



Sustainable Tourism in the North  
Clean Energy  
Final Report 2022

## Abstract

The Nordic countries have provided leadership in the global climate agenda and high ambitions to achieve carbon neutrality. On a national level, each has implemented strategies and introduced economic incentives to support the development and uptake of clean energy technology. Increasingly, the Nordics have become popular tourist destinations, known for their pristine nature, dramatic landscapes, clean air, and high standard of living. Sustainable Tourism in the North - Clean Energy examined the extent to which visitors have been involved in the Nordic clean energy journey. The project objective was to outline the current status of alternative fuels in four Nordic tourism sectors, namely: rental cars, marine vessels, buses and hospitality. Moreover, the consortium sought to identify barriers to accelerating the Nordic tourism energy transition.

This paper discusses the findings and analyzes feedback from stakeholders in these sectors. It provides policy recommendations to promote carbon neutrality and describes how a Digital Green Visitor Passport could benefit tourism operators and visitors while contributing to increased embracement of clean energy options within the four specific tourism segments.

A three-year project funded by the Nordic Council of Ministers under Iceland's 2019 Presidency of the Nordic Council, Sustainable Tourism in the North – Clean Energy ran from 2019 to 2021. It was coordinated and executed by Icelandic New Energy and administered by the National Energy Authority Iceland.

## Table of Contents

Abstract .....	2
Table of figures.....	5
Introduction.....	6
Project background .....	6
Nordic context and roadmaps.....	7
Bus and coach sector and tourism .....	9
Introduction.....	9
Sustainable Tourism in the North – workshop on buses and coaches.....	9
Current status of alternative fuel buses and coaches.....	10
Fuels and energy carriers .....	11
Infrastructure .....	12
Support and incentives for carbon neutral steps.....	12
Marine sector and tourism.....	14
Introduction.....	14
Current status of alternative fuel vessels.....	15
Sustainable Tourism in the North – workshop on marine vessels.....	16
Fuels and infrastructure .....	17
Policy and incentives for carbon neutral steps .....	18
Rental cars and tourism.....	20
Introduction.....	20
Current status of alternative rental passenger vehicles .....	20
Sustainable Tourism in the North – workshop on rental cars.....	21
Charging infrastructure .....	22
Keflavik airport layout .....	23
Policy and incentives for zero emission cars.....	23
Hospitality tourism .....	25
Introduction.....	25
Sustainable Tourism in the North – workshop on hospitality.....	26
Ecolabelling and certification .....	26
Policy for green hospitality.....	27
Digital Green Visitor Passport and Portal.....	28
Objective .....	29
Mobile implementation.....	29
Benefits.....	30

Stakeholders.....	30
Discussion.....	30
References.....	32

## Table of figures

Figure 1 Number of alternative fuel buses and coaches in the Nordic countries (including battery electric, plug-in hybrid electric, LNG, CNG, and hydrogen) (Source: European Alternative Fuels Observatory, 2021).....	10
Figure 2 Emissions from different modes of transport (BBC, 2021) .....	11
Figure 3 Development of Li-ion battery pack price, volume-weighted average (BloombergNEF, 2022) .....	11
Figure 5 Total number of ships (in operation and on order) using alternative fuel vessels worldwide (DNV, 2022) .....	16
Figure 6 Bunkering infrastructure in operation and decided for ammonia, LNG and methanol in 2022 (DNV, 2022) .....	18
Figure 7 Examples of environmental management factors monitored in hospitality industry .....	25
Figure 8 Examples of tourism related ecolabels in the Nordics .....	27
Figure 9 The Nordic Digital Green Visitor Passport explained .....	29

## Introduction

The Nordic countries have made significant progress towards their energy transition away from conventional fossil fuels and adopting alternative fuels in transport and other sectors. Each of these countries has set ambitious targets for implementing renewable energy sources, moving ever closer to a sustainable, carbon neutral energy system. In fact, the Nordic countries quite surpassed the EU 2020 target of 20% renewable sources as a share of gross final energy consumption (Nordic Energy Research, 2021).

Sustainability is indeed one of several fundamental focus points for Nordic tourism (Nordic Council of Ministers, 2021) and the Nordics have been rated among the most sustainable destinations to visit (Nordic Visitor, 2022). In the context of sustainable tourism and the fourth industrial revolution as well as a heightened global awareness of climate challenges, to what extent are tourists who visit the Nordic countries aware of the Nordic decarbonising success? This project, Sustainable Tourism in the North: Clean Energy, addresses the use of alternative fuels in the tourism related service sectors and how tourism in the Nordic countries can contribute to stimulating further use of alternative fuels. It also seeks to provide suggestions on how to further inform and involve visitors to the Nordics in the clean energy journey, to share sustainable travel practices and encourage and incentivise alternative fuel options.

Stakeholders include: Tourism associations, utilities and other energy stakeholders, hotels and other accommodation, car rentals, policy makers, vessel operators, bus and coach operators, municipalities, local government, regional government.

The project enjoyed direct participation of representatives from Icelandic Travel Industry Association, MaRa the Finnish Hospitality Association, Hurtigbåtforbundet in Norway and Transportföretagen Sweden via steering group, meeting online on a regular basis to exchange information on current status and next steps in each tourism sector.

During its three year timeline, this project has endeavored to

- ✓ Map the use of alternative fuels used today in the tourism segment
  - Identify opportunities to increase sustainable tourism and the use of alternative energy options in transport
- ✓ With a focus specifically on the energy related infrastructure needed in order to advance and accelerate the Nordic green energy transition
  - Identify, which policy instruments (government role) and actions are necessary to increase the share of sustainable energy options in tourist experience in the Nordic countries

This report covers the findings from stakeholder workshops, addresses barriers to accelerating tourism engagement in the Nordic energy transition and offers policy recommendations to promote carbon neutrality in four Nordic tourism sectors.

## Project background

The Nordic countries are world leaders as concerns decarbonising the energy sector, specifically with regard to transport. Norway and Iceland are frontrunners in the adoption of electric vehicles and related infrastructure. With the number of visitors entering the Nordic countries per year, it is increasingly important for the tourism sector to contribute to the overall goal of carbon neutrality.



What problem will the project help solve? While visiting the Nordic countries, tourists inevitably are large consumers of fuels, utilizing taxis, buses, passenger vehicles, airport transport, boats, ferries and various recreational equipment which runs on fossil fuel<sup>1</sup>. Visitors consume alternative fuels and green energy by choice only to a very limited extent, which arouses the question: how can the Nordic countries stimulate use of vehicles, equipment etc. which inspires visitors to opt for ecofriendly solutions? As the use of alternatives increases, the economic model of building infrastructure improves and at the same time visiting the “green valley of Europe” could become a more fulfilling experience.

## Nordic context and roadmaps

Sustainability and decarbonisation of transport and energy systems has been high on the Nordic political agenda for some time. In January 2019, the Nordic Prime Ministers announced the Helsingfors Declaration (The Nordic Prime Ministers, 2019), which voices a commitment towards carbon neutrality and a vision thereof to 2030 (The Nordic Prime Ministers, Ministers for Co-operation (MR-SAM), 2019). All of the Nordic countries have a set a formal goal of reaching carbon neutrality within the next 20 years. Keeping in mind that carbon neutrality is a broad concept, for the purposes of this report, the term refers to carbon neutral system where produced emissions and the Nordic region’s ability to absorb or sequester them are in balance (Grunfelder, 2020).

The national targets for each of the Nordic countries to achieve carbon neutrality are as follows:

Norway by 2030 (with carbon offsets)

Finland by 2035

Iceland by 2040

Sweden by 2045 (with carbon offsets)

Denmark by 2050

Indeed, one of four strategic themes of The Nordic Tourism Plan for 2019-2023 (Nordic Council of Ministers, 2019), focuses on creating and maintaining *sustainable Nordics*. This requires complex integration on local, national and regional levels, taking into account interests economic, social and environmental and considering diverse service sectors linked to tourism. Indeed, The Nordic Tourism Plan and Nordic Tourism Policy Analysis (Árnadóttir, 2019) suggest the development of a *Nordic roadmap for sustainable tourism*, with the objective of detailing specific, quantitative goals and actions to be undertaken within a clearly defined timeframe. Policy, infrastructure and funding must support and guide the roadmap in order for it do be realised in a timely manner.

Each of the Nordic countries has created its own national roadmap for tourism in addition to a vision for making sustainability as a focal point in the coming years. These are at different stages of design and implementation (see Table 1 on the following page).

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<sup>1</sup> The scope of the project did not include aviation fuel.

Table 1 Nordic Sustainable Tourism Strategies – reproduced from (Nordic Council of Ministers, 2021)

Denmark	Finland	Iceland	Norway	Sweden
National Strategy on sustainable growth in tourism (2021), Wonderful Copenhagen tourism for good strategy (2019)	Finland's national tourism strategy for 2019–2028: Achieving more together - sustainable growth and renewal in Finnish tourism 2019-2028	Leading in Sustainable Development - Policy framework for tourism until 2030	National Tourism Strategy 2030 (2021)	National strategy on sustainable tourism (upcoming)

In August 2019, the Nordic Prime ministers issued a joint declaration under the name *Our vision 2030* (The Nordic Prime Ministers, Ministers for Co-operation (MR-SAM), 2019). The document sets the stage for the Nordic Region to become the most sustainable and integrated region in the world by 2030. The Nordic governments commit to working toward three main strategic priorities: creating a Nordic region that is green, competitive and socially sustainable.

Finally, it is highly relevant to mention a recent joint statement from the meeting of the Nordic Council to support efforts to mobilise private investments to accelerate climate action and green recovery (The Nordic Council and the Nordic Council of Ministers, 2022). This will without a doubt lend necessary support to develop and scale up clean energy technology and innovation within the region.





Photo credit: Matthew Henry via Unsplash

## Bus and coach sector and tourism

### Introduction

The concept of transport and mobility has changed quite a bit in the last decade with the introduction of micromobility, increased environmental awareness and progress in transitioning the Nordic passenger vehicle fleet away from fossil fuels. Nordic municipalities have implemented policies to encourage bicycle use, invested in alternative fuel buses and welcomed various means of concepts involving mobility as a service. Nevertheless, on a Nordic level, as of 2020, EVs only make up 4% of the total car fleet and cars still account 85% of all inland passenger transport (Nordic Energy Research, 2020). Nordic cities have been increasingly choosing electric buses for public transport over diesel and committing to replacing fossil fuel fleets entirely by the end of the current decade. Finland and Sweden though, boasting extensive natural forest resources, have also considerable bus fleets operating on biofuels (Institute of Transport Economics , 2018). Still, challenges remain and actions for decarbonization seem too slow for Nordic countries to meet international commitments to reduce greenhouse gas emissions drastically.

For the purposes of this report, the terminology bus will be used to refer to vehicles with more than eight seats used for urban passenger transport and the term coach refers to long haul vehicles with more than eight seats for passenger transport<sup>2</sup>.

### Sustainable Tourism in the North – workshop on buses and coaches

Project partners Icelandic New Energy (IS), Icelandic Travel Industry Association (IS) and Transportföretagen (SE) jointly hosted an online workshop on March 24, 2021. The focus was on key stakeholders and participants, represented Denmark, Iceland, Norway, and Sweden. Most spoke on behalf of bus and coach operators and related government transport organisations. Presentations on current status of the bus and coach sector and next steps in alternative fuel buses were provided by Scania, Volvo and the Swedish Confederation of Transport Enterprises. Discussions centered on the various challenges OEMs<sup>3</sup> face, incentives needed to accelerate energy transition, operation within labor laws and different alternative fuels and infrastructure. The recommendations and findings are based on discussions during the workshop, literature review in addition to other communication with stakeholders.

<sup>2</sup> EU vehicle classification: <https://www.transportpolicy.net/standard/eu-vehicle-definitions/>

<sup>3</sup> OEM: Original Equipment Manufacturer.

### Current status of alternative fuel buses and coaches

The share of alternative fuel buses and coaches in the Nordic countries has been slowly but steadily rising in the last decade, with different low carbon fuels and energy carriers gaining support and market share in line with respective incentives and fuel availability. The number of compressed natural gas (CNG) buses, for example, has been growing steadily in Sweden since the year 2000, reaching 2.680 in 2020 while in Denmark, battery electric buses were added to the fleet in 2012, with CNG coming into play in 2015 and both increasing since then to reach 113 (battery electric) and 154 (CNG) in 2020. Figure 1 displays the total number of alternative fuel buses in each of the Nordic countries at the end of 2020. This has been driven in part by the European emission standards for new heavy-duty diesel engines, commonly referred to as Euro I ... VI. These have been implemented successfully since 1992, with increasingly stringent emission limits for the vehicles with the aim to contribute to EU commitments under the Paris Agreement and reduce fuel consumption costs for transport operators (European Commission, 2022).

Norway and Sweden are clearly in the lead with fleets mostly comprised of CNG and electric buses. Though the investment cost for CNG buses is high, compared to conventional vehicles counterparts, the price of CNG is generally lower than petrol or diesel and increasingly stringent emissions regulations and incentives have widened it (Hagos, 2018). For electric buses, signs are emerging that lower fuel and maintenance costs are offsetting higher capital cost from the vehicle life perspective. Furthermore, electric engines in general are more energy efficient than those running on natural gas, providing still more incentives for fleet manager to consider switching to cleaner vehicle options.

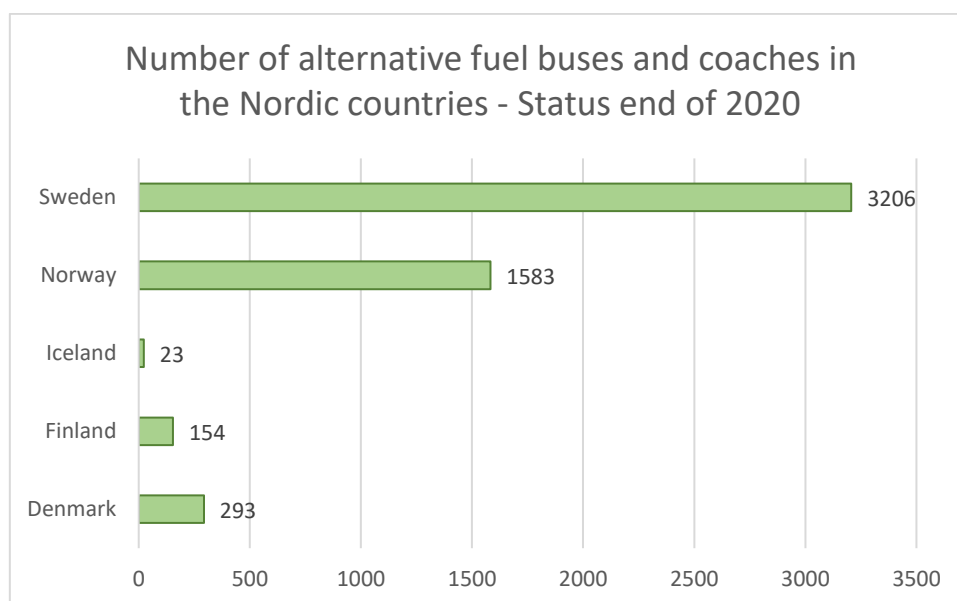


Figure 1 Number of alternative fuel buses and coaches in the Nordic countries (including battery electric, plug-in hybrid electric, LNG, CNG, and hydrogen) (Source: European Alternative Fuels Observatory, 2021)

For coaches, models using biodiesel and HVO are already available and the number of fully electric and electrically chargeable models is rising fast (European Automobile Manufacturers' Association, 2022). Bans on diesel fuelled vehicles coming into force in urban European areas in the next 5 to 10 years will prove to be a significant driver to accelerate the transition.

Comparison of different transport modes show that travel by bus or coach is indeed a clean transport alternative to the personal passenger vehicle, specifically with regard to emissions per passenger kilometer (Figure 2). This tends to be, however, a fact often overlooked in national transport policy. The Nordics could benefit from pushing this agenda among the public, specifically when it comes to

highlighting the individual and private sector contribution to the reduction of carbon footprint. After all, companies are the largest buyers of bus and coach tickets in many of the Nordic countries.

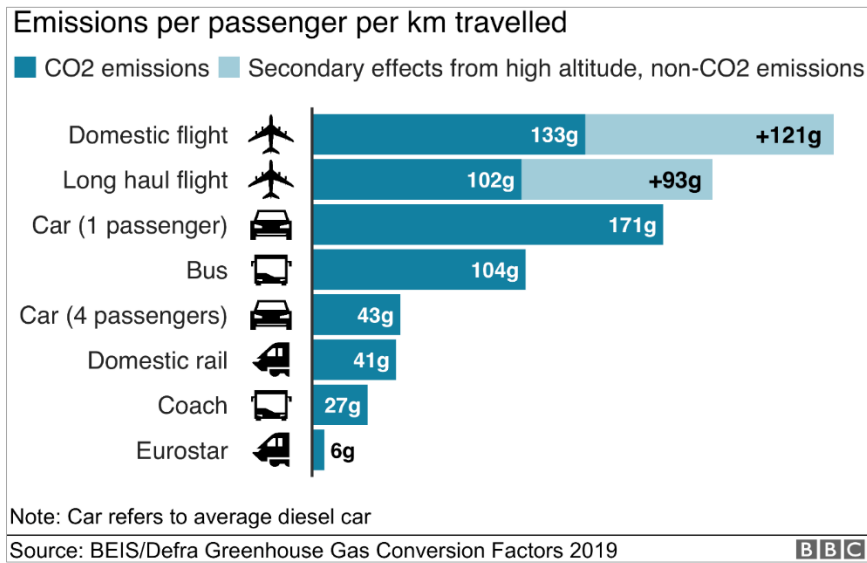


Figure 2 Emissions from different modes of transport (BBC, 2021)

### Fuels and energy carriers

In the coming years, and for batteries in particular, the price per kilowatt hour (kWh) for battery packs is expected to continue to decrease while the average energy density will most likely also increase with new chemistry, technology and development. Indeed in 2020, the average cost of a lithium-ion battery pack fell to USD 137 per kWh (Figure 3) and by 2023, average prices will be close to USD 100/kWh (BloombergNEF, 2022).

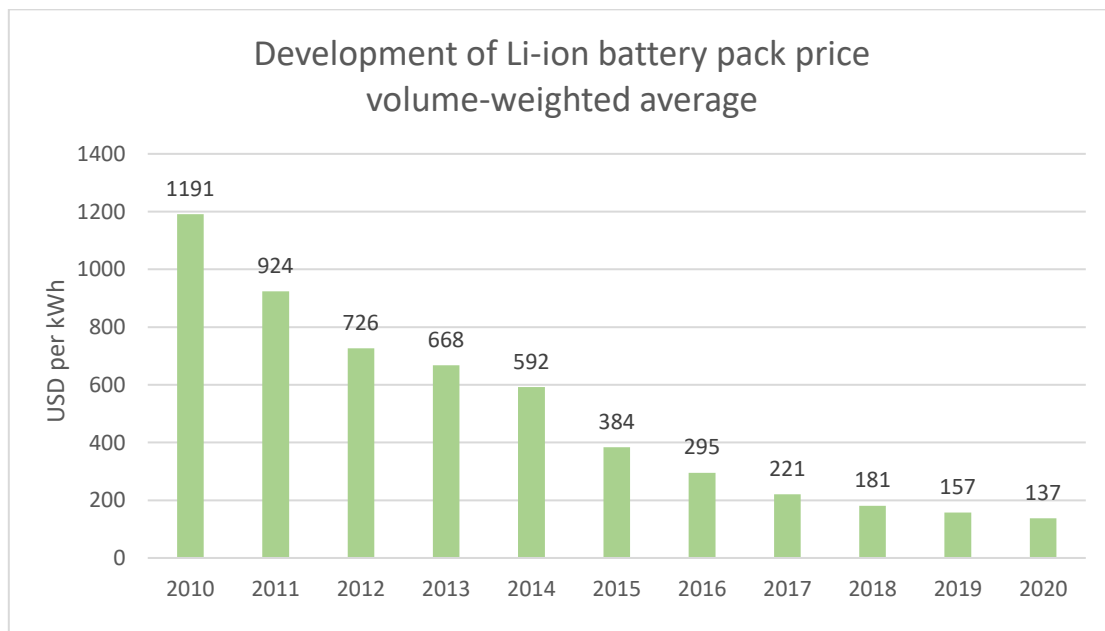


Figure 3 Development of Li-ion battery pack price, volume-weighted average (BloombergNEF, 2022)

The competitive price will allow for greater range, enabling more urban bus operators to go electric than before. This will also potentially push out fossil fuel heaters which are currently used in many electric buses today. Battery electric buses are very suitable for urban routes, city buses, small vessels and numerous applications.

As regards green fuel alternatives, biofuels and biogas will continue to be a feasible option in many of the Nordics as regional forests can supply biofuel from waste products. The choice of alternative for operators will depend on vehicle supply on the market, incentives to level pricing of fuel and investment cost, infrastructure and fuel availability. This broaches the subject of the next section, infrastructure.

For coaches in particular and also longer bus routes, hydrogen may become an economically viable solution as electric options could prove challenging for coaches. OEMs have indicated that battery electric coaches providing adequate luggage storage with range of 500 km will become available within 5 years. Though long haul coaches tend to cover distances of up to 1000 km between transeuropean destinations, regulation required rest stops for driver will provide charging opportunity at rest stops, given that widespread fast charging will be available at such locations.

### Infrastructure

The cost, scale of implementation and status of infrastructure for the various alternative fuels and energy carriers vary significantly between countries across the EU and also the Nordics. For the purposes of this report, the types in focus are biofuels (liquid and gaseous), electricity and hydrogen. Biofuels include CNG, biogas, biodiesels and bioethanols.

As regards location of charging or refuelling infrastructure for regional buses and coaches, conventional rest stops and depots would be most suitable, depending on type of fuel or energy carrier. Refuelling only during shift change or obligatory rest periods would be preferable but would rely on the range of buses operating on other fuels, such as biofuels or hydrogen.

For electric city buses, the infrastructure required can also be variable: trolley buses or trams draws power from two overhead wires, pantographs need one overhead wire for power, and then there is charging infrastructure. Charging for buses can be done via opportunity charger, flash charger or conventional fast charging.

Providing infrastructure for buses and coaches is expensive specifically for hydrogen and fastcharging. If the introduction of such fleets is to speed up governmental programs need to support such build up at a faster rate than currently being done. Here it is important to compare the TCO (total cost of operation) for the entire system before deciding on economics.

### Support and incentives for carbon neutral steps

Clear long-term government support is essential to the next steps in decarbonising the bus and coach sector. It may take the form of economic incentives, tax exemptions, public procurement practices, project funding or investment loans, to name a few.

Some examples on incentives to encourage and accelerate the uptake of alternative fuel buses and coaches in the Nordics include:

- ✓ Priority parking or stopping area centers for vehicles operating in full or part on alternative fuels at airports and other transport centers
- ✓ Zero emission zones in cities (restricted access for fossil fuel vehicles)
  - Noise reduced zones
  - More flexible service times
- ✓ Public procurement with preference for zero or low emission technology
- ✓ Funding and financing opportunities for zero emission vehicles
- ✓ Incentives based on total fleet emission reduction for operators

Further EU-wide emission reduction targets must go hand in hand with corresponding infrastructure ramp-up. In recent years, during the early introduction of alternative fuel vehicles, great pressure has been applied to vehicle manufacturers to increase vehicle efficiency, reduce emissions and increase production of low and zero emission vehicles of various sizes: passenger cars, trucks, buses, coaches, etc. However, the rollout of charging and refuelling infrastructure for alternative fuel vehicles has lagged behind.

The introduction of restricted zones in urban areas have proven challenging for bus and coach operators. Restricted zones are those where the municipality or city has set limits to the level of noise allowed, sometimes during a certain time of day, or implemented a lower speed limit or created a low- or zero emission zone<sup>4</sup>. Lower speed limits on motorways or streets have been introduced with some success, resulting in reduced fuel consumption and pollutant emissions within the speed restricted zone. This means by which to strengthen energy transition has, though, been effective in that operators must comply and are forced to consider options that allow them to enter restricted zones. Finally, regulations to compel fleet managers to reduce total emissions of fleet have been in discussion in several Nordic countries. These will an essential contribution to meeting EU CO<sub>2</sub> emission targets for 2025 and 2030. Regulation effectiveness would be strengthened when combined with a mechanism to incentivise the uptake of zero- and low-emission vehicles such as the super-credits system that applies for passenger vehicles (European Commission, 2022).

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<sup>4</sup> A low emission zone is a defined area where access by some polluting vehicles is restricted or deterred with the aim of improving air quality. A zero-emission zone (ZEZ) is a LEZ where only zero-emissions vehicles (ZEVs) are allowed. From Low-emission zone - Wikipedia. [https://en.wikipedia.org/wiki/Low-emission\\_zone](https://en.wikipedia.org/wiki/Low-emission_zone)



## Marine sector and tourism

### Introduction

The Nordics have been in the forefront of decarbonising the marine sector. Out of the five sovereign states, Norway has led clean energy vessel development, with the MV Ampère, the world's first battery electric car ferry, being launched in 2015 and the MF Hydra, the world's first hydrogen-powered ferry delivered in 2021. Furthermore, maritime vessels operating in the Nordics on LNG, biofuel oil, liquefied biogas and methanol have been in operation for up to a decade now.

Indeed, in May 2022, the Nordic climate and environment ministers agreed that the countries will collaborate to establish green corridors for emission-free shipping between ports within the Nordic region (The Nordic Council and the Nordic Council of Ministers, 2022). This is in line with previous ambitions for the Nordics to become the most sustainable region in the world, promoting the green energy transition and carbon neutrality.

The Nordics have pioneered projects demonstrating the use of various fuels for marine applications, such as LNG, methanol, hydrogen, biofuels, electricity. Finally, both MAN ES and Wärtsilä are in the development phase of ammonia engines for shipping with the aim to offer them before 2025.

The main focus of decarbonisation has centered on publicly operated passenger vessels and ro-ro vessels as well, in addition to larger types. The development of clean energy boats for touristic and recreational purposes has sailed under the radar as international decarbonisation urgency has risen. However, the implementation of NO<sub>x</sub> Emission Control Areas (NECA) and SO<sub>x</sub> Emission Control Areas (SECA) in the North and Baltic Seas have demonstrated the positive impacts thereof, resulting in significant improvement in coastal and port area air quality. Certainly, it is part of a European success story that must be continued.

The EU Green Deal was introduced in July 2021, heralding ambitious revisions to emissions targets of reducing greenhouse gas emissions (GHG) by 2030. Proposals having a direct impact on the maritime sector, including the EU Emissions Trading System (ETS), the FuelEU Maritime Initiative, and the Energy Taxation Directive (ETD), will nonetheless mainly impact vessels larger than those making up the bulk of Nordic maritime tourism. Thus it is important for the Nordic national and regional governments to address the issue of decarbonisation of the entire Nordic maritime sector and design measures by which to promote the uptake of alternative fuels, investment in related infrastructure and creating funding opportunities for early adopters of clean energy marine technologies. Further to the proposals



and on a more international level, the International Maritime Organization (IMO) has also considered strong policy measures such carbon pricing and obligatory reduction in GHG intensity of fuels.

Fundamental drivers for decarbonisation in the maritime sector include stricter emission regulations (though not applicable to all vessels), pressure from shipowners, the public and, in some instances, demands from investors. As mentioned in this report's introduction, the Nordic countries each have national ambitions towards carbon neutrality and some have set targets for zero emission shipping by 2050 on an industry based level.<sup>56</sup>

A large majority of touristic vessels is not directly affected by proposed measures by the IMO and EU, which only apply to ships above 5.000 GT and exclude a number of ship types such as yachts, offshore vessels, and fishing vessels. Nevertheless, the inescapable but progressive decarbonization of international shipping will, in the long-term, increase alternative fuel availability in Europe and the Nordics and thus affect marine vessels on a more local and regional level.

### Current status of alternative fuel vessels

The current status on the number of vessels registered in the Nordic countries and running on alternative fuels varies. The fuels in use so far include LNG, methanol, electricity (battery) and hybrid-electric. Ammonia and other e-fuels are among alternatives in the long term future; their use will be demonstrated in coming years. The types of vessels include chemical and oil tankers, offshore service vessels, ro/ro passenger ships, passenger ships. Table 2 provides a static insight into the current (2020) status of green energy vessels in the Nordics.

*Table 2 Number of registered alternative fuel vessels in the Nordic countries in 2020*

Denmark	Finland	Iceland	Norway	Sweden
13	2	2	66	19

Worldwide, the total number of ships at the end of 2020 came to 1102 vessels running on alternative fuels. A significantly larger number, 4554, currently utilises scrubber technology to meet global sulphur caps and SOx emissions regulations. Figure five below demonstrates the number of ships operating on different alternative fuels and on order in 2022.

<sup>5</sup> Norwegian shipping climate neutral by 2050. <https://rederi.no/en/aktuelt/2020/norwegian-shipping-climate-neutral-by-2050/>

<sup>6</sup> Denmark must draw the global transition of shipping. <https://www.danishshipping.dk/en/press/news/denmark-must-draw-the-global-transition-of-shipping#:~:text=Danish%20Shipping%20will%20therefore%20give,global%2C%20climate%2Dneutral%20shipping.>

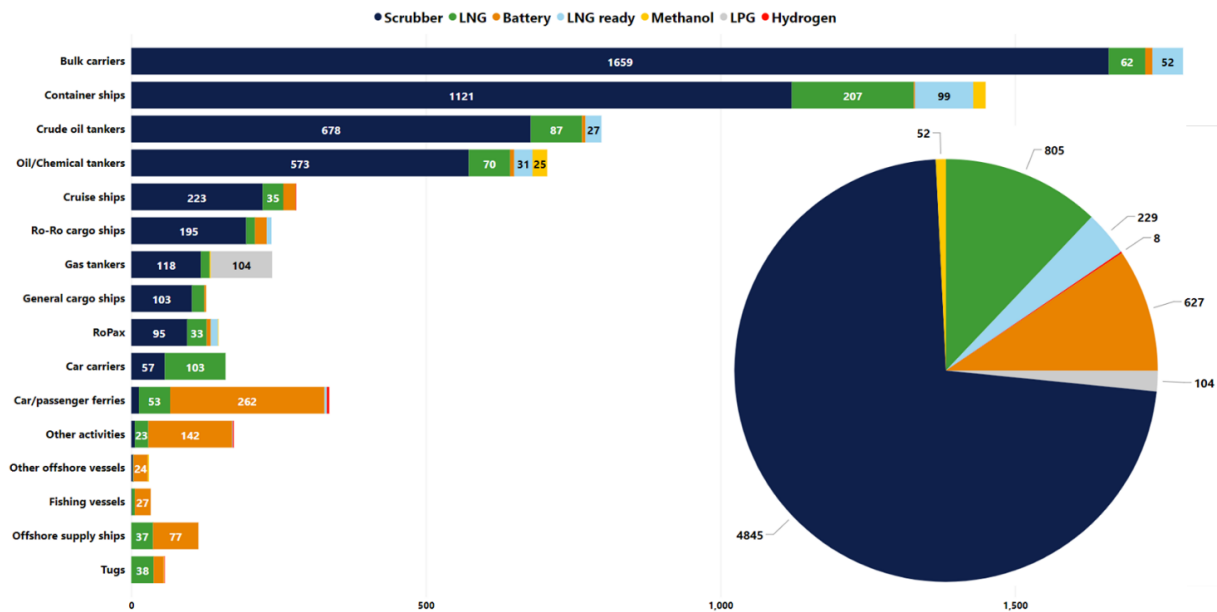


Figure 4 Total number of ships (in operation and on order) using alternative fuel vessels worldwide (DNV, 2022)

### Sustainable Tourism in the North – workshop on marine vessels

In October 2019, coinciding with Skärgårdsredarnas annual autumn meeting and exhibition in Gothenburg, the Sustainable Tourism in the North – Clean Energy project partners hosted a two hour workshop with key invited guests also attending the NordPass meeting and event. Participants, hailing from Denmark, Finland, Iceland, Norway and Sweden, represented tourist boat operators, national boat associations, tourist associations, ferry operators, NHO Sjøfart Norway, Blidö Sundsbolaget, Skärgårdsredarna, Suomen Matkustajalaivayhdistys. Three presentations guided the discussion, one from Hurtigbåtforbundet in Norway, another from Northsailing in Iceland and finally, the project manager introduced the project and presented issues to address. The group sought to answer the following questions and discuss the statements:

What is the alternative fuel status in each country?

Is the current policy favourable to increasing the utilization of sustainable/renewable fuels in the particular tourism sector?

Identify some of the barriers to increasing sustainable fuel consumption

Identify some opportunities or low hanging fruits to accelerate the development of clean energy tourist vessels

The interest in sustainable practices was evident among the group and many described measures already implemented and revealed the growing pressure from customers to choose green technology. However much work is to be done, with respect to attitudes and acceptance of green fuels, financing, government support, infrastructure deployment, fuel supply and bunkering and other practical issues. Technology supply is not an obstacle, but cost is. Green, environmentally friendly technology is available today, but most clean marine fuels are still produced at high cost and small scale.

However, the landscape for decarbonisation is changing for the better. Green, renewable and low- or zero emission fuel production is growing worldwide but at a gradual pace as many shipowners and operators wait, hoping for a clear fuel of the future winner, larger scale production, extended infrastructure networks and more competitive prices.

In general, touristic and recreational vessel operators run on a budget with little room for investment in new technologies. In the recent years, many Nordic operators have made efforts to reduce fuel consumption, as this is a major factor of expenditure. This comes easily for some ferry operators, who claim that in the past 20 years or so, ferries have been built equipped with unnecessarily large engines, making the utilisation of a fraction of the total output a simple measure to implement. A reduction of up to 20% can be achieved by reducing speed by 10% (also known as slow steaming<sup>7</sup>). Other measures include more sensible cruising, increasing propeller efficiency, propeller maintenance and even replacement with larger radius, proper weight distribution and hull cleaning.

Funding is a major obstacle to converting or retrofitting vessels to use low- or zero emission technology, a point that was discussed extensively during the project workshop. In Denmark for example, green marine projects seem to be driven by the private sector or EU funding, rather than government initiatives. The electric ferry Ellen in Denmark is one example.

Many operators reported that staff and some vessel passengers increasingly put pressure on touristic companies to embrace and create a more environmentally friendly experience. A key question is who is willing to pay for this transition as alternative fuels and low and zero-emission technology is typically more costly than fossil fuel counterparts. Is it the passenger, the investor, the shipowner, the operator or the government (incentives, investment funds, etc.)? In some cases this depends on the customer. One operator reported that some visitors who do research and book a tour ahead of time will choose the green, carbon-neutral tour over the conventional diesel-driven boat ride for an extra fee. However, another Nordic operator stated that none of his staff had ever received inquiries into the fuel the boat runs on or on the availability of a green alternative. This indicates that there may be a need for more marketing of low emission tours in addition to increasing awareness among the public and other passengers using these modes of transport and recreation.

Another driver for choosing to go green, related to customer attitude and preference, is to improve the customer experience. Running on a fuel or energy carrier than fossil fuel provides a journey free of noise, vibration, fuel fumes and particulates.

Summarising points discussed during the marine workshop provides an overview of the key issues and factors that require attention by different stakeholders.

### Fuels and infrastructure

It is clear that batteries can replace fossil fuels for propulsion on short-sea and coastal routes but e-fuels, hydrogen among others, will be required for longer distances and transatlantic shipping. Maritime battery system costs are going down, generally in the range of 500-1000 USD/kWh depending on chemistry and whether they are intended for retrofits or newbuilds (MAN Energy Solutions, 2019).

Currently, LNG is the fuel most readily and widely available on a global scale compared to other low and zero emissions fuels. Indeed LNG bunkering infrastructure is being developed to supply the growing fleet, however, though most of the LNG vessels in operation are passenger ferries (46 total) there are almost six times as many container ships and car carriers on order. As regards ammonia and methanol, it is generally assumed that existing terminals can be used for bunker vessels, with limited to no modifications to the terminal (DNV, 2022) but this remains to be seen. Figure 6 demonstrates

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<sup>7</sup> Slow steaming or ECO speed is the practice of significantly reducing the sailing speed to reduce fuel consumption. (Global Maritime Energy Efficiency Partnerships, 2022)

the worldwide spread of infrastructure for LNG, ammonia and methanol, both those already operational and decided.



Figure 5 Bunkering infrastructure in operation and decided for ammonia, LNG and methanol in 2022 (DNV, 2022)

For biofuel, smaller startup producers have struggled with scaling up due to high cost of certification thus preventing them from bringing the product to market. Investment or governmental aid may be required to aid this development.

Increased deployment of charging infrastructure must coincide with newbuilt and retrofit vessels utilizing batteries as a main sources of power. Furthermore, as more ports require ships to use onshore power connections, considerations regarding grid capacity and electricity taxation must be addressed.

A great majority of vessel operators linked to the Nordic tourism sector are small companies with limited investment capacity. As the number of low and zero emission fueled vessels such as cargo, container, cruise and other large scale ships continues to grow, so will the fuel infrastructure expand and strengthen. Fuel production will further increase, bringing prices down. This, in turn will make the transition for smaller vessel operators easier and more feasible, bringing down current barriers involving, cost, availability, CapEx and OpEx.

### Policy and incentives for carbon neutral steps

Stronger incentives for low and zero carbon technologies are needed to boost deployment thereof. In the absence of carbon pricing, alternative fuels will struggle to become competitive with fossil fuels. Its worth mentioning that fossil fuel for ships is usually not taxed like known on land. So it is actually only around half price (compared to fuelling a car). This makes the economic equation even worse. Coinciding with this, implementation of a phase out period for fossil fuel subsidies is becoming ever more urgent. It is reasonable to expect the introduction of carbon prices or market-based measures in shipping in the years closing in on 2030.

A reduced rate of taxation to electricity directly provided to vessels at berth in ports is likely to encourage decarbonization efforts with the increased demand and even obligatory use of onshore power systems.

Similar to urban low emission zones mentioned previously in context with bus and coach transport, restricted marine areas favoring clean energy vessels has also been demonstrated as a driver for emission reduction for shipowners. Norway has served as an important pioneer in that respect, as the Norwegian parliament adopted zero-emission regulations in the Unesco World Heritage fjords

Nærøfjord and Geirangerfjord. These are due to come into force by 2026 at the latest (NCE Maritime CleanTech, 2018). This could also be relevant in the growing aqua culture industry, i.e. zero emission ships within fjords servicing food production. Ports can also contribute to the Nordic energy transition. Increasingly, port authorities have been implementing environmental port indices enabling them to collect reported data on emissions and other factors from vessels and offer concessions to those demonstrating acceptable environmental performance.

Finally, there have been suggestions for the design and implementation of a funding mechanism such as the Norwegian NO<sub>x</sub> fund. In practice, this allows the taxed industry to pay a taxation rate per emission unit lower than proposed by the government directly into a fund, to which it may in turn apply for support to reduce that specific emission constituent.



Photo Credit: Anton Brink @ ruv.is

## Rental cars and tourism

### Introduction

Although tourism is an vital part of the economy in all the Nordic countries the car rental fleet is nowhere as important as in Iceland. This chapter therefore has a very Icelandic theme to it – as it is a good representative of what is needed to achieve real scale deployment of zero-emission vehicles in any rental fleet. However, there is a difference to usage of vehicles. In Iceland most of the tourists travel large distances and often on unpaved roads. This is not the case everywhere in the Nordics. Furthermore, for rentals catering to businesspeople traveling within Nordic urban areas, electric vehicles (EVs) might be a better fit than in Iceland. Nevertheless, the case of Iceland represents the obstacles relevant to a wider region than the high north rural regions. For the purposes of this section and report, the scope of investigation was limited to pure EVs only and the focus has been on the case of Iceland.

In general, the car rental companies in Iceland play an essential role regarding the renewal of the Icelandic car fleet as they purchase about 40% of all new cars sold annually in Iceland. Their fleet counts for about 10% of the total national passenger car fleet and total purchases have been around 5.000 to 8.000 units annually in recent years. These vehicles enter the used vehicle market after 18-36 months. If Iceland is to attain emission reduction by converting its car fleet to zero emission technologies, it is vital that car rental companies contribute to the development by drastically increasing the share of such cars.

More than half of tourists in Iceland (60% in 2018) travel via rental cars around the island (Government of Iceland, 2021). This places car rental companies in a very central role in energy transition, not only on a national level but also provides them with an opportunity to influence visitor purchasing behavior at home. At the beginning of the millennium the Icelandic government implemented vital vehicle purchase incentives for car rental companies to boost renewal of the fleet and support the tourism industry. This had the major effect of lowering the average lifetime of rental cars and had a significant impact on the tourism sector even today. All these incentives have now been revoked. A similar package may be needed to bolster further development in the sector.

### Current status of alternative rental passenger vehicles

As there is no comprehensive network or association of Nordic rental car companies in the Nordic countries, estimating the total number of alternative fuel rental cars is a challenge. Furthermore, the countries have quite different status with regard to use of public transport, passenger vehicles and



indeed ferries as mode of regular transport to geographical, historical, meteorological and cultural conditions, government support and general public mindset towards cars and other modes of transport.

There is still a limited variety of zero-emission vehicles that suit the needs of car rental companies and their customers as well as limited availability of vehicles. This is changing quickly: waiting lists will decrease as manufacturing volumes rise and more models offer sizable luggage compartments. Although car dealerships have had good access to EVs throughout the last decade due to Iceland's steady progress decarbonizing its fleet, car rental requirements for hundreds of cars in the variety needed within the next few years is almost insurmountable considering the international competition for every single EV. The driving range of zero-emission vehicles is still limited. Car rental customers tend to drive longer distances and most EVs do not cope with much more than 350 km range (without charging). The same customers are also hesitant to trust infrastructure, not forgetting that almost none of them have driven or charged an EV in their lifetime. There is also a great demand for 4x4 vehicles in Iceland which are currently not available as EVs suitable for highland driving.

Zero-emission vehicles do not have spare tires as the batteries take up much of the space. This is a very important issue as the condition of the roads in Iceland can be poor and customer travel in the car to very remote areas so when a tire is punctured it is very difficult to service the customer with a new tire unless with huge cost. Furthermore, the carrying capacity of many of the EVs is lower than that of conventional vehicles. Thus 3-4 persons including luggage can in some instances result in a total weight surpassing what an average EV is built for. Finally, charging cables can be lost and are a costly replacement.

Most of the car rental companies offer few EVs and plug-in hybrid electric vehicles (PHEV). However, the demand for renting, specifically pure battery electric vehicles, such vehicles is almost zero. A handful of domestic companies, outside of Reykjavik, rent such vehicles when visiting Reykjavik but demand from tourist is negligible. A non-EV owner is unlikely willing to travel and rent such a vehicle due to lack of familiarity with charging, range, etc. Currently, the only possible customers are therefore potential EV owners, which in 2021 numbered less than 12 million globally (Statista, 2022). Iceland also has mountain roads and pathways open in the summer and severe weather conditions often in winter which customers are not convinced that current EVs can cope with.

Zero-emission vehicle manufacturing price is currently significantly higher than that of comparable petrol or diesel vehicles. However, the car rental customer is not willing to pay a higher price for choosing the more environmentally friendly vehicle. The customer mostly sees rental cars as a generic product, booked online so daily rental price is very high as priority.

### [Sustainable Tourism in the North – workshop on rental cars](#)

The goal of the workshop was to identify possibilities to use zero-emission vehicles in the car rental fleet and identify the possible barriers for car rentals to increase their use and offering of zero-emission vehicles. The focus was on pure electric vehicles, but plug-in hybrids and hydrogen vehicles were also up for discussion.

The group sought to discuss and answer questions such as

What is the uptake status of low and zero emission vehicles as rental cars?

Is the current policy favourable to increasing the utilization of sustainable/renewable fuels in this particular tourism sector? Which policy measures would support the development?

Identify some of the barriers to increasing the share of EVs in the rental car fleet

### Identify some opportunities or low hanging fruits to accelerate the development

Participants described a market where demand for any alternative fuel vehicle is next to nonexistent thus requiring only a miniscule percentage of EVs as part of a rental car fleet. In Iceland, the competition in the sector is fierce and the operating environment involves only a handful of extremely busy weeks. During this period, time is of the essence and under current operating conditions, charging an EV as part of the handover process between customers is excessively time consuming. One solution to this barrier might be to make the customer responsible for returning the vehicles 80-90% charged, similar to filling up on fuel on a conventional vehicle. 70% of the year, Icelandic rental car fleet far exceeds the demand, which is not favorable to a supply of expensive EVs on the parking lot.

The challenge of energy transition of this particular sector, that is the deployment of infrastructure and uptake of EVs as rental cars must be a done as a collaborative effort, involving also utility companies and charging point operators. Equally important is the opportunity for the public sector to back the process and even accelerate it with clear, longterm policy measures and the provision of funding or financing. The following sections describe the key challenges to further electrification of rental car fleets and means by which to address the issues.

### Charging infrastructure

It is important to outline and analyze the cost structure of providing infrastructure for car rentals. Infrastructure will be vital to encourage car rental companies to increasingly offer and market EVs in large quantity. There are several topics that need to be addressed prior to further infrastructure rollout.

- ✓ **Cost of infrastructure (a few pathways need to be explored):**
  - Conventional charging. This means that it will take up to 12-24 hours to charge a vehicle if it is returned empty. The vehicle is therefore out of use during that time, so customers might have to pay an extra fee as the vehicle cannot be used while being charged. This is the cheapest solution, but still approximately one thousand plugs are needed.
  - Semi-fast charging. Will take 2-4 hours of charging and still creates complications servicing the vehicles. Relatively cheap solution but still hundreds of plugs are needed.
  - Fast charging minimum 100 kW. Still will take 30 min to recharge a vehicle. Makes it simpler for the companies to get the vehicles back into service. Still needs hundreds of plugs. Expensive solution.
  - Super-fast charging, i.e., 150 kW charging or larger. Could be a solution for the companies but would be extremely expensive to build up and still a very few vehicles can use such chargers.
- ✓ **Grid connections**
  - For conventional and semi-fast charging above it should be possible to use the current electrical grid without major cost.
  - For fast and superfast charging, it is very likely that considerable or major investment needs to be done to provide such infrastructure. Building hundreds of chargers 50-150 kW each would heavily affect the grid in the area and could demand major resources.
- ✓ **Infrastructure provider**
  - Car rental stakeholders do not foresee that it will be their role to construct charging infrastructure. Responsibility for infrastructure needs to be clarified, whether it rests with utilities, airport operators, municipality, government, or others.

Though this project has focused on electric vehicles, a real consideration should be done also regarding hydrogen. If thousands of cars would be deployed it might be cheaper to provide hydrogen as a fuel

for car rental vehicles. Currently they are not available in the quantity needed for and infrastructure is lacking, with only 2 hydrogen stations available in or around Reykjavik. However, looking a few years ahead, this pathway should be explored as a feasible, less costly solution as hydrogen production is scaled up.

### Keflavik airport layout

Keflavík airport operation is of utmost importance. During the summer around 1.500 - 2.000 cars are exchanged daily at the airport. Major development plans are on the horizon for the airport. The goal is to expand the airport drastically so currently the airport authorities have been working on new zoning plans for the area. Due to disruption of growth<sup>8</sup> this has taken longer than expected. The car rental companies do therefore not foresee where and how the future will be for them at the airport. Until this is clear no major infrastructure can be planned or built.

During 2019 more than 40% of all cars sold to private customers in Iceland were hybrid, plug-in hybrid electric vehicles, methane or zero emission vehicles. This shows that the conventional customer is moving away from fossil fuel vehicles towards eco-friendly cars. This has increased rapidly over the last few years as more clean energy vehicles are introduced to the market. This indicates that soon it might become increasingly difficult to resell conventional fossil fuel vehicles and therefore the price drop of such vehicles could penalize the resale value of used car rentals. This fact is an issue the car rentals are already considering and might strengthen the case for greater investment in hybrid and plug-in hybrids in coming years.

### Policy and incentives for zero emission cars

Recently the Icelandic government proposed incentives for renting out zero-emission vehicles, i.e. that they can be rented out without VAT, which increases their competitiveness in the market as they are still more expensive to purchase.

Rental car companies see plug-in hybrid electric vehicles as an important step towards zero emission rental cars, specifically in the next 2-3 years. The VAT exemption incentive for PHEVs was extended, to allow for 15.000 vehicles to enjoy the benefits thereof, instead of the former number of 10.000. Furthermore, rather than repealing the incentive, the maximum VAT refund amount will be reduced in steps in until the end of 2022. This will likely prove important to increasing the uptake of PHEV into Icelandic rental car fleets.

Infrastructure, specifically for EVs, is being built around Iceland providing service for the ring road and recently hotels and guesthouses have been offered financial support from the government to build battery electric charging on site. This infrastructure opens the pathway for tourists to drive around the island in a battery electric vehicle. With increased charging opportunities it also increases the chance that customers can charge the vehicle overnight at the last location they stay before departing Iceland and therefore the opportunity to leave the vehicle at a rental location with around +70% full charge, is vital for the car rental companies so that re-charging the vehicle (fill up for next customer) will take a shorter time.

Insurance companies provide rental vehicles to customers. If they prioritize to provide customers with EVs this could impact the use of the vehicles and open a channel for car rentals to take a slightly larger step, than they do today, into buying more EVs.

The car rental companies indicated that specific incentives might be brought forward regarding the overall emissions of their fleet. Already their fleet is getting better fuel efficiency and certain measures

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<sup>8</sup> Bankruptcy of WOW air, for example.

could be put in place that if they reach a certain overall reduction in CO<sub>2</sub> emission in the overall fleet incentives could be activated (income tax, reduction of import taxes, etc.). This could also be connected to the overall percentage of EVs in the fleet of a car rental company.

A major market campaign must be initiated by the government in order to highlight clean energy vehicles as transport options for the public and indeed for visitors. However, this cannot be introduced until many of the above-mentioned barriers have been overcome or at least partially resolved.

Overall, it is unlikely that major investment will take place in the car rental in the near future. The companies are overall positive toward greener technology, but a zero-emission technology remains difficult to sell and expensive to buy. Further work is needed to understand use cases for EVs as rental cars in Iceland and extensive expansion of the current charging network would establish grounds for zero-emission tourism around the country.



## Hospitality tourism

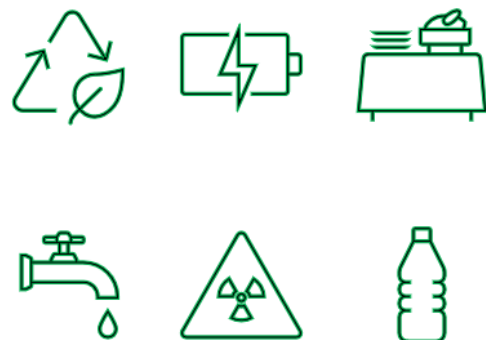
### Introduction

Sustainable Tourism in the North – Clean Energy, focused on transport in tourism and the sectors of rental cars, marine vessels and buses have already been covered in previous sections. The hospitality industry is a large part of the service industry with anywhere between five and eleven subsectors, including food and beverage; recreation, attractions, events, travel. Each of them plays an important role in tourism. The scope of the project was limited to covering hotels and accommodation under hospitality but to a slightly lesser extent than the transport sectors due to time constraints.

Increasingly, Nordic ministers for tourism and business have called for further cooperation on developing the Nordic brand (Nordic Council of Ministers, 2019) and the Nordics as sustainable destinations of pristine, unique nature. Moreover, strong suggestions have been made for the implementation of policies that allow for sustainable tourism development while maintaining steady visitor numbers (Øian, Fredman, Sandell, Sæpórsdóttir, & Tyrväinen, 2018). Policy design and implementation however, requires data and information as input for effective tourism development.

For the hospitality sector, the main tool for improvement and measurement of environmental performance has come in the form of green accounting and ecolabelling. Key performance indicators related to environmental factors include:

- ✓ Energy management (utilities expenses)
- ✓ Plastic and other resource consumption
- ✓ Water consumption
- ✓ Waste - Composting, recycling and reusing
- ✓ Carbon footprint of food
- ✓ Hazardous material and chemical use
- ✓ Air quality
- ✓ Vehicle and equipment fleet – efficiency, fuel



*Figure 6 Examples of environmental management factors monitored in hospitality industry*

Measuring resources utilization accurately is the first step toward analysis, management and progress. This applied to goods, services, employees and others operational elements has clear benefits, indeed

the adoption of certified programs of performance have brought about improvements across sectors and value chains.

Surrounding the growth of sustainable tourism, there has also been a trend to encourage visitors to extend their stay beyond the common few days. The objective is to reduce the carbon footprint related to airtravel per trip and encourage spending during the stay. In Iceland for example, the average traveller stays 4-5 nights at a hotel or bed and breakfast (Icelandic Tourist Board, 2022) and drives 1550 km over that time period (Rannsóknir og ráðgjöf ferðapjónustunnar, 2020). Over the last two decades, the tendency has been for an increasing number, up to three out of four visitors, to travel the country on their own, in a rental car rather than by coordinated group travel in a bus or coach. As visitors stay for longer, they are likely to get a better sense of the community and therein lies an opportunity to educate them. One can also argue for involving them in a carbon neutrality journey, for example by offering means by which to offset emissions generated during their stay, and even sharing tips on a more sustainable lifestyle for them to bring back to their home country.

### Sustainable Tourism in the North – workshop on hospitality

Similar to previous workshops focusing on other tourism sectors, this one brought together Nordic stakeholders to discuss opportunities and barriers to Nordic carbon neutrality in the tourism sector. Held in Oslo, representatives from the Icelandic Travel Industry Association, NHO Reiseliv in Norway, Visita (an industry and employer organization for the Swedish hospitality industry), MaRa the Finnish Hospitality Association, and Horesta, a tourism industry association in Denmark were present at the workshop.

Representatives agreed that the Nordics aim to strengthen Nordic market share as sustainable destinations and have each been seeking to increase the average number of overnight stays per trip. The mode of travel for visitors differs considerably between countries and depends on their origin as well. Norway for example has a total of 20.000 rental cars and an annual average of 6 million tourists while the Icelandic rental car fleet has reached 27.000 in the peak tourism year of 2018, during which over 2 million visited<sup>9</sup>. Thus, for travellers in mainland Scandinavia, a significant share drive their own vehicle to the destination rather than rent one.

Data driven marketing in tourism has been on the rise (Camilleri, 2019), and this has in turn made a meaningful difference in understanding visitor behavior and their purchasing patterns. Data analytics can help hoteliers to develop a strategy for improving revenue management, identifying important patterns and optimise marketing campaigns. As the focus on sustainable destinations continues to grow, data will also continue assist hospitality companies in finding the right customers and engaging them in their carbon neutral process.

Representatives highlighted the importance of Nordic cooperation: there is regional cooperation among Nordic tourist associations and industry based meetings on a regular basis. Hospitality stakeholders also cooperate through Hospitality Europe (HOTREC), an umbrella association for accommodation, restaurants, bars and cafés, bringing together 43 national associations across Europe. Finally, there is more focused regional cooperation on tourism, through the North Atlantic Tourism Association (NATA) for example, west Nordic countries Greenland, Iceland and the Faroe Islands.

### Ecolabelling and certification

Ecolabelling is a voluntary means of environmental performance certification and labelling applied worldwide. An ecolabel identifies products or services proven to be environmentally preferable within

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<sup>9</sup> This number refers to arrivals in Keflavik International airport. (Icelandic Tourist Board, 2022)



a certain category based on specific criteria and requirements. These generally help consumers identify and choose environmentally sound goods and services. The most widespread Nordic one is the Nordic Swan Ecolabel, also known as Svanen, and was established in 1989 by the Nordic Council of Ministers.

For tourism goods and services, there are different national level certifications such as Vakinn in Iceland,<sup>10</sup> Norway offers certification through Ecotourism Norway and Green Travel, Sweden has Naturens Bästa and others, Finland tourism works through Green Tourism of Finland (GTF) and EU and global labels and finally Danish hospitality mostly relies on Green Key. International ecolabels include ISO standards 14001 and ISO 21401 (and more), EU Eco-Management and Audit Scheme (EMAS), EarthCheck, Bio Hotels and Green Key (see figure 8).



Figure 7 Examples of tourism related ecolabels in the Nordics

Each of the Nordic countries has information available to tourists on ecotourism and means by which to travel sustainably and choose environmentally friendly services along the way. The maze of different ecolabels must however seem a jungle to those unfamiliar with relying on them on a regular basis. In this regard, Ecolabel Index can help prospective tourists on a global level. It is the largest global directory of ecolabels, tracking 455 ecolabels in 199 countries, and 25 industry sectors, including tourism. However, aside from the Nordic Swan which is strictly an ecolabel in itself, there is no central resource providing oversight for Nordic tourism goods and services which is easy to use, navigate and understand. Furthermore, there exists no digital tool supporting carbon neutral tourism and practices in travel, such as zero-emission transport options and comparison thereof, certified accommodation, carbon neutral recreation and tours, locally sourced food and so on. Rather there are booking apps that comprise travel sectors such as accommodation, restaurants and recreation and these may include means by which to filter for green or environmentally friendly services but there is no all-encompassing resource for planning a carbon-neutral trip to a specific country or region, such as the Nordics. Finally, calculating the carbon footprint of a complete trip remains a challenge for tourists. Thus, for visitors interested in enjoying a carbon neutral journey to and within the Nordic countries, they must do their own investigative and analysis work ahead of time, keeping track by their own means or tools.

### Policy for green hospitality

In Iceland, the government has allocated funding to support the involvement of the tourism sector in the national energy transition through the Energy Fund. So far, the calls have applied specifically to

<sup>10</sup> Based on work by [Qualmark](#), New Zealand tourism's official quality assurance organisation.

hotels and accommodation, restaurants, rest stops and tourist attractions and involved funding to purchase and implement charging points. The hospitality segment of tourism differs from transport modes discussed earlier in that it concerns services in stationary structures which are governed by national level regulations and permits for operation on a municipal level such as a business license, certificate of occupancy, food service permit, building health permit to name only a few. Furthermore guidelines for

Certification and ecolabeling is a voluntary undertaking by the operator and is not subsidised. For smaller enterprises the process can be cumbersome, and may appear a costly investment that does not provide tangible payback. Thus, one approach to incentivise SME's to get certified could entail financial support to lower the investment in taking the first step towards ecolabel certification.

On a Nordic level, the *Plan for Nordic Tourism Cooperation 2019-2023* (Nordic Council of Ministers, 2019) called for increased dialogue between Nordic policymakers, a harmonised regulatory framework for the Nordic countries, and strengthening methodologies for sustainable tourism strategies in the region. Previous policy analyses have taken a comprehensive approach for the tourism sector as a whole, for development and implementation of economic instruments such as entrance fees, concessions and licence permits with the objective to counteract the unprecedented increase in the number of visitors to the Nordics over the past 10-20 years (Øian, Fredman, Sandell, Sæþórsdóttir, & Tyrväinen, 2018). In this context, it is also worth mentioning Ragnheidur Elin Arnadóttir's Nordic Tourism Policy Analysis (Árnadóttir, 2019) which covered the topic of policy quite extensively.

## Digital Green Visitor Passport and Portal

Sustainable Tourism in the North - Clean Energy has had the main objective to identify means by which to accelerate the transition to carbon neutrality for Nordic tourism. In order to gather information, several workshops and meetings were held during the project period. Discussions have mostly centered on bringing knowledge from the private sector to the public sector to inform policy, but establishing a link between another focal point. The initial description of this project included some reflections on what type of information should be gathered from workshops during the project period. Questions project partners sought to answer were:

- ✓ How best to reach tourists through different digital and social media?
- ✓ How to encourage sustainable tourism with respect to energy options in transport?
- ✓ How to inform tourists on Nordic tourism programs and efforts related to sustainability, climate action and decarbonisation?
- ✓ How can we engage and involve visitors to the Nordic countries in our journey towards carbon neutrality?
- ✓ As leaders in renewable, green energy and clean technology, how can we share our experiences and best practices with visitors?

Throughout the project, the discussion on availability and accessibility of information on carbon neutral and sustainable tourism in the Nordics came up repeatedly. Stakeholders with ambitious plans for carbon neutrality and emission reduction cater to so-called early adopters or green tourists that prepare well for their trip and make smart and informed decisions based on research when choosing options for hotel, transport and recreation abroad. In order to get our visitors of all types on board, the project proposes as its main conclusion and recommendation: a digital green visitor passport and portal of information. The passport would take the form of an application , a program designed to assist and inform visitors to plan and experience a low carbon or carbon neutral trip to a Nordic destination.

## Objective

The application's main objective would be to serve as an information portal for visitors to enable and facilitate environmentally friendly choices for a trip to the Nordics. As a catalog, the app could contain and display current details on low and carbon-free solutions in the Nordic countries including transport modes, ecolabelled goods and services, economic incentives to choose green products or clean energy options and benefits for green visitors. Facts on progress made on a local, national and regional level towards carbon neutrality would serve as inspiration to visitors as would local sustainable practices to increase energy efficiency, reduce waste and water and resource consumption and choose clean energy options over conventional fossil fuels. Ultimately, the main goal of the initiative would remain to increase the use of alternative energy options in the tourism sector and increase visitor awareness of successful measures and steps in the Nordic journey to carbon neutrality.



Figure 8 The Nordic Digital Green Visitor Passport explained

## Mobile implementation

A dedicated website would host information on the initiative and relate the premises for the concept and application itself. Users could use the application to plan ahead of time and book services prior to arrival or use on the go for information at the destination. The app can track of the user's journey and offer points for choosing certified green travel options. It could serve simultaneously as a portal to booking and act as a resource for carbon neutral goods and services available within the region. The possibilities are numerous, including the option for the application to

- ✓ Provide information about green options in the vicinity (through location services)
- ✓ Educates the user on the history of renewable energy connected to each place (power production, district heating, clean energy in transport etc.)
- ✓ Hold or link to information on local food production and availability
- ✓ Hold or link to information on charging stations for electric cars
- ✓ Hold or link to information on Nordic Ecolabelled hotels and services
- ✓ Hold or link to information on ISO certified companies and services
- ✓ Maintain the status of points for each environmentally friendly solution user books or uses
- ✓ Offer the chance of sharing information and updates from the app to social media
- ✓ Provide an end result for carbon neutral points collected during a trip

- ✓ Provide information on how to offset emissions due to travel and other segments of the trip
- ✓ Run competitions between users e.g. over one month, over summer months, the lowest carbon footprint, most solutions utilized, etc.
- ✓ Create competition between participating companies - the most popular environmentally friendly product or the most shared on social media, the best newcomer, the most carbon savings, etc.

## Benefits

The advantages of involving visitors in the Nordic energy transition are manifold and wide reaching. Above all, there is the increased share of clean energy utilization in addition to the simultaneous reduction in fossil fuel consumption by rental cars, buses and coaches, touristic marine vessels and participating accommodation operators. The communication of sustainable practices would support increased environmental awareness of the public, service providers and tourists alike and perhaps appeal to a larger group of potential visitors interested in taking a sustainable, carbon neutral trip to the Nordics. There is also the benefit for tour operators and tourism stakeholders in general of participating in collective marketing efforts, attracting customers, and generating awareness of the Nordic brand as a sustainable destination. Finally, the creation and promotion of an application such as has been described here could only further highlight Nordic success and showcase Nordic clean technology and green energy options around the world.

## Stakeholders

For effective implementation and marketing of the product, bringing stakeholders from across tourism sectors and the public sector is essential. They include: National Tourist Boards, National Energy Agencies, Ministries for Environment, Climate, Energy, Tourism and Transport, National Travel Industry Associations, Digital Marketing Companies, Clean Energy Infrastructure Operators and Federations for Transport and Energy to name only a few.

The concept of a digital green passport was discussed widely with stakeholders during workshops, meetings and in communication on the project. The idea received positive feedback and much attention from the significant majority of players. Following the conclusion of Sustainable Tourism in the North, it will be presented among Nordic stakeholders in order to develop the concept further and enable its realization.

## Discussion

This report has aspired to provide insight into barriers Nordic tourism stakeholders face in working to reduce their emissions and reliance on fossil fuels, in other words, to implement proactive steps towards carbon neutral operation. It has discussed various policy actions and recommendations to accelerate the contribution of Nordic tourism to carbon neutrality. The report has detailed issues that key players in the focus sectors of rental cars, buses, boats and hotels have deemed urgent to tackle and opportunities to maintain Nordic leadership in energy transition to a clean energy future. Stakeholders participating in workshops brought different viewpoints to the table, supplied important knowledge and experience and demonstrated the Nordic willingness to set ambitions high.

Tourism has been high on the agenda of the Nordic Council of Ministers for some time as the economic impact of tourism has been immense and the Nordic countries are no exception there. Support for Nordic projects such as these has demonstrated the importance of Nordic collaboration and highlighted strengths. Ambitious targets must now be met through further action and funding schemes to support tourism stakeholders during the early stages and adoption of green energy technology until it can be scaled up significantly. This project alone has led to at least one spin-off project in Iceland

analyzing means by which to accelerate the electrification of the rental car fleet and was funded by the Icelandic Ministry for Environment and Natural Resources in 2020 (Icelandic New Energy, 2021).

Taking into account suggestions, made by stakeholders and recent policy analyses, to advance collaboration and strengthen the Nordic brand, the project partners are confident Nordic tourism will, under the auspices of the Nordic Tourism Working Group and other initiatives, continue to promote green growth, a circular economy and lead by example in our home countries.

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