DESTINATION ASSESSMENT REPORT

PART 1 - INDICATORS

SCHOUWEN-DUIVELAND

The Netherlands
This report has been created as a pilot report of the Green Destinations START Program, in full: Sustainability Support Tools for Assessment and Reset of Tourism. The START Program is a joint initiative of Stichting Green Destinations and the Good Travel Guide. The program is meant to offer towns, cities, regions and countries around the world a selection of affordable, relatively simple but effective assessment, monitoring, benchmarking and forecasting tools related to sustainability-related subjects. The START program is designed to provide destination managers with holistic and thematic assessments through the integration of key indicators and data to have an objective and up-to-date overview of destination sustainability attributes.

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Stichting Green Destinations is a non-profit organisation (foundation) for sustainable destination management and recognition based in the Netherlands, aiming to support destinations to deliver responsible tourism, based upon its globally recognized GD Standard.

The Good Travel Guide is a travel platform, launched in September 2020 by Green Destinations BV. The Guide's website and social media exclusively feature destinations, businesses and travel offerings that are selected or certified after an independent check or audit.
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INTRODUCTION

The Destination Assessment Reports - Indicators (DAS-I) that are created in the context of the Green Destinations START Program aim to compare a destination’s performance on sustainable tourism-related subjects with reference destinations and with the regional (provincial) and country average. START DAS-I reports present assessments using data from a variety of open source databases that are partly aggregated in a dataset generated in 2020 by Wageningen University and Research in the framework of the SASTDes project, in which both Green Destinations and the Good Travel Guide are consortium partners.

The DAS-I attempts to provide unique comparisons of a destination’s sustainability performance for selected subjects and adopts a visual approach and a modular minimalistic reporting approach on the basis of available datasets.

Schouwen-Duiveland has been selected for this first pilot report since it is the first Certified Green Destination in Europe. This report is primarily meant to explore and develop a methodology on what kind of assessments can be based upon available datasets in the European Union. The reference destinations for Schouwen-Duiveland that we have selected are Westvoorne, Goeree-Overflakkee (both in the province of Zuid-Holland) and Veere, Middelburg and Sluis (province of Zeeland). When datasets were missing for a particular reference destination, it has been left out. Occasionally other municipalities have been added to provide a useful comparison.

This report starts with providing an overview of the sustainability performance of Schouwen-Duiveland in a national context. After that, the report covers four themes: Nature & Scenery, Environment, Energy & Climate and Business & Sustainability. In each theme, several subjects are addressed, with a total of 18 subjects.

For each subject, it is first described what the relevance is for a tourism destination. After that, the situation in Schouwen-Duiveland is described and compared with the reference destinations. This description is substantiated by data and visualised in charts. Finally, some key points for destination management are presented (light blue box) as well as some relevant key messages for residents and visitors based upon the findings of the report (light green box).
Schouwen-Duiveland is a municipality in the north of the province of Zeeland, the Netherlands. Schouwen-Duiveland is neighboring the province of Zuid-Holland towards the north, separated by an inland lake, Grevelingenmeer. Having made major steps towards sustainable tourism development, recognised through a series of sustainable tourism awards, including the QualityCoast Platinum Award and Green Destination certification, Schouwen-Duiveland is now at a crossroads facing a series of critical questions regarding the future of sustainable destination development and the revitalisation of the regional tourism industry post-Covid.

Before starting our in-depth analysis, Schouwen-Duiveland’s performance is compared with the country average in several sub-themes of which data on the national average were available. In order to provide a comprehensive overview of this comparison the SPeAR tool is used, resulting in the diagram (Figure 1). In the following paragraphs, the subjects in the diagram are described.

*The green colours indicate that the destination level performance is better than the national average. Yellow indicates that the destination level performance is similar to the national average, whereas orange and red indicate a poorer performance relative to the national average.*
Regarding wastewater treatment, the destination condition is the same as the national average. In terms of PM10 and NO2 concentrations, which indicate air quality, this destination's level performance is similar to and better than the national average respectively. With respect to land cover, Schouwen-Duiveland has a more balanced share of natural and urban land use than the national average, and hence scores better. In terms of bathing water quality, the scores from 2019 were excellent at all seven measuring stations around Schouwen-Duiveland. However, for the Netherlands in general, bathing water quality was only excellent in three quarters of measuring stations. Concerning GHG emissions, specifically CH4 and CO2 emissions in Schouwen-Duiveland are lower than the national average, which means Schouwen-Duiveland is performing better on this subject.

Further, despite the fact that the Netherlands has one of the highest levels of artificial night sky brightness in the world, Schouwen-Duiveland is a relatively dark part of the country, which results in lower light pollution compared to the national average. Additionally, after comparing the noise level in Schouwen-Duiveland with the country average, it became clear that Schouwen-Duiveland has more potential quiet areas than the national average. Finally, regarding solid waste reduction, separation, and recycling, Schouwen-Duiveland is outperforming the country average and for this reason, this performance is illustrated in green.
NATURE AND SCENERY
PROTECTED NATURAL AREAS

WHY IS THIS IMPORTANT?
Protected areas are locations or zones that are reserved by the government for the aim of conserving nature and biodiversity. The protected areas serve several functions, including safeguarding natural resources, preserving protected species and wilderness, as well as improving the livelihoods for the wildlife (Naughton-Treves, Holland & Brandon, 2005). Visitors can visit certain protected areas while following local regulations.

THE SITUATION IN SCHOUWEN-DUIVELAND
There are a total of 391 protected areas in the Netherlands. The network of the protected natural sites includes national parks as well as it overlaps with Natura 2000 sites. Natura 2000 is a network of natural protected areas across EU countries. Certain species and their natural habitats are protected in order to preserve biodiversity (Natura 2000, n.d.). It offers special guidelines for the most vulnerable and threatened species. The Netherlands has 161 Natura 2000 sites and 15 of them are in the province of Zeeland (Natura 2000, n.d.). There are four Natura 2000 sites around Schouwen-Duiveland: Kop van Schouwen, Grevelingen, Voordelta and the Oosterschelde (Figure 2, table 1).
### KEY MESSAGES FOR RESIDENTS AND VISITORS

In Schouwen-Duiveland, the four protected areas: ‘Kop van Schouwen’, ‘Grevelingen’, ‘Voordelta’ and ‘Oosterschelde’ can be found. The guidelines for visiting protected areas provide a deeper understanding of the actions that are taken to preserve nature. In Kop van Schouwen, visitors can find dunes, beaches, forests, and even lakes in the area. There are also different species inhabiting the area, where the varied landscapes offer shelters for the ecosystem (Zeeland.com, n.d.)

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*Table 1: The four Natura 2000 sites in and around Schouwen-Duiveland*

<table>
<thead>
<tr>
<th>NAME</th>
<th>AREA (HA)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kop van Schouwen</td>
<td>2242</td>
<td>Located on the west side of Schouwen-Duiveland. The area includes a great variety of dune habitat types. Apart from the big variety of dunes, several other landscapes occur at a short distance with each other such as beaches, grasslands, forests and dune lakes, ideal for recreational purposes.</td>
</tr>
<tr>
<td>Grevelingen</td>
<td>13753</td>
<td>Salt lake between Goeree-Overflakkee and Schouwen-Duiveland. The largest saltwater lake in Europe, which is a great site for diving and other recreational activities. Fauna like white-tailed eagles, horses and cows can be found here, alongside a variety of saltwater and freshwater plants.</td>
</tr>
<tr>
<td>Voordelta</td>
<td>83534</td>
<td>Marina area to the west of the islands in South Holland and Zeeland. This protected area is a mix of shallow coastal waters, intertidal areas and beaches.</td>
</tr>
<tr>
<td>Oosterschelde</td>
<td>36975</td>
<td>Tidal lake surrounded by Schouwen-Duiveland, Tholen, South Beveland and North Beveland. A national park with a rich diversity of plants, birds and animals. Ideal destination for diving, having a rich underwater world with many kinds of fish and shellfish. Furthermore, it has a considerable variety of birds, making it a great destination for bird enthusiasts.</td>
</tr>
</tbody>
</table>

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*Natura 2000 Network Viewer, 2019; Natura 2000 (n.d.); Provincie Zeeland (2011); Staatsbosbeheer (n.d.); Netherlands Board of Tourism & Conventions (n.d.)*
LAND COVER

WHY IS THIS IMPORTANT?
Crop- and grassland, forest, urban, water and other natural habitats are the main categories for land cover. As different types of land cover serve as the foundation for tourism activities, it is essential to know which types of land cover are present in your destination and which tourism activities can take place. There are various nature-related activities and tours in land and water areas, such as hiking, cycling, wildlife observation, wind- and kitesurfing and tidal flat walking. Also in urban areas tourism activities take place as well as it serves as the site for many (tourism) businesses such as accommodations, resorts, transportation hubs and shopping malls.

THE SITUATION IN SCHOUWEN-DUIVELAND
In Schouwen-Duiveland the largest land cover share is crop and grassland which accounts for 69% of its land cover, which is quite similar to the national average (Figure 3), however less than the municipal average. Schouwen-Duiveland has a forested area of 3.3% which means it is relatively less forested than the national average and slightly less than the municipal average. Almost all of the forest of Schouwen-Duiveland is located in the dunes in the west. The share in urban land cover (11.7%) is quite similar to the provincial average of Zeeland and the national average. According to Citypopulation (2021), only 16.8% of Schouwen-Duiveland is moderately urbanized, 21.8% is lowly urbanized and 61.5% is rural. Regarding inland water surface, Schouwen-Duiveland has a lower share than the national average. However, it has a slightly higher percentage than the municipal average and some reference destinations, except for Westvoorne and Middelburg. Due to the coastal area of Schouwen-Duiveland, there are still various water sports that can be enjoyed by visitors. Moreover, the coastal area is rich in its ecosystem and has a variety of animal species (Overbeek & Vader, 2003). In terms of other natural habitats (11.5%), Schouwen-Duiveland has a significantly higher share than the national average, the provincial average and some reference destinations. Yet, Schouwen-Duiveland has an almost similar share in other natural habitats compared to Goeree-Overflakkee and Westvoorne.
KEY MESSAGES FOR RESIDENTS AND VISITORS

There are various nature-related activities options in most parts of the island. Wetland, woods and dunes are particular natural assets for Schouwen-Duivelant. Due to the diverse landscape, biking on flat terrain and hiking on hilly dunes are both possible. The largest part of Schouwen-Duivelant is covered with crop- and grassland. Schouwen-Duivelant has slightly less forest than the provincial average, but slightly more inland water surface than the provincial average. Moreover, Schouwen-Duivelant has more land cover that is considered as other natural habitats than the reference destinations and the provincial- and national average.

INVASIVE ALIEN SPECIES

WHY IS THIS IMPORTANT?

Tourism is both the cause and the effect of invasive alien species (IAS). While most of the IAS have been introduced as ornamental plants or by global trade, tourism also plays an important role in the spreading of plants and animals into new regions. As this study reveals, IAS species are significantly more common and diverse in high-tourism areas. Tourism is one of the only means of introduction into remote regions, such as oceanic islands, the poles, and biodiversity hotspots like the Galapagos Islands.
Although many introductions are unintentional, many species are deliberately brought in (ex. planted in hotel gardens). As nature tourism continues to grow, effective biosecurity measures are needed to limit further damages. On the other hand, IAS can also impact outdoor activities, such as fishing, hunting, hiking, wildlife viewing and water sports. They can damage the water quality, affect plants and animals' diversity, and indirectly cause economic losses to destinations.

THE SITUATION IN SCHOUWEN-DUIVELAND
From a total of 24 IAS in the Netherlands coming from all parts of the world, 16 have been observed in Schouwen-Duiveland.

As you can see in the table below, gooses are the most invasive species, representing 63% of all IAS in the region. 12 out of the 16 species are plants. From all these species, only the Nile-cabbage have been reported being introduced by tourism, via recreational boating. As the research on tourism as a potential cause of IAS is relatively new, it is possible though that tourism activities are also involved in the spreading of IAS in the area, only it is not scientifically confirmed yet.
<table>
<thead>
<tr>
<th>Name IAS</th>
<th>Scientific name</th>
<th>Ocurrences</th>
<th>IUCN Red List</th>
<th>Native to</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egyptian Goose</td>
<td><em>Alopochen aegyptiaca</em></td>
<td>4044</td>
<td>Least concern</td>
<td>Sub-Saharan Africa, Nile Valley</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Canada Goose</td>
<td><em>Branta canadensis</em></td>
<td>3886</td>
<td>Least concern</td>
<td>North and South America, Greenland</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Domestic Cat</td>
<td><em>Felis catus Linnaeus</em></td>
<td>58</td>
<td>Unknown</td>
<td>Eastern Mediterranean (3000 years ago)</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Black cherry</td>
<td><em>Prunus serotina</em></td>
<td>591</td>
<td>Least Concern</td>
<td>North America</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Heath Star Moss</td>
<td><em>Campylopus introflexus</em></td>
<td>423</td>
<td>Unknown</td>
<td>Southern hemisphere</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Japanese rose</td>
<td><em>Rosa rugosa</em></td>
<td>270</td>
<td>Unknown</td>
<td>Northeastern China, Japan, Korea and southeastern Siberia</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Giant hogweed</td>
<td><em>Heracleum mantegazzianum</em></td>
<td>266</td>
<td>Least Concern</td>
<td>Azerbaijan, Georgia, Russia</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Japanese knotweed</td>
<td><em>Fallopia japonica</em></td>
<td>179</td>
<td>Unknown</td>
<td>China, Japan, Korea, Taiwan</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Juneberry</td>
<td><em>Amelanchier lamarckii</em></td>
<td>105</td>
<td>Unknown</td>
<td>Eastern Canada</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>American Cranberry</td>
<td><em>Vaccinium macrocarpum</em></td>
<td>4</td>
<td>Unknown</td>
<td>Central and eastern Canada, North US</td>
<td>Terrestrial</td>
</tr>
<tr>
<td>Pacific azolla</td>
<td><em>Azolla filiculoides</em></td>
<td>59</td>
<td>Unknown</td>
<td>South America</td>
<td>Freshwater</td>
</tr>
<tr>
<td>Largeflower primrose-willow</td>
<td><em>Ludwigia grandiflora</em></td>
<td>12</td>
<td>Unknown</td>
<td>South America</td>
<td>Freshwater</td>
</tr>
<tr>
<td>Brazilian water-milfoil</td>
<td><em>Myriophyllum aquaticum</em></td>
<td>4</td>
<td>Unknown</td>
<td>South America</td>
<td>Freshwater</td>
</tr>
<tr>
<td>Nile-cabbage</td>
<td><em>Pistia stratiotes</em></td>
<td>2</td>
<td>Least Concern</td>
<td>South America</td>
<td>Freshwater</td>
</tr>
<tr>
<td>African payal</td>
<td><em>Salvinia molesta</em></td>
<td>2</td>
<td>Unknown</td>
<td>South-eastern Brazil</td>
<td>Freshwater</td>
</tr>
</tbody>
</table>

*Table 2: Invasive Alien Species in Schouwen-Duiveland*
The Egyptian goose has the most occurrences, having been observed 4044 times in Schouwen-Duiveland.

**Figure 5: Distribution map of the Egyptian goose**

**EGYPTIAN GOOSE**  
*Alopochen aegyptiaca*

**Native to:**  
Subsaharan Africa, Nile Valley

**Pathway:**  
Introduced as ornamental species (20th cent.)  
Birds escaped parks, started to breed in wild.

**Socio-economic impact:**  
Damage to agricultural crops  
Defecating in recreational waters/public areas  
Potential vector of avian influenza

**Environmental impact:**  
Grazing  
Aggressive towards other birds  
Competition for breeding sites/food  
Agricultural pest, especially close to water

**Management:**  
Ban on importing, selling, breeding, growing  
Online citizen-science databases  
Regular bird species monitoring schemes

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ENVIRONMENT
WHY IS THIS IMPORTANT?
No or inadequate water systems cause sewage water, agricultural runoff and discharge flow into the environment untreated. This degrades the water quality as well as it contaminates water sources such as rivers, reservoirs and oceans. In addition, tourism and tourists increase the overall water consumption in a destination as they use water-intensive amenities (Gössling et al., 2012). According to Gössling and Peeters (2015), the average water usage (direct and indirect water use) of a tourist is estimated at 6575 liters per guest per night. As a result, they could cause constant pressure on the purification systems as they must process a much bigger amount of wastewater (Gabarda Mallorqui et al., 2016). A major part of the solution is to improve the way we manage and treat wastewater. Wastewater that has undergone sufficient treatment for its intended recipient (e.g. lake, river, ocean or soil) or further use (e.g. in agriculture) could help protect our ecosystems (Nathansan & Ambulkar, 2021). Hence, as a tourist and a tourism destination, it is important to ensure adequate systems are in place to treat the wastewater that is generated before it flows back into the environment.

THE SITUATION IN SCHOUWEN-DUIVELAND
Schouwen-Duiveland has a slightly lower percentage of wastewater treatment compared to most reference destinations and other municipalities in the Netherlands (Figure 6). Yet, Schouwen-Duiveland is treating 99% of its wastewater before discharging in the environment, which reflects the wastewater treatment of the national average of 99.5% (OECD, 2019).

Figure 6: Percentage of sewage and wastewater treated in Schouwen-Duiveland compared to reference destinations and other municipalities*

*Green Destinations, 2020, OECD, 2019
Wastewater treatment in Schouwen-Duiveland is adequately organised and relevant regulations are enforced, aimed to minimise impacts to people and the environment. This is done by the Water Board with sewage- and water management plans, such as sewage treatment plants. Also a number of companies have come up with plans to treat and discharge waste water efficiently. During inspections and company visits, attention is paid to quantities of waste water and possibilities for reuse. The septic tanks are subject to legal provisions based on the Soil Protection Act, Water Board regulations and municipal regulations. Maintenance and discharge are checked and enforced (Green Destinations, 2020).

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

Schouwen-Duiveland is doing excellent when it comes to wastewater treatment as it treats 99% of its wastewater before discharging it into the environment, which reflects the Dutch national average. Schouwen-Duiveland adequately organises wastewater treatment and enforces relevant regulations to minimise impacts to people and the environment.

**SOLID WASTE REDUCTION**

**WHY IS THIS IMPORTANT?**

With rapid population growth and urbanisation, annual waste generation is expected to increase to 3.40 billion tonnes in 2050 (WASTE, n.d.). Irresponsible waste disposal can have huge environmental impacts and can cause serious problems. Lack of collection systems and adequate treatment often results in disposing waste into the open environment. Waste can create air pollution due to gas and chemicals evaporating. As well, when waste ends up in landfill and chemicals leach out into the soil, this can result in soil contamination. All at an extraordinary cost of environmental health (Alam & Ahmade, 2013). The tourism industry can be a significant contributor to this issue, as tourists were found to generate up to twice the amount of solid waste per capita (Styles, Schönberger & Martos, 2013). The waste management hierarchy prioritises the reduction of waste as the most effective and cost-saving measure, followed by reuse and recycling. In fact, it is estimated that 15-20% of global GHG emissions could be reduced through the improvement of waste management, including waste prevention measures (UNEP & ISWA, 2015).
THE SITUATION IN SCHOUWEN-DUIVELAND

The amount of total solid waste in kg per inhabitant in Schouwen-Duiveland is compared to reference destinations, the provincial and national average (Figure 7). In Schouwen-Duiveland a trend of significant reduction is visible as in 2018 an amount of 687.0 kg was measured whereas in 2017 this was 749.4 kg. Comparing the solid waste in kg per inhabitant to the national average, Schouwen-Duiveland has a significantly higher number. However, according to the CBS (2020), in highly urbanised areas less solid waste is collected (413 kg per inhabitant in 2019), whereas in non-urban areas 602 kg solid waste per inhabitant was collected in 2019. In less urbanised areas there are more houses with (larger) gardens, which generates more garden waste (CBS, 2020). When comparing Schouwen-Duiveland to the provincial average, Schouwen-Duiveland has a lower number of solid waste in kg per inhabitant. However, comparing the solid waste in kg per inhabitant to the national average, Schouwen-Duiveland has a much higher amount.

![Figure 7: Household waste per inhabitant (kg) in Schouwen-Duiveland compared to reference destinations, the provincial average and national average*](image)

Schouwen-Duiveland has set quantitative goals to reduce solid waste. Regarding residual waste, for example, the municipality aims to achieve the national collection target of 100 kg per inhabitant in the period 2020-2025. From 2025 onwards it will be 30 kg. This is monitored by keeping track of the figures of waste streams (Green Destinations, 2020).

*CBS, 2020a; Afvalmonitor, 2020
KEY POINTS

Schouwen-Duiveland adequately monitors and reports on reducing solid waste. However, it remains unclear how visitors and the hospitality sector are involved in reaching the quantitative goals that are set. A point of improvement could be to include a strategy on reducing and eliminating plastics and single-use items (e.g. banning plastic bags, bottles, packaging, straws) and food waste, especially in (and in cooperation with) the hospitality sector.

KEY MESSAGES FOR RESIDENTS AND VISITORS

Schouwen-Duiveland adequately monitors and reports on reducing solid waste. As a visitor you can contribute to minimising the environmental impact by using less single-use plastic and separating waste properly.

SOLID WASTE SEPARATION AND RECYCLING

WHY IS THIS IMPORTANT?

A solid waste management system starts with efficient waste collection. Waste separation is one of the steps towards a circular economy. Paper, plastic and general waste need to be collected in separate bins because like this the waste can be processed in the right way (Maastricht University, n.d.). The separation of waste ensures that recyclable materials are reused when making new products. Recycling of waste saves on resources and energy, which in turn decreases costs and damage to the environment (Downs & Acevedo, 2019). An increasing number of visitors generates an increasing amount of waste, which constantly adds pressure to the waste management systems. To decrease the environmental impact of visitors regarding waste, it is important to ensure that as a destination you are separating waste and have recycling systems in place to protect the environment.
THE SITUATION IN SCHOUWEN-DUIVELAND

In Schouwen-Duiveland, inhabitants are encouraged to separate waste better with the project ‘Separating waste pays off’ (Green Destinations, 2020). Additionally, in recent years the municipality has placed more collection bins for paper and cardboard (+25%), packaging glass (+10%) and textiles (+200%) to encourage even more waste separation. As a result, Schouwen-Duiveland is collecting 72% of its solid waste separately in 2018 (Figure 8). The destination was doing well compared to the national average which is estimated at 58% in 2018. In 2018, Schouwen-Duiveland was performing the best compared to the reference destinations. No conclusion can be drawn yet for Schouwen-Duiveland in 2019 due to a lack of data availability.

![Figure 8: Separation rate of total household waste in Schouwen-Duiveland compared to reference destinations and the national average*](image)

As part of the Tourism Agenda and the promotion of sustainability in recreational businesses, waste separation is one of the sustainability measures that participating businesses are working on as part of awarded innovation vouchers. Many companies on Schouwen-Duiveland already use separate underground collection systems. This not only contributes to better waste separation but also to more comfort for holidaymakers in the parks and accommodations (Green Destinations, 2020).

*CBS, 2020b; Afvalmonitor, 2020
Schouwen-Duiveland has a good approach to waste separation. Yet, the extra pressure on the environment by an increasing number of tourists is not compromised by the waste management systems in place in the municipality. To improve waste separation in Schouwen-Duiveland even more, visitors could be encouraged to separate their waste, which can for example be done by increasing the number of separate waste bins.

In 2018 Schouwen-Duiveland collected 72% of their solid waste separately (e.g. organic, paper, glass, plastic). In 2018 the destination did relatively well when compared to the national average which is estimated at a 58% separation rate as well as compared to reference destinations.

Air pollution can cause a variety of environmental effects and is hazardous to health. Global warming is a direct consequence of the greenhouse effect, which is produced by the high emission of CO2 and methane into the atmosphere. The mass of the poles are melting, and this is leading to flooding and the rising of sea levels and many animal species, whose survival depends on oceans and rivers, are threatened. Moreover, the constant pollution of the air can cause acid rain and smog. Contaminated water and gases seep into the earth, changing the composition of soils. Poor soil quality also means the disappearance of ecosystems and habitats (Manisalidis et al., 2020). In relation to health, around 91% of the world’s population lives in a place where the air pollution exceeds the World Health Organization (WHO) limits. It is estimated that exposure to high concentrations of air pollution leads to 8.7 million deaths annually due to related illnesses such as stroke, heart disease, lung cancer and chronic respiratory diseases (Vohra et al., 2021). Major sources of air pollution include heat and power generation, industrial plants, agricultural practices, waste disposal, road transport and domestic waste (Saxena & Naik, 2018). High concentrations of pollutants might have an impact on visitors’ health during their stay, especially if they are already suffering from preexisting respiratory illnesses (WHO, 2019). As such, it can be an important factor to take into consideration while visiting a new place.
According to the European Environment Agency (2021), levels of NO2 between 0 parts per billion (ppb) and 40 ppb are considered to be good, between 40 and 90 ppb fair, 90-120 ppb moderate, while concentrations above 120 ppb are considered to be poor and unhealthy. Regarding PM10 the European Environment Agency (2021) considers the level of PM10 between 0 and 20 µg/m³ as good, between 20 and 40 µg/m³ fair, between 40 and 50 µg/m³ moderate, and 50 µg/m³ and higher, as poor.

THE SITUATION IN SCHOUWEN-DUIVELAND
The table below shows a population weighted average for nitrogen dioxide (NO2) and particulate matter 10 (PM10) concentration in the air above Schouwen-Duiveland and the reference destinations. NO2 is used as an indicator of the mixture of air pollutants that come from traffic (Atlas Leefomgeving, 2018). Schouwen-Duiveland has one of the lowest concentrations of NO2 (13.9) on average after Veere, even though the concentration is slightly increasing. Particulate matter (PM10) or fine dust concerns particles smaller than 10 micrometres. The less fine dust, the better the air quality. Schouwen-Duiveland has a similar concentration to most reference destinations, only Westvoorne has a significantly higher concentration of fine dust particles. According to the European Air Quality Index of the European Environment Agency (2021), Schouwen-Duiveland and the reference destinations have good air quality regarding NO2 and PM10.

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Number of inhabitants</th>
<th>NO2</th>
<th>PM10</th>
<th>NO2</th>
<th>PM10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2019</td>
<td>2020</td>
<td>2019</td>
<td>2020</td>
</tr>
<tr>
<td>Schouwen-Duiveland</td>
<td>33,606</td>
<td>13.8</td>
<td>13.9</td>
<td>16.1</td>
<td>16.7</td>
</tr>
<tr>
<td>Westvoorne</td>
<td>13,485</td>
<td>15.7</td>
<td>16.1</td>
<td>17.1</td>
<td>17.5</td>
</tr>
<tr>
<td>Goeree-Overflakkee</td>
<td>47,866</td>
<td>14.5</td>
<td>14.9</td>
<td>16.5</td>
<td>17.1</td>
</tr>
<tr>
<td>Veere</td>
<td>21,798</td>
<td>13.0</td>
<td>12.8</td>
<td>16.1</td>
<td>16.7</td>
</tr>
<tr>
<td>Sluis</td>
<td>23,702</td>
<td>14.0</td>
<td>13.3</td>
<td>15.6</td>
<td>16.4</td>
</tr>
<tr>
<td>Middelburg</td>
<td>47,445</td>
<td>15.7</td>
<td>15.2</td>
<td>16.1</td>
<td>16.8</td>
</tr>
</tbody>
</table>

Table 3: Population weighted average concentration [µg/m³] for NO2 and PM10 in Schouwen-Duiveland compared to reference destinations in 2019 and 2020*
This is also reflected in the maps of the area. In the map of PM10 concentration (Figure 9) you can see cities mainly in the other provinces highlighted in yellow and orange. In these places there is a higher concentration in the air than in other places. Overall, the PM10 concentration in Zeeland is considerably better than in Zuid-Holland or Brabant. This is because traffic is a source of fine dust. Livestock buildings, industry and wood-burning are also possible sources.

![Figure 9: Particulate Matter 10 (PM10) concentration in Schouwen-Duiveland and surrounding area in 2019*](image)

In the map of NO2 concentration below (Figure 10) you will find higher concentrations in cities and the provinces of Brabant and Zuid-Holland. There is considerably less nitrogen dioxide in the air in Schouwen-Duiveland. Specifically the coastal areas appear to have the best air quality.

![Figure 10: Nitrogen dioxide (NO2) concentration in Schouwen-Duiveland and surrounding area in 2019**](image)

*Atlas Leefomgeving, 2019a
**Atlas Leefomgeving, 2019b
Another source shows that the annual mean for Nitrogen dioxide concentration (ug/m³) for 2019 in Schouwen-Duiveland is 17, which indicates 'good' air quality. To put this number in perspective, the values of some of the municipalities that are popular sources of visitors to the municipality are added in a figure (Figure 11). The municipality is compared with the values of Amsterdam (33), Rotterdam (50) and Breda (66) in the Netherlands, Köln (47) in Germany and Antwerp (42) in Belgium. The figure shows that the air quality categories of all the included municipalities (except for Amsterdam) are indicating ‘fair’ air quality. As you can see, the destination has considerably cleaner air than all the visitor source destinations.

**Figure 11: Annual Mean Nitrogen Dioxide (NO2) concentration in Schouwen-Duiveland compared to visitor source destinations in 2019**

Lastly, there is an air quality monitoring station in Schouwen-Duiveland that is measuring all the air pollutants in real-time. The station in the inner city of Zierikzee reports mostly a health impact category in the range of ‘fair’ and ‘moderate’ and sometimes ‘poor’ (Figure 12).

**Figure 12: Zierikzee Air Quality Index accumulated in one year (2020-2021)**

*SASTDes database, 2021
** European Environment Agency, 2021
Figure 16 shows the air quality categories that were accumulated in the 365 days before 17 February 2021. This is a different picture compared to the last one as all air pollutants are included in this measure for air quality. Here an increased amount of ozone (O3) or smog is the reason for the impact category of ‘fair’. People with lung and heart conditions, in particular, can be seriously affected by smog. As a result, the quality of the air there is not as good as in the outer area. That is because air gets trapped more easily in an environment with lots of buildings, heavy traffic and narrow streets. However, air quality is acceptable, but there may be a risk for some people, particularly those who are unusually sensitive to air pollution. When air quality is ‘poor’, everyone who is active outdoors may experience health effects. Members of sensitive groups are likely to experience more serious health effects.

**KEY POINTS**

Schouwen-Duiveland is scoring relatively low on NO2 and average on PM10 concentration in the air in comparison with reference destinations. The municipality has one of the lowest concentrations of NO2 on average after Veere. Both concentrations are lower than in the provinces of Brabant and Zuid-Holland. This indicates that there is considerably clean air in Schouwen-Duiveland. However, when compared to the previous year, averages are slightly increasing.

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

Schouwen-Duiveland has mostly 'good' air quality. Only in Zierikzee there are sometimes values measured that indicate a 'poor' quality of the air due to ozone concentration. Everywhere else in the municipality the air quality is considered satisfactory and air pollution poses little to no risk. Concentrations of NO2 and PM10 in Zeeland are considerably lower than in the provinces of Brabant and Zuid-Holland. Specifically the coastal areas appear to have the best air quality.
WHY IS THIS IMPORTANT?
Noise pollution can be defined as any disturbing or unwanted noise that interferes or harms humans or wildlife. Wildlife can be negatively impacted by noise disturbances through increasing stress levels, decreasing immune responses, reducing reproductive success, increasing predation risk, degrading conspecific communication, and damaging hearing (Pater, Grubb & Delaney, 2009). Moreover, excessive noise has become a significant contributor to the poor health of people. It can lead to problems such as sleep disturbances, an increased risk of hypertension, cardiovascular disease, obesity, diabetes, deterioration in work and school performance and premature death (Hart, 2018). An overview of noise impacts in Europe is given in the infographic below (Figure 13).

This type of pollution is so omnipresent today that we often fail to even notice it. While travelling, a visitor can be exposed to a lot of noise in a destination. From transport systems (e.g. street traffic sounds, noise coming from airplanes, helicopters, powerboats, jet skis, motorcycles) to public events (e.g., bars and discos, festivals as well as and tour guides with loudspeakers and music).

THE SITUATION IN SCHOUWEN-DUIVELAND
The Quietness Suitability Index 2019 (SASTDes, 2021) provides an overview of the highest (100) and lowest (0) proportion of potential quiet areas, or in other words; low noise levels (100) and high noise levels (0) in a destination. The score of Schouwen-Duiveland is 28.96. To put this number in perspective, the values of some of the surrounding municipalities but also other values of some of the cities that are popular sources of visitors to the municipality are added in a graph (Figure 14).

*European Environment Agency, 2014
Schouwen-Duiveland is scoring well in comparison with the city of Middelburg. However, some reference destinations have an even better score, such as Veere (40.4), Sluis (35.11) or Goeree-Overflakkkee (30.77). In addition, the score of Schouwen-Duiveland is compared with Amsterdam (5.92), Rotterdam (0.19) Breda (8.00) in the Netherlands. These figures imply a relatively limited noise disturbance level of the Schouwen-Duiveland municipality. The same conclusions can be drawn when potential quiet areas are compared to Köln (1.85) in Germany and Antwerp (1.19) in Belgium. It becomes clear that Schouwen-Duiveland scores significantly higher on the index and thus has a more limited noise disturbance than some of the popular visitor sources.

This information is also reflected in figures 15 & 16, that show how much noise different sources generate together. This concerns the average noise level of road traffic, train traffic, aircraft, industry and wind turbines. Unwanted noise can cause annoyance and health problems. To express the amount of noise, Lden (Level Day-Evening-Night) is used. This is a measure to calculate how much noise is present on average per 24 hours. According to the European Environment Agency (2019) the EU indicator threshold for noise exposure is 55 dB Lden. Next to this, silence zones are also indicated on the map. In a silent area only sounds that belong to the area are allowed, such as the sound of a tractor. It is assumed that the noise levels will be lower than 40 decibels. Such areas can be found close to built-up areas, but also in the city. Approximately 650 thousand hectares of the Netherlands have been designated as quiet areas. More than half of these are in the Wadden Sea and Zeeland waters.
Schouwen-Duiveland has more potential quiet areas than other parts of the Netherlands. Potential quiet areas imply a relative quietness, where other sounds than man-made noise are given the chance to come forward. Or in other words, where noise disturbance is more limited. You can also see that the municipality has a low level of noise (Lden) compared to the provinces of Brabant and Zuid-Holland, as most parts are marked white. However, roads cause a lot of noise. They light up red on the map.
KEY POINTS

Schouwen-Duiveland has more potential quiet areas than other parts of the Netherlands. Noise disturbance is more limited. The municipality has a low level of noise (Lden) compared to the provinces of Brabant and Zuid-Holland. However, some roads can cause a lot of noise, but in general it looks like noise is adequately regulated and minimised.

KEY MESSAGES FOR RESIDENTS AND VISITORS

Schouwen-Duiveland has more ‘potentially quiet areas’ than some of the important destinations that are popular sources of visitors to the municipality. A ‘potential quiet area’ implies a relative quietness, where other sounds than man-made noise are given the chance to come forward. Or in other words, there is a limited noise disturbance level compared to those selected visitor sources. There is not a lot of unwanted noise that will cause annoyance and health issues.

BATHING WATER QUALITY

WHY IS THIS IMPORTANT?

Bathing waters are used for a wide range of purposes and are therefore exposed to a number of pollution risks. A poor bathing water quality is a cause for concern, as swimming at beaches or bathing lakes contaminated with faecal bacteria can result in health problems. Therefore, a good bathing water quality is important for many sea- and lakeside destinations making the destination more attractive to potential visitors.

THE SITUATION IN SCHOUWEN-DUIVELAND

The European Environment Agency collects information on the water quality at bathing water points. Based on the classification made in the EU Bathing Water Directive, European Environment Agency (2020) gives an indication if a bathing water point is ‘poor’, ‘sufficient’, ‘good’ or ‘excellent’. Methodological evaluation of bathing water quality is limited to certain areas in the world. Seven monitoring stations around the coast of Schouwen-Duiveland are monitoring the quality of the bathing water. In 2020 all bathing points at Schouwen-Duiveland were rated ‘excellent’.
This means the bathing water quality of Schouwen-Duiveland is 100%. This can be compared to reference destinations in the region (Figure 17). In Veere the measuring station also indicated ‘excellent’ bathing water quality for 2020. But in Goeree-Overflakkee two out of eleven measuring points were rated ‘good’, one as ‘sufficient’ and the rest ‘excellent’. Also Westvoorne has been rated with ‘excellent’ bathing water quality. This shows that Schouwen-Duiveland is doing well compared to the reference destinations. In the Netherlands in general, bathing water quality was only excellent in 73.8% of measuring stations. 10.6% was good quality and the rest was either ‘sufficient’ or ‘poor’ quality (European Environment Agency, 2020).

![Figure 17: Rated bathing water quality measuring points in Schouwen-Duiveland compared to reference destinations*](image)

*European Environment Agency, 2020
LIGHT POLLUTION

WHY IS THIS IMPORTANT?
Light pollution is the use of artificial outdoor lighting in a way that results in the brightening of night skies, disrupting natural environmental cycles and activities of wildlife, as well as preventing humans from observing a starlit sky (IDA, n.d). Watching the stars or other planets is an important nature experience (Lima et al., 2016). Increasingly, one must take into account that light pollution might interfere with this experience. Due to light pollution, the night sky over many of our cities and even in areas away from urban development, is hundreds of times brighter than it would be under natural conditions. Light pollution is mainly caused by misdirected, excessive, inefficient and unnecessary lighting systems (Gallaway et al., 2010). Examples are street lights, neon signs and illuminated displays, security lights that light up buildings and their surroundings and exterior lights found on most homes/businesses.

THE SITUATION IN SCHOUWEN-DUIVELAND
There is no average radiance intensity available of the municipality. However, looking at the map (Figure 18) Schouwen-Duiveland is in a relatively dark spot of the Netherlands. The amount of artificial night sky brightness is measured in radiance intensity (10W9/cm2 * sr), in which a ‘0’ indicates no light pollution and ‘75’ or more is very polluted (Light Pollution Map, 2020). In 2020, in Schouwen-Duiveland the amount of artificial night sky brightness in most places has a radiance intensity score between 0.15 - 0.25, 0.25 - 0.50 and 0.50 - 1.50. The sky above the towns is the most light-polluted area in the municipality. Zierikzee has the highest radiance intensity in the area with a 3 km² spot with a score between 1.50 - 10.00. Other small towns such as Renesse, Burgh-Haamstede and Oosterland have a very small spot with such radiance intensity. Higher scores do not occur in the area. The Netherlands' average score in radiance intensity or the amount of artificial night sky brightness at night is 6.92, which belongs to one of the highest scores worldwide (Light Pollution Map, n.d.).

Figure 18: Light pollution - Radiance intensity at night in Schouwen-Duiveland 2020*
Schouwen-Duiveland has a separate policy for the preservation of darkness and the prevention of light pollution. If lighting is required, it should be dynamic and only at the location where it is required. In order to prevent light pollution, LED lighting is used in public lighting and, where possible, an evening and night-time intensity for lighting is used. In addition to the legal framework, developments are clearly aimed at minimising pollution of the environment by unnecessary light sources, in accordance with the Light and Darkness module in the Environmental Policy Plan.

**KEY POINTS**

Impacts of light pollution to wildlife, resident and visitor experience are adequately addressed. Tourism enterprises and visitors are encouraged to minimise light pollution.

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

While the Netherlands average score in radiance intensity or the amount of artificial night sky brightness belongs to one of the highest worldwide, Schouwen-Duiveland is in a relatively dark spot of the Netherlands. As there is less light pollution, on a non-cloudy night you could see many more stars in Zeeland than in the rest of the country. Zeeland’s beaches are a good option for a stargazing experience. They are quite dark at night, as long as you stay away from beach huts and villages.
ENERGY AND CLIMATE EMERGENCY
WHY IS THIS IMPORTANT?
As energy reduction has been identified as a key tool to counter climate change, it is important to understand the breakdown of the main consumption, including the hospitality sector, to move towards a decline in energy usage.

THE SITUATION IN SCHOUWEN-DUIVELAND
To have a clear overview of the energy breakdown in Schouwen-Duiveland, the total energy usage, the total energy usage per capita as well as the share the hospitality sector has in the total energy usage, are presented. The total energy usage is important to know, to be able to identify the share of the hospitality sector in this. Next to that, the total energy usage per capita is important as this provides a more easily comparable number as the general total energy usage also depends on the number of inhabitants and businesses in a destination.

The energy consumption in Schouwen-Duiveland in 2019 has slightly increased compared to the energy usage in 2014. Figure 19 presents a trend in the total energy usage of Schouwen-Duiveland compared to the reference destinations in Zeeland (Klimaatmonitor, n.d.).

![Figure 19: Total known energy usage (TJ) of Schouwen-Duiveland compared to the reference destinations 2014-2019*](image-url)
Due to the difference in number of residents in Schouwen-Duiveland and the reference destinations, the energy usage per capita is calculated to provide a fair comparison. To assess the energy usage per capita, the total energy usage per municipality was divided by the number of inhabitants retrieved from CBS StatLine (2020). Comparing Schouwen-Duiveland with the other selected destinations, Schouwen-Duiveland has the second highest energy consumption per capita (Figure 20).

**Figure 20: Per capita energy consumption (TJ) of Schouwen-Duiveland compared to the reference destinations in 2019**

Klimaatmonitor (n.d.) also reported specifically for each municipality the energy consumption in the hospitality sector. Figure 21 shows that the hospitality sector in Schouwen-Duiveland consumes a higher amount of energy compared to the other surrounding destinations.

**Figure 21: Energy usage (TJ) for the hospitality sector in Schouwen-Duiveland and the reference destinations during 2014-2019**

*Klimaatmonitor, n.d.-a*
Comparing the hospitality sector with the total energy usage, the share of energy from the hospitality sector accounts for almost 7.3%.

**KEY POINTS**

Even though the total energy usage slightly increased over five years (2014-2019) Schouwen-Duiveland monitors and actively takes initiative in reducing energy consumption levels within its commercial services. To decrease the energy consumption of visitors, destination managers can create campaigns to inform visitors on energy saving tips to consider whilst travelling.

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

The hospitality sector of Schouwen-Duiveland has a relatively high energy consumption level. It is recommended to visitors to use an energy and power consumption calculator to monitor usage of electrical appliances such as the Energy Power and Consumption Calculator (Electrical Technology, n.d.) as well as a carbon footprint calculator.

**RENEWABLE ENERGY PRODUCTION**

**WHY IS THIS IMPORTANT?**

Transitioning towards renewable energy sources has been identified as an effective strategy to reduce greenhouse gases and in turn, to counter climate change IRENA (n.d). As a destination it is important to understand the breakdown of main consumption forms including electricity, heat, traffic and transport, in order to assess and incorporate renewable energy alternatives and actively participate in the reduction of greenhouse gases.

**THE SITUATION IN SCHOUWEN-DUIVELAND**

In Schouwen-Duiveland the renewable energy production trend is going towards a more sustainable path: in 2019, 1902 TJ was already being generated from renewable sources (see Figure 22) and is performing well compared to the reference destinations.
The usage of renewable heat and solar power (behind the meter) in Schouwen-Duiveland are showing signs of considerable growth and are used immediately after being generated in homes, companies and institutions. It is assumed that 33% of solar power is generated behind the meter and it is included in the total known amount of energy used (Klimaatmonitor, n.d.-c). To be able to see the particular main consumption forms of renewable energy in Schouwen-Duiveland, an overview of the renewable energy sources is provided in figure 23. It is shown that the main renewable energy source is renewable electricity and that it has considerably grown between 2017 and 2018.
To analyze what sources provide renewable electricity, figure 24 explains that wind on land and solar power are the main factors for the generation of renewable electricity in the considered years.

Figure 24: Sources used for renewable electricity in Schouwen-Duiveland over a period of 5 years*

As the installed solar panels provide a good example of how much they contribute to renewable electricity, the number of solar panels compared with the generated power of solar panels is illustrated in figure 25. This figure shows that Schouwen-Duiveland is the third municipality in Zeeland with the highest number of solar panels installed. Solar panels in Schouwen-Duiveland have produced approximately 36,000 kW of power, which is quite high compared to reference destinations and other municipalities in Zeeland.

Figure 25: Number of solar panels installed and power generated in Schouwen-Duiveland and surrounding municipalities**

*Klimaatmonitor, n.d.-a
**CBS, 2019
After considering the several sources of renewable energy, it can now be understood how much renewable energy is created in the destination. The Ministry of Infrastructure and Water Management developed a detailed report on that and to understand how Schouwen-Duiveland is performing in this sense, data was compared to the competitors’ to show a trend over a 7 years period.

After considering how much energy is consumed in the previous paragraph as well as the amount of renewable energy generated in Schouwen-Duiveland, figure 26 provides an overview of this comparison. Even though Schouwen-Duiveland consumes more energy compared to other municipalities in Zeeland, the renewable energy generation in Schouwen-Duiveland is increasing and is quite high compared to other municipalities (see Figure 26). However, even though Schouwen-Duiveland is making strides in the right direction, figure 26 also shows that the total known energy consumption in 2018 (up to 4,023 TJ which was the combined end use of electricity, heat and vehicle fuels (Klimaatmonitor, 2021) is significantly higher than the total known renewable energy generation and is hence far from covered.

![Figure 26: Energy consumption versus renewable generation in Schouwen-Duiveland*](image)

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

Schouwen-Duiveland is the first destination in the European Union that was certified according to a GSTC Accredited destination certification (by Green Destinations) for their continued efforts in producing and using renewable energy. Even though Schouwen-Duiveland is producing relatively much renewable energy, it is recommended to encourage visitors to choose accommodations that use renewable energy or even generate its own solar energy. With this they can contribute to reducing greenhouse gases and in turn combating climate change.

*Klimaatmonitor, 2021*
KEY POINTS

In 2018, about a quarter of the energy consumed in Schouwen-Duiveland comes from renewable energy and the renewable energy generation and consumption show a slow but steady increase. Yet, the amount of (general) energy consumption is among the highest compared to surrounding municipalities in Zeeland. Hence, the renewable energy generation still outweighs the energy consumption.

Specifically for the hospitality sector we are not able to assess how much renewable energy is invested and used. Hence, to increase the incorporation of renewable energy practices it is encouraged to implement and better monitor renewable energy practices.

To show how accommodations in your destination are performing regarding renewable energy, they can participate in the Good Travel Seal program. The score of this certification, including this particular subject, will be published on the Schouwen-Duiveland page of the Good Travel Guide. The scorecard can also be shown to (potential) visitors.

GREENHOUSE GAS EMISSIONS

CO2 EMISSIONS

WHY IS THIS IMPORTANT?
Greenhouse gasses have significantly contributed to the amount of global warming to date. This includes and is not limited to carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), tropospheric ozone (O3) and trace gases such as “F- gases” (Ritchie & Roser, 2020). CO2 is the most globally well-known greenhouse gas. Since the beginning of industrialization the CO2 in the atmosphere has increased by about 40%. CO2 is mainly produced by burning fossil fuels such as coal, natural gas and crude oil (WorldData.Info, n.d.). The level of CO2 released by human activities is absorbed by the air and the oceans, with air pollution and acidification of the oceans as consequences (WorldData.Info, n.d.).

Methane however, is 25 times stronger than CO2 in terms of its global warming potential (Pariona, 2017). Hence, it is important to understand the related emission levels of both greenhouse gases in Schouwen-Duiveland.
THE SITUATION IN SCHOUWEN-DUIVELAND
Schouwen-Duiveland’s CO2 emissions originate from the consumption of natural gas and electricity, vehicle fuels and district heating (Klimaatmonitor, n.d.-e). As shown in figure 27 below, after Goeree-Overflakkee, Schouwen-Duiveland emitted the highest amount of CO2 in comparison with the reference destinations. However, together with Middelburg, Schouwen-Duiveland shows a trend in reducing its CO2 emissions.

Figure 27: CO2 emissions in Schouwen-Duiveland compared to reference destinations in 2015-2019*

Figure 28 shows the amount of CO2 emitted (21.858 tons) by the hospitality sector of Schouwen-Duiveland and surrounding municipalities in Zeeland. Comparing this, it shows that the hospitality sector of Schouwen-Duiveland together with Veere emits the highest amount of CO2 emissions¹.

Figure 28: CO2 emissions for hospitality sector in Schouwen-Duiveland compared to reference destinations in 2012-2019*

*Klimaatmonitor, n.d.-e

¹ It should noted that the amount of hospitality organisations is not taken into account, which makes that the comparison is made based on absolute numbers.
When comparing the CO2 emissions of the hospitality sector with the total amount of CO2 emissions in Schouwen-Duiveland (252,700 tons), it shows that the hospitality sector accounts for almost 8.7%. The hospitality sector of Schouwen-Duiveland has a higher share from the total amount of CO2 emissions than Middelburg (2.7%) and Goeree-Overflakkee (4.2%), however a lower share than Sluis (12.2%) and Veere (18.7%).

Due to the difference in number of residents in Schouwen-Duiveland and the reference destinations, it is important to know the CO2 emissions per capita, to provide a fair comparison of the CO2 emissions in an area. Also, to reduce the CO2 emissions in your area, it is useful to know how much visitors as well as residents contribute to this. Considering these amounts, differences can be found and appropriate measures can be taken to reduce the carbon footprint.

The CO2 emissions per capita can be found in figure 29. The CO2 emissions from visitors can be calculated in the Carbon Footprint Calculator².

² This carbon footprint calculator will be only operational in several European countries. Yet, more carbon footprint calculators on the global scale will become available in the longer run.
METHANE EMISSIONS

WHY IS THIS IMPORTANT?
"Methane (CH4) is the second most important greenhouse gas contributor to climate change following CO2", and is emitted from both natural and anthropogenic sources. "It has 82 times greater global warming potential than CO2 on a 20-year timescale and potent local air pollution and contributes to ozone formation, which itself causes serious health problems" (European Commission, 2021). The agriculture sector is responsible for the majority of CH4 emissions, followed by the waste sector (European Commission, 2021; European Environment Agency, 2020). As the agricultural sector can play an important role in providing food to the hospitality sector, it is important to know the methane emissions in your destination. When considering methane emissions and contributing to implementing appropriate measures to reduce the amounts, a more sustainable food supply chain can be created.

THE SITUATION IN SCHOUWEN-DUIVELAND
Schouwen-Duiveland is releasing a significant amount of methane into the atmosphere (Ministry of Infrastructure, n.d.). Comparing Schouwen-Duiveland to reference destinations, Schouwen-Duiveland released together with Goeree-Overflakkee and Sluis, a higher and almost stable quantity of methane into the atmosphere. This also shows that in Schouwen-Duiveland there has not been a significant decline in methane emissions over the last four years.

![Figure 30: Methane emissions in Schouwen-Duiveland compared to reference destinations in 2018*](http://example.com/image.jpg)

*Klimaatmonitor, n.d.-g*
Since the agricultural sector is one of the main sectors that releases the majority of CH4 into the air, it is worth comparing Schouwen-Duiveland’s methane emissions from the agricultural sector with reference destinations. Figure 31 shows that the agriculture of Schouwen-Duiveland had the second highest methane emissions in 2018 compared to reference destinations. However, a specific conclusion related to tourism and the food consumption by visitors at each destination cannot be drawn, as these numbers are related to meat production and not meat consumption within the destinations.

**Figure 31: Methane emissions from the agricultural sector in Schouwen-Duiveland compared to surrounding municipalities in 2018**

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

Even though Schouwen-Duiveland has the second highest CO2 emissions in the hospitality sector and performs on average regarding the methane emissions compared to reference destinations, the municipality aims to reduce their emissions by encouraging residents and visitors to choose sustainable activities, accommodations and transportation, e.g. promoting bicycle use.
KEY POINTS

Compared to reference destinations, Schouwen-Duiveland has the second highest total known CO2 emissions. Also the hospitality sector from Schouwen-Duiveland belongs, with absolute numbers, to the top CO2 emitters compared to reference destinations. However, looking at the relative share of the hospitality sector in the total amount of CO2 emissions, Schouwen-Duiveland performs worse than Middelburg and Goeree-Overflakkee, but better than Sluis and Veere. Considering these amounts, steps towards reducing the CO2 emissions in the hospitality sector should be taken. One aspect can be focussing on the carbon footprint of visitors in your destination. To compare this with the average resident in your area, the CO2 emissions per capita data as well as data from the carbon footprint calculator can be used.

Regarding methane emissions, Schouwen-Duiveland released (like Goeree-Overflakkee and Sluis) a higher and almost stable quantity of methane into the atmosphere, compared to reference destinations. To help reduce the methane emissions of the agricultural sector as the hospitality sector depends on this sector, it is important to contribute to taking appropriate measures to reduce the amounts and in turn creating a more sustainable food supply chain.

FLOOD RISK

WHY IS THIS IMPORTANT?

Climate change causes impacts on nature’s ecosystems and the habitats that support life. Besides, global average temperatures are predicted to increase between 1.5 and 5 degree Celsius by 2050. As average temperatures rise, heat waves, floods, drought and rising sea levels intensify (Masson-Delmotte et al., 2018). The responsible factors are among others greenhouse gas emissions from fossil fuel combustions and land use change (Masson-Delmotte et al., 2018).

THE SITUATION IN SCHOUWEN-DUIVELAND

Schouwen-Duiveland is affected by salinisation in times of drought, which causes problems to the agricultural sector. Together with the risk of flooding which will increase due to climate change, businesses are required to adapt to these consequences of climate change. To better understand the chance of flooding in the province of Zeeland 2050, a heat map was constructed (Figure 32).
Figure 32: Location-related probability of flood in 2050 > 0cm in the province of Zeeland*

Figure 33 shows that Zeeland’s probability of flood in 2050 is considered as a very slim to medium chance for much of the urbanized surface. As for the coastal area the probability gets higher and red zones are detected. For the development of flood adaptation strategies, it is important to know what the flood water depth in your area will be. Figure 39 shows what the maximum water depth would be if. In case of flooding, the depth of water in Schouwen-Duiveland is predicted to be roughly between 1.5-2 meters.

*Plan Bureau voor de Leefomgeving, n.d.
Zeeland has a very slim to medium chance of flooding per year in 2050. The maximum water depth in case of a flood in the present in Schouwen-Duiveland is predicted to be between 1.5 and 2 meter. This information can be used to create strategies to prepare for floods.

The Water Management Center of the Netherlands of Rijkswaterstaat and the water boards communicates and issues an alarm for (imminent) high water. Also the chances of dike failure are very low. More flood maps can be found at Water Management Centrum Nederland (n.d.), the Climate Effect Atlas and the Risk Map.

Urban environments are hotter than the surrounding open, natural, or rural areas (Sharma & Bharat, 2009). This is described by the term ‘Urban Heat Island’ (UHI) (Sharma & Bharat, 2009). This happens on the surface and in the atmosphere (no more than one mile from the surface) when buildings, concrete structures and asphalt roads in urban areas act as heat sinks and absorb solar radiation and release and store heat (Environmental Protection Agency, 2008; Gartland, 2012).
Many detrimental effects arise as a result of the creation of urban heat islands. Higher temperatures have a large impact and have the potential to affect among others local water quality and human health and comfort. For instance, due to increased electricity demand to cool surfaces, more air pollutants and emitted GHG by power plants. Moreover, people consume more water leading to pressure on the water supply (Mohajerani et al., 2017). Therefore, elevated temperature along with increased air pollution can lead to human discomfort and health problems (Sharma & Bharat, 2009; Gartland, 2012).

THE SITUATION IN SCHOUWEN-DUIVELAND

As shown in figure 34, the average temperature difference between the urban and surrounding areas mainly remains below 0.2 °C in Schouwen-Duiveland, implying that the intensity of UHI in Schouwen-Duiveland is generally lower when compared to many other municipalities in the Netherlands. This is in line with expectations as Schouwen-Duiveland is a less urbanised destination as urban land cover accounts for just 11.7 percent.

![Figure 34: Urban heat island effect in the province of Zeeland and the Netherlands*](image)

*Atlas Leefomgeving, n.d.-b*
BUSINESS AND SUSTAINABILITY
WHY IS THIS IMPORTANT?
While Airbnb as a major player in the accommodation sector can help to diversify the accommodation offering at destinations, and possibly offer an authentic experience, they also often outnumber other traditional accommodation providers such as hotels. As Airbnb is an increasing concern due to the potential of facilitating gentrification, it is important to consider the number of Airbnb accommodations in a destination compared to traditional accommodation providers (Wachsmuth & Weisler, 2018).

THE SITUATION IN SCHOUWEN-DUIVELAND
As shown in table 4, Schouwen-Duiveland has 0.2 Airbnbbs for every hotel room. This also means that, as shown in figure 41, Schouwen-Duiveland has 1 Airbnb for every 150 inhabitants. The nearby city Middelburg, has 1 Airbnb for every 309 inhabitants, whereas Amsterdam has 1 Airbnb for every 80.85 inhabitants. Compared to the reference destinations, Schouwen-Duiveland has the lowest Airbnb/hotel room ratio (see Table 4). Next to that, Schouwen-Duiveland has almost 150 inhabitants per Airbnb accommodation (in comparison to 80.85 residents in Amsterdam) showing that the Airbnb presence in Schouwen-Duiveland is significantly lower than in Amsterdam. As the number of residents per Airbnb is higher in Schouwen-Duiveland compared to the reference destinations; Veere and Sluis, as well as the city of Amsterdam, the potential for facilitating gentrification is thus much lower in Schouwen-Duiveland.

<table>
<thead>
<tr>
<th></th>
<th>Amsterdam</th>
<th>Schouwen-Duiveland</th>
<th>Middelburg</th>
<th>Veere</th>
<th>Sluis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Airbnb accommodations</td>
<td>10,687</td>
<td>226</td>
<td>158</td>
<td>417</td>
<td>247</td>
</tr>
<tr>
<td>Number of hotel rooms</td>
<td>36,860</td>
<td>1,120</td>
<td>570</td>
<td>1,650</td>
<td>800</td>
</tr>
<tr>
<td>Number of inhabitants</td>
<td>862,965</td>
<td>33,859</td>
<td>48,822</td>
<td>21,878</td>
<td>23,187</td>
</tr>
<tr>
<td>Airbnb / hotel room ratio</td>
<td>0.29</td>
<td>0.2</td>
<td>0.27</td>
<td>0.25</td>
<td>0.31</td>
</tr>
<tr>
<td>Number of residents per Airbnb</td>
<td>80.85</td>
<td>149.82</td>
<td>309</td>
<td>52.46</td>
<td>93.87</td>
</tr>
</tbody>
</table>

Table 4: Airbnb in Amsterdam, Schouwen-Duiveland, Middelburg, Veere & Sluis*
To put yourself on the map as a destination working on sustainability, it is useful to know the availability of hotel rooms participating in a sustainable tourism program like the Green Key or the Good Travel Seal.

Schouwen-Duiveland has 47 hotels (Booking.com) of which five of them are certified. Although there are different types of certifications, certified hotels are shown to perform better than the average hotel without sustainability certification. According to TUI Research (2018), certified accommodations indeed show more effective environmental management, and save more energy and water. In addition to this, certified accommodations perform better regarding waste reduction and separation as well as fair and equal treatment of employees and destinations. Next to this, the customer satisfaction seems to be higher.

Table 5 provides an overview of the number of hotels compared to the ecolabel hotels in Schouwen-Duiveland, reference destinations and other municipalities.
It should be noted that there is the possibility of overlap between the various municipalities. Caution has therefore to be taken when interpreting the data.

Bookdifferent, n.d.

**KEY POINTS**

To increase the sustainability performance of your destination, it is recommended to encourage accommodations in your destination to participate in a sustainable tourism program, such as the Good Travel Seal or Green Key.

**KEY MESSAGES FOR RESIDENTS AND VISITORS**

As no Airbnb accommodation is certified for sustainability, it is recommended to encourage visitors and residents to choose for accommodations participating in a sustainable tourism program such as the Good Travel Seal and Green Key. Of the 47 hotels in Schouwen-Duiveland, five are certified. They can be found in the Good Travel Guide.

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3 It should be noted that there is the possibility of overlap between the various municipalities. Caution has therefore to be taken when interpreting the data.

Bookdifferent, n.d.

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Total number of hotels</th>
<th>Number of ecolabel hotels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schouwen-Duiveland</td>
<td>47</td>
<td>5</td>
</tr>
<tr>
<td>Sluis</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Veere</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Middelburg</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>Goeree-Overflakkee</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>Westvoorne</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Cadzand</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Domburg</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Oostvoorne</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Rockanje</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 5: Total number of hotels versus number of ecolabel hotels in Schouwen-Duiveland compared to reference destinations and other municipalities³**


Green Destinations foundation and the Good Travel Guide have joined forces in the development of a Sustainability Support Toolkit for the Assessment and Reset of Tourism: the START toolkit.

Green Destinations foundation is a non-profit organisation for sustainable tourism destinations, supporting more than 200 destinations with certification and training based upon the GSTC Destination Criteria.

The Good Travel Guide is operated by Green Destinations B.V. It supports destinations and businesses in communicating their responsible tourism achievements to travellers in a clear and transparent way, based upon the GSTC criteria and the Sustainable Development Goals (SDGs).