year to better define the energy consumption of tourism.⁵⁷ The ECE Dashboard for Sustainable Development Goals⁵⁸ includes data on renewable energy for each member State. Therefore, the share of renewable energy in total final energy consumption can function as an indicator for circularity in tourism's non-transport energy consumption.

45. One of the limitations is that the share of renewable energy in the energy mix differs greatly from country to country. For example, Iceland produces 76.7 per cent of its energy from renewable sources, while Turkmenistan uses 99.9 per cent non-renewable sources.⁵⁹ The ECE member State average is 21.5 per cent renewable energy in the energy mix. Historic development of energy supply determines the status quo. Between 2000 and 2017, both positive and negative trends in the usage of renewable energy can be observed.

⁵⁵ Lluís Garay, Xavier Font and August Corrons, "Sustainability-oriented innovation in tourism: An analysis based on the decomposed theory of planned behaviour", *Journal of Travel Research*, vol. 58, No. 4 (April 2018), pp. 622–636.

⁵⁶ UNWTO and UNEP, *Climate Change and Tourism: Responding to Global Challenges*.

⁵⁷ European Union, *The European Tourism Indicator System*.

⁵⁸ Available at <https://w3.unece.org/SDG/en>.

⁵⁹ United Nations Economic Commission for Europe, Indicator 7.2.1: Renewable energy share in the total final energy consumption, %, available at <https://w3.unece.org/SDG/en/Indicator?id=23>.

46. Future policies should focus on pushing the transition towards renewable energy, also in remote tourism destinations, and demand the implementation of energy-saving technologies in new facilities or during renovation.

Energy use and contributing to climate change through tourism transport

47. Tourism transport almost completely depends on fossil fuels and is the main source of tourism's CO₂ emissions (see figure I above). Transport between the tourist's home and the destination produces the bulk of the travel distance and thus of the energy use and emissions. To define circularity measures for this hotspot area, it is important to know how tourists arrive at and depart from their destinations: by aeroplane, car, or a more sustainable mode of transport like bus or train. The more tourists use alternative modes of transport and travel shorter distances, the more emissions can be prevented. The opportunities to decarbonize transport using renewable energy are also much greater for other modes than the aeroplane. The choice of travel mode is related to the availability of transport modes and the psychological default of transport modes of citizens of a country.

48. As there are no good indicators for tourism transport's energy use, it is proposed to look at the proportion of trips that are domestic and the proportion of international trips that are made by air.

49. With some reservations for large countries, domestic tourism trips are expected to create lower emissions than outbound travel, due to shorter distances and a transport mix that should contain less air travel. In 2019, 73.3 per cent of trips taken in the ECE countries shown in figure II below were domestic,⁶⁰ with the proportion strongly correlated with country area.⁶¹ Between 2012 and 2019, 0.4 per cent more domestic trips were taken in European Union countries.⁶²

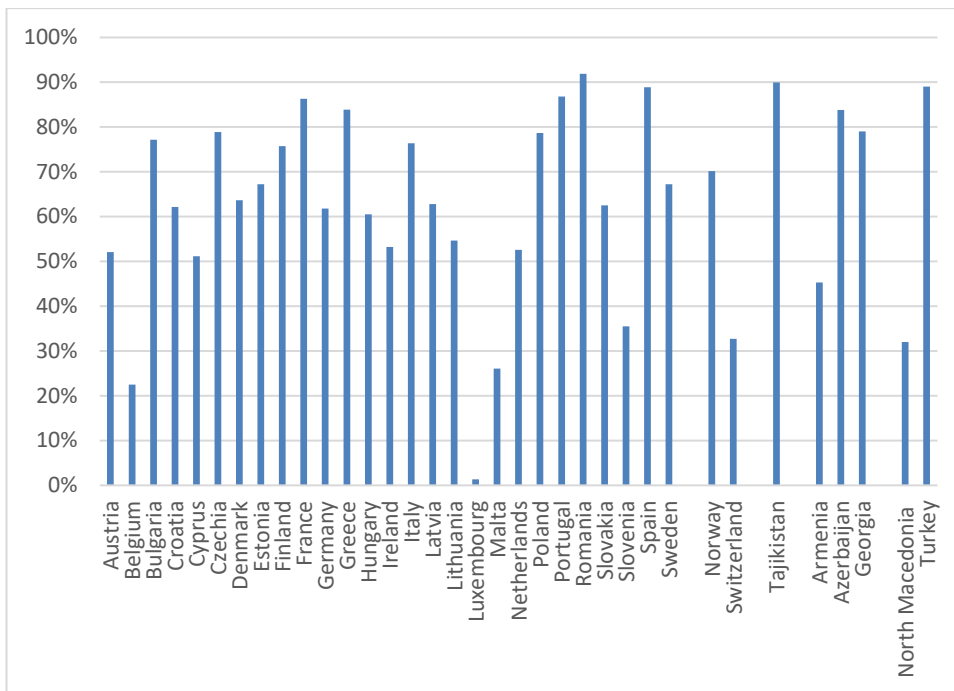
50. In 2019, 48.6 per cent of inbound tourism in the ECE countries shown in figure III below involved arrival by air. In 2019, 49.3 per cent of outbound tourism trips from the European Union (minus Sweden but plus Switzerland) were by air, up from 46.1 per cent in 2012. Between 2012 and 2019, outbound travel by air increased in these countries by 34.8 per cent (see figure IV below), which represents 61.5 per cent of the total increase in outbound travel.

⁶⁰ Eurostat, "Number of trips by mode of transport", 21 April 2021, available at https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tour_dem_ttr&lang=en; and UNWTO. (2021). Compendium of Tourism Statistics data set [Electronic], Series 2.9: Domestic tourism - Total trips by mode of transport – Thousands, and Series 3.2: Outbound tourism - Departures of overnight visitors (tourists) - Thousands. UNWTO.

⁶¹ Area from ECE Statistical Database, 2020.

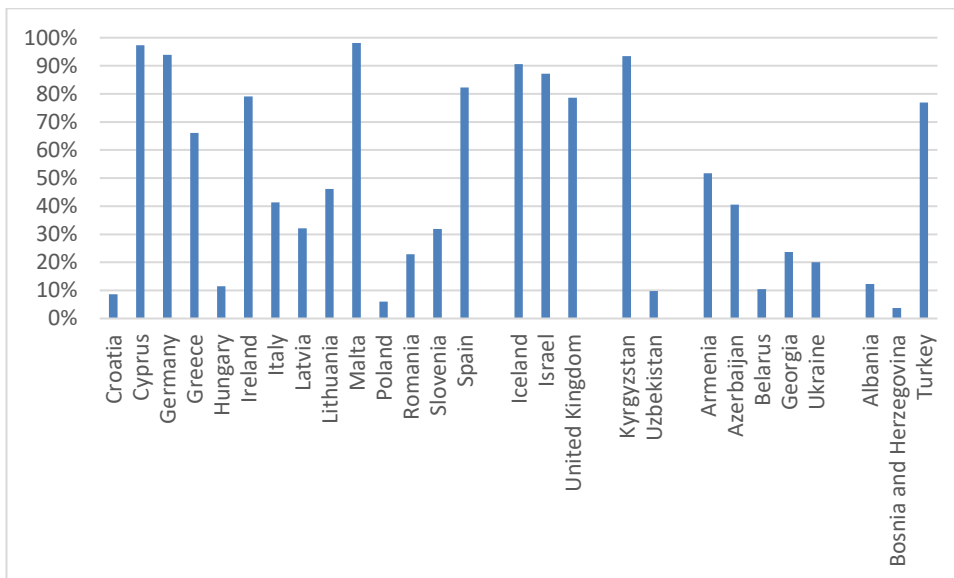
⁶² No data for Sweden.

Figure II
Proportion of trips that are domestic, selected countries grouped by subregion, per cent (2019)



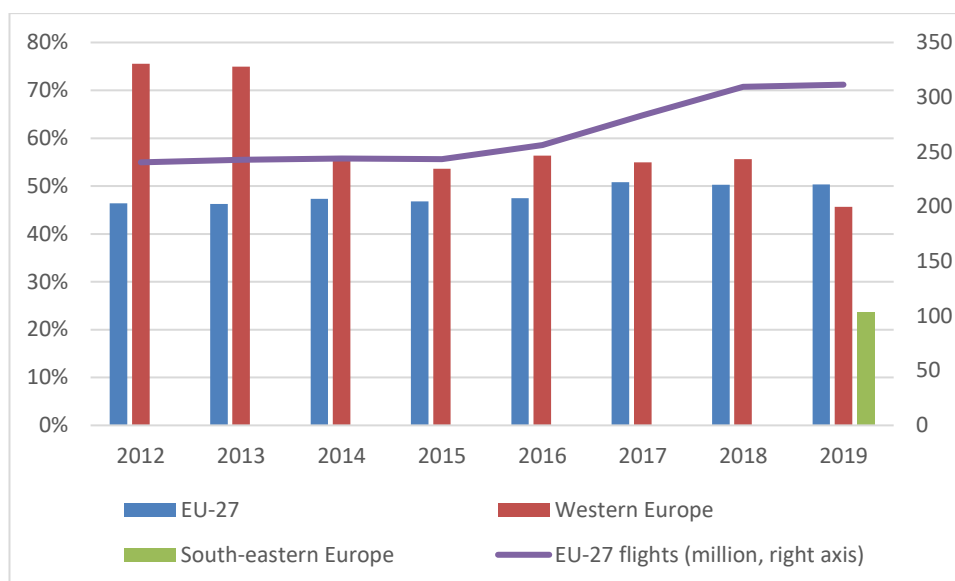
Source: UNWTO and Eurostat.
 Notes: Norway and Tajikistan – 2018.

Figure III
Proportion of in-bound arrivals by air, selected countries grouped by subregion, per cent (2019)



Source: UNWTO.

Figure IV
Proportion of outbound trips by air, and total number of flights, per cent (left axis) and million flights (right axis) (2013–2019)



Source: Eurostat.

Notes: No data for Sweden in 2012–2013 (for number of flights, the value for 2014 is used); for Western Europe, only Norway (2013–2018), Switzerland (2012–2019) and the United Kingdom of Great Britain and Northern Ireland (2012–2013); for South-Eastern Europe, only North Macedonia (2019). The step change in the proportion of outbound trips by air from 2013 to 2014 in Western Europe is explained by the lack of data for the United Kingdom of Great Britain and Northern Ireland after 2013.

51. Future policies should invest in infrastructure for low-emission transport modes such as rail, instead of aviation, and increase marketing for domestic tourism.

Resources for construction and maintenance

52. Resource use in the construction and maintenance of tourism facilities (for example, accommodation) is high and can well be addressed with a circular economy approach. These aspects are as yet unmeasured, so this section cannot report on their state.

53. To increase circularity within tourism facilities, suggestions include using the share of circular building material flows, remanufacturing furniture, leasing contracts for high-end appliances and usage of easy-to-repair materials and interiors,⁶³ but these will be a challenge to use as an indicator. There are some cases where circularity in construction has been used for marketing purposes.

54. Future policies should support the usage of recycled resources and circular building material flows and make it mandatory to offer repairs for appliances.

(Sustainable) tourism management plans

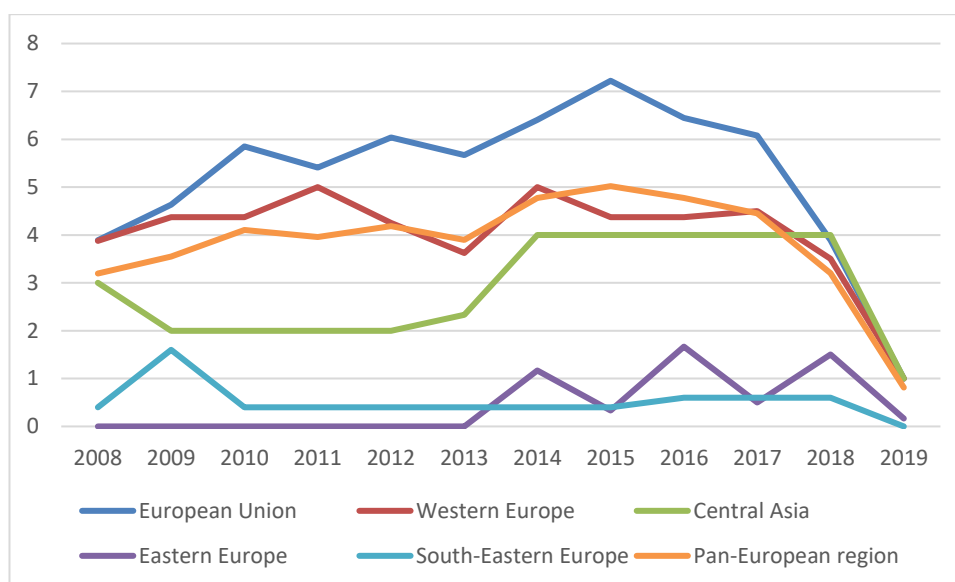
55. Under Sustainable Development Goal 12 on responsible consumption and production, indicator 12.b.1 “Number of sustainable tourism strategies or policies and implemented action plans with agreed monitoring and evaluation tools” is relevant to this theme. Sustainable tourism development plans are defined as guidelines and management practices for all types of destinations that refer to the balance between economic, sociocultural and environmental aspects of tourism to guarantee long-term sustainability.⁶⁴ This entails the

⁶³ Jesper Manniche and others, *Destination: A circular tourism economy – A handbook for transitioning toward a circular economy within the tourism and hospitality sectors in the South Baltic Region* (Nexoe, Denmark, Centre for Regional and Tourism Research, 2017).

⁶⁴ UNEP and UNWTO, *Making tourism more sustainable: A Guide for Policy Makers* (Madrid, 2005).

optimal use of environmental resources that can be achieved with circular development. Figure V below shows the gradual growth in the implementation of standard accounting tools to monitor the economic and environmental aspects of tourism, the practical measure used for indicator 12.b.1, with the number of tables (Tourism Satellite Account and the System of Environmental-Economic Accounting) increasing from a regional average of 3 in 2008 to 5 in 2015; the more recent decline is a reflection of the lag in reporting.

Figure V
implementation of standard accounting tools to monitor the economic and environmental aspects of tourism, number of tables (2008–2019)



Source: United Nations Global Sustainable Development Goal Indicators Database.

Notes: No data for Albania, Azerbaijan, San Marino, Tajikistan or Turkmenistan. Data missing for North Macedonia (2019), the Russian Federation (2008) and Ukraine (2008).

56. In their report on sustainable consumption and production patterns, UNWTO and UNEP review 73 national tourism policies and their extent of reporting on sustainable consumption and production is presented.⁶⁵ The report shows that biodiversity and sustainable land-use have entered tourism sustainability reports in countries across the world. However, policies on water efficiency are lacking. A similar pattern has been observed where tourism development plans focus on policies that facilitate growth and economic benefit, such as nature conservation, but do not define sustainability as the core of their overall strategy.⁶⁶

57. To achieve circular practices at destinations, future policies should favour funding destination marketing organizations that base their tourism development plans on circular frameworks and opportunities to learn about circular tourism. In addition, policymakers should identify barriers to circular tourism development and provide a policy framework necessary to overcome those challenges.

5. Case studies

E-fuels for aviation

58. International aviation has been identified as one of the sectors difficult to align with climate targets,⁶⁷ despite the European part of aviation being part of the European Union Emissions Trading System. E-fuels are based on the well-developed power-to-liquids

⁶⁵ UNWTO and UNEP, *Baseline Report on the Integration of Sustainable Consumption*.

⁶⁶ Manniche and others, *Destination: A circular tourism economy*.

⁶⁷ Energy Transitions Commission, *Mission possible: Reaching net-zero carbon emissions from harder-to-abate sectors by mid-century* (n.p., Energy Transitions Commission, 2018).

process: producing jet fuel (Jet A) from CO₂, water and a substantial amount of renewable energy.⁶⁸ The CO₂ source could be a large industry, but ultimately it could be the atmosphere itself. In the latter case, one would completely close the carbon cycle (hence the term “circular kerosene” is used sometimes). E-fuels need 80 per cent less land than other sustainable aviation fuels, very little water and do not compromise feedstocks, nature and agriculture. The development of e-fuels for (international) aviation is a perfect transnational case for a circular development related to tourism, which also directly contributes to international targets for mitigating climate change, in line with Sustainable Development Goal 13 (Climate Action).

59. Various projects are under development. In the Netherlands, the start-up Synkero, in collaboration with the Port of Amsterdam, Schiphol Airport, KLM and SkyNRG, aims to develop a commercial plant in the Port of Amsterdam, using waste CO₂ and green hydrogen.^{69,70} SkyNRG is also building a factory for e-fuels in Delfzijl (Netherlands), with KLM, Schiphol Airport and SHV Energy.⁷¹ The Zenid initiative, with Uniper, Rotterdam The Hague Airport, Climeworks, SkyNRG and Rotterdam The Hague Innovation Airport, aims to construct a demonstration factory for sustainable kerosene using captured CO₂ from the air as a raw material in Rotterdam.⁷² The Norwegian consortium Norsk e-Fuel is planning a commercial plant for hydrogen-based renewable aviation fuel.⁷³ In February 2021, KLM announced having carried out a passenger flight partly flown on sustainably produced synthetic kerosene, based on CO₂, water and renewable energy from solar and wind energy.⁷⁴

60. The production process does require a very high amount of energy, however, which could further increase the mismatch between the demand for and failing increase in renewable electricity supply, and these fuels will be two to six times more expensive than Jet A was in 2017. E-fuels cannot enter the market without a very substantial tax on fossil kerosene and/or subsidies, or through the application of a mixing mandate with an increasing share over time, up to 100 per cent in 2050.⁷⁵ A mandate would be the most direct and secure way to reach the goal of zero aviation emissions in 2050, with the costs falling on airlines and thus passengers (polluter-pays principle). Mixing mandates are already included in national level aviation policies in Germany, the Netherlands, Norway and Sweden. The European Union announced its “Fit for 55” package of regulatory proposals on 14 July 2021, of which a part is a blending mandate for sustainable aviation fuel.⁷⁶

⁶⁸ Patrick Schmidt and others, “Power-to-Liquids as Renewable Fuel Option for Aviation: A Review”, *Chemie Ingenieur Technik*, vol. 90, No. 1–2 (January/February 2018), pp. 127–140.

⁶⁹ Synkero, “Synkero: Futureproof aviation”, available at <https://synkero.com/wp-content/uploads/2021/06/Synkero-White-Paper.pdf>.

⁷⁰ The mention of commercial companies, services or products does not imply endorsement by the United Nations or its Member States.

⁷¹ SkyNRG, “SkyNRG, KLM and SHV Energy announce project first European plant for sustainable aviation fuel”, 7 May 2019, available at <https://skynrg.com/press-releases/klm-skyng-and-shv-energy-announce-project-first-european-plant-for-sustainable-aviation-fuel/>.

⁷² SkyNRG, “Consortium launches Zenid – Sustainable Aviation Fuel from Air”, 8 February 2021, available at <https://skynrg.com/press-releases/consortium-launches-zenid-sustainable-aviation-fuel-from-air/>.

⁷³ Norsk e-fuel, “Supplying your renewable fuel. Unlimited.”, available at www.norsk-e-fuel.com/en/.

⁷⁴ KLM, “World first in the Netherlands by KLM, Shell and Dutch ministry for Infrastructure and Water Management: first passenger flight performed with sustainable synthetic kerosene”, 8 February 2021, available at <https://news.klm.com/world-first-in-the-netherlands-by-klm-shell-and-dutch-ministry-for-infrastructure-and-water-management-first-passenger-flight-performed-with-sustainable-synthetic-kerosene/>.

⁷⁵ Jörgen Larsson and others, “International and national climate policies for aviation: a review”, *Climate Policy*, vol. 19, No. 6 (January 2019), pp. 787–799.

⁷⁶ European Commission, Proposal for a Regulation of the European Parliament and of the Council on ensuring a level playing field for sustainable air transport, COM(2021) 561 final.