Study of Norwegian's Socioeconomic impact in the Nordic Region

June 2025

Bright ideas.
Sustainable change.

Photo - Dimos Bstakis @norwegian_aviation

Executive summary:

Norwegian Supports Jobs, Trade, and Regional Ties in Norway, Denmark, Sweden and Finland. Meanwhile, its Emissions Underscore the Need for Careful and Balanced Climate Policy

As the climate agenda moves forward, aviation must change. However, when we discuss how to cut emissions, we must also understand what is at stake, not just for our industry, but for society. This is why Norwegian commissioned this report: to build a clear, data-based understanding of the value Norwegian creates for communities we serve.

The results are significant. In 2024, Norwegian's operations supported around 19,000 jobs and generated €1.6 billion in direct and indirect value across the Nordics. Beyond that, Norwegian's connectivity helps enable broader economic activity, including tourism, trade and regional cohesion, contributing to tens of thousands of additional jobs and over €12 billion in value. Much of this activity is closely tied to Norwegian's specific footprint, including its regional reach, workforce, and low-fare model, and may not be easily replaced by other carriers under current market conditions.

At the same time, the report acknowledge the environmental cost of aviation. This report estimates the societal cost of Norwegian's emissions and explores how policy instruments, including taxation, can support a transition to cleaner aviation.

The real challenge is not to choose between environmental responsibility and social value, but to pursue both. We believe that with the right policy framework and continued investment in sustainable aviation, this is possible.

We hope this report contributes to a more informed and balanced conversation, not just about aviation's footprint, but also about its footprint in people's lives.

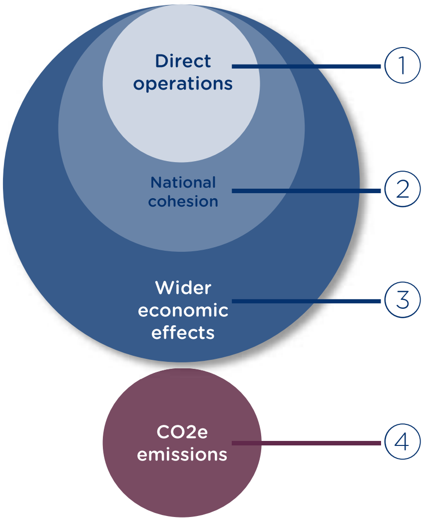
Assessing Norwegian's role in society requires a thorough analysis of both its contributions and its costs. Policy and taxation plays an important role in harvesting both the positive benefits of air travel and reducing societal costs from aviation activity

The analysis investigates the effects of **Norwegian's aviation activity…**

…. Where Norwegian's presence in the Nordics entails both societal benefits – with local value creation and facilitation of connections – and costs - especially in the form of emissions. With this input…

… We discuss aviation taxation and its role in decarbonization of aviation

Norwegian's aviation activity



① Through its **direct operations** Norwegian contributes to the Nordic economy, supporting jobs, paying taxes, and generating gross value added locally.

② By connecting regions within each country, Norwegian helps tie communities together. Such **national cohesion** enables people to access essential services, commute for work, and maintain ties across municipalities.

③ Norwegian's route network links the Nordics to the world, and facilitates **wider economic effects** such as trade, tourism, investment, and productivity.

④ For Norwegian, the **CO_2e emissions** from its flights constitute the most important societal costs from operations. Understanding these costs are an integral part of understanding the contribution of Norwegian to society

Aviation taxation and decarbonization

Taxation plays a key role in balancing aviation's benefits with its environmental costs. By pricing emissions and reinvesting in sustainable technologies, policymakers can support **decarbonization** while maintaining connectivity

Norwegian's pure company operations contributed with 19,200 jobs and 1.65 million € in GVA within the Nordics in 2024 – value that would not necessarily be anchored locally by other operators

Norwegian's **operations** are associated with **19,200** **Nordic jobs**

Direct effect

7,600

Norwegian staff

Indirect effect

11,600

Indirect through Norwegian's expenditure

… which contributes **1.65 Billion €** **in GVA**

Direct effect

650

Norwegian staff & profits

Indirect effect

1,000

Indirect through Norwegian's expenditure

***Note**: Figures are based on detailed company data provided by Norwegian and input output tables from each Nordic country's statistical authority. Data only includes Nordic effects – that is jobs and GVA produced within national boundaries of the Nordics.*

①

Direct operations

Job and GVA effects by country

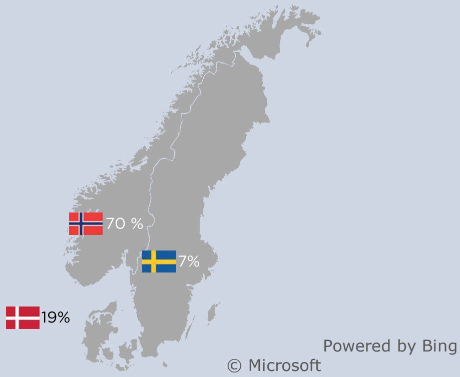
	Jobs	GVA Mio. €
🇳🇴	12,170	1,080
🇸🇪	5,350	430
🇩🇰	1,200	100
🇫🇮	450	40

GVA

Gross value added (GVA) is a measure of economic output that captures the value added by an activity, sector, or company to the economy. It reflects the difference between output and intermediate consumption. GVA is conceptually close to GDP: GDP = GVA + taxes – subsidies on products

Norwegian facilitates value beyond its operations. Norwegian facilitates 70% of domestic routes in Norway, 19% in Denmark, and 7% in Sweden – supporting national cohesion within the countries

Norwegian serves a significant share of domestic flight routes in Denmark, Norway and Sweden



Note: Figures are based on estimates using official commuting flow data, travel-time distances between municipalities (by car and air), and population-weighted municipal centroids. For full details, see the main report and appendix.

Regional integration

The **average travel times** across the countries decrease significantly in the presence of domestic air routes.

Accessibility to essential services

Travel time to a University hospital is more than 1 hour faster by air for **514,000** Norwegians and **223,000** Swedes. This translates into significant time savings for the group

Accessibility to job opportunities

Air travel enables 0.5-2% of the workforce to reach their workplace within 3 hours – something many wouldn't have been able to within the same time by car

2

National cohesion

Average time reduction with air connectivity between municipalities compared to road only

🇳🇴	33%
🇸🇪	18%
🇩🇰	2%

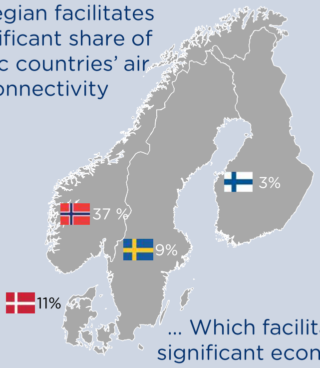
Average time saved to a university hospital for remote municipalities, where air is a feasible travel method

🇳🇴	3 hours
🇸🇪	2 hours
🇩🇰	-

Increase in commuters able to reach place of work in less than 3 hours with air compared to road

🇳🇴	57,700
🇸🇪	49,000
🇩🇰	16,700

Norwegian facilitates wider economic effects in the Nordics. Total estimated value facilitated by Norwegian is 12.7 billion in GVA and 100,000 jobs – by supporting Nordic connectivity



Norwegian facilitates a significant share of Nordic countries' air connectivity

... Which facilitates significant economic value in the Nordics

100,000 jobs

... equal to 7 out of 8 persons working in Trondheim, Uppsala, Odense or Turku

15% in tourism industries

12.7 Billion €

... In GVA - equal to the entire value added of the Nordic countries in 3 days

③

Wider economic effects

Job and GVA effects by country

	Jobs	GVA Bn. €
🇳🇴	53,000	7.7
🇸🇪	25,500	2.6
🇩🇰	16,000	1.9
🇫🇮	5,000	0.5

GVA

Gross value added (GVA) is a measure of economic output that captures the value added by an activity, sector, or company to the economy. It reflects the difference between output and intermediate consumption. GVA is conceptually close to GDP: GDP = GVA + taxes – subsidies on products

Value comes from

Trade

Tourism

Investment

Productivity

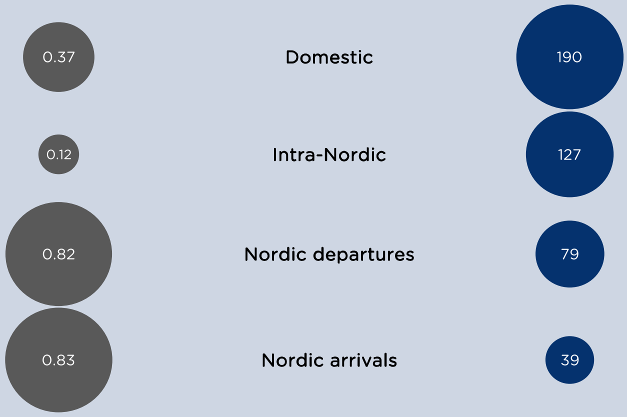
Norwegian flights emitted 2,14 Mio. tons of CO2e in 2024. Taxation seeks to internalize the costs of these emissions, with differing costs of emitting across the Nordics

Airplanes emit CO2e when combusting fuel, and Norwegian's planes are no exception

… But Norwegian also pays a price for its emissions – through passenger- and emissions taxes. Large differences exist across routes

Norwegian's CO2e emissions
(Mio. T)

Norwegian's average carbon price*
(€/ton CO2e)



Full EU-ETS carbon price
(€/ton CO2e)

70

Societal costs of emissions are the same regardless of emitter. Norwegian pays a high effective carbon tax, compared to the EU wide ETS system

***Note**: Norwegian's carbon price is estimated from actual flight paths and calculated for the first half of 2025. The assumed ETS price includes an allocation of free allowances in 2025, which will be phased out in coming years. For passenger taxes, a load factor of 85% is assumed.*

④

CO2e emissions

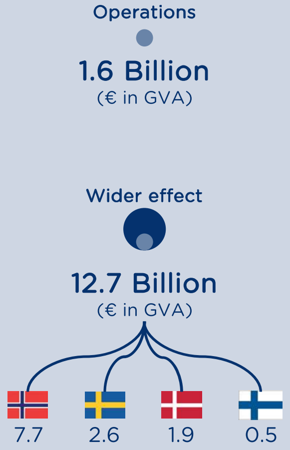
The estimated societal costs of Norwegian's emissions depend on cost estimate used. We apply a range between 59€ (low) and 210 € (high)

Estimated societal cost of Norwegian's emissions

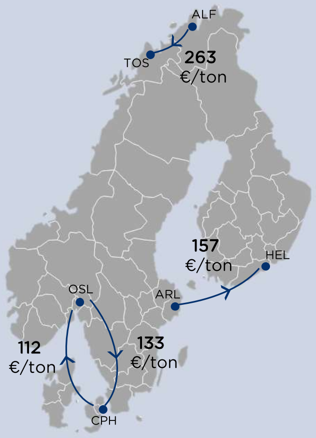
Significant parts of costs are internalized through taxation

Where does that leave aviation emissions regulation and taxation?

The value facilitated by Norwegian's routes is significant



While local taxation rules place a comparatively high and heterogenous tax burden on Nordic air travel



Decarbonizing aviation is a key priority. Taxation is an important instrument, but it must balance climate goals with the socioeconomic benefits of connectivity.

1

Taxes on *air travel* increase ticket prices but do not incentivize airlines to reduce emissions. This may lead to inefficient decarbonization and reduce the societal value of connectivity.

2

Taxes on *air emissions* raise airlines' operating costs in proportion to emissions, encouraging airlines to adopt cleaner technologies and practices. This supports more efficient decarbonization while placing less strain on connectivity.

3

Revenue from aviation taxes can be reinvested in green aviation (e.g. Sustainable Aviation Fuels). This creates the potential to reduce emissions without sacrificing the positive effects of air connectivity.

Emissions-based taxation, combined with targeted reinvestment in clean technologies, offers a robust strategy to reduce emissions while preserving connectivity, generating a net societal gain.

Preface

As the climate agenda continues to shape public policy, aviation finds itself at the center of a complex debate. On one hand, there is strong political pressure to reduce emissions from air travel - especially in the Nordic countries where environmental goals are ambitious. On the other hand, aviation plays a vital role in connecting communities across vast distances and challenging geography. It supports mobility, tourism, business activity, and regional development. In this context, aviation is not just a means of transport, but part of the infrastructure that holds society together.

This study focuses specifically on Norwegian and Widerøe - two airlines that together play a critical role in maintaining regional, national, and international connectivity across the Nordics. Norwegian, as one of the largest aviation operators in the region, is uniquely positioned to support both economic resilience and the transition toward a more sustainable aviation sector. Widerøe, meanwhile, maintains vital links to remote communities – also through Public Service Obligation (PSO) routes.

The purpose of the report is to provide a clear, data-driven picture of how Norwegian's aviation activity (referring from here on to both Norwegian and Widerøe) contributes to societal value in the Nordics[1]. This includes not only direct economic effects such as employment and gross value added, but also the broader societal impacts of connectivity, from tourism to regional cohesion, labor market integration, and trade. These findings are intended to inform future decisions on regulation, taxation, and investment, ensuring that aviation's role in supporting economic and societal resilience is considered alongside climate goals.

The Nordic region illustrates this tension particularly clearly, where world-leading climate ambitions coincide with a strong societal reliance on air connectivity. This makes the region a compelling test case for how aviation can evolve to serve both people and planet.

The analysis follows a step-by-step framework, moving from the most direct effects to broader societal impacts and environmental cost. This is illustrated in the figure below, which serves as a roadmap for the chapters that follow.

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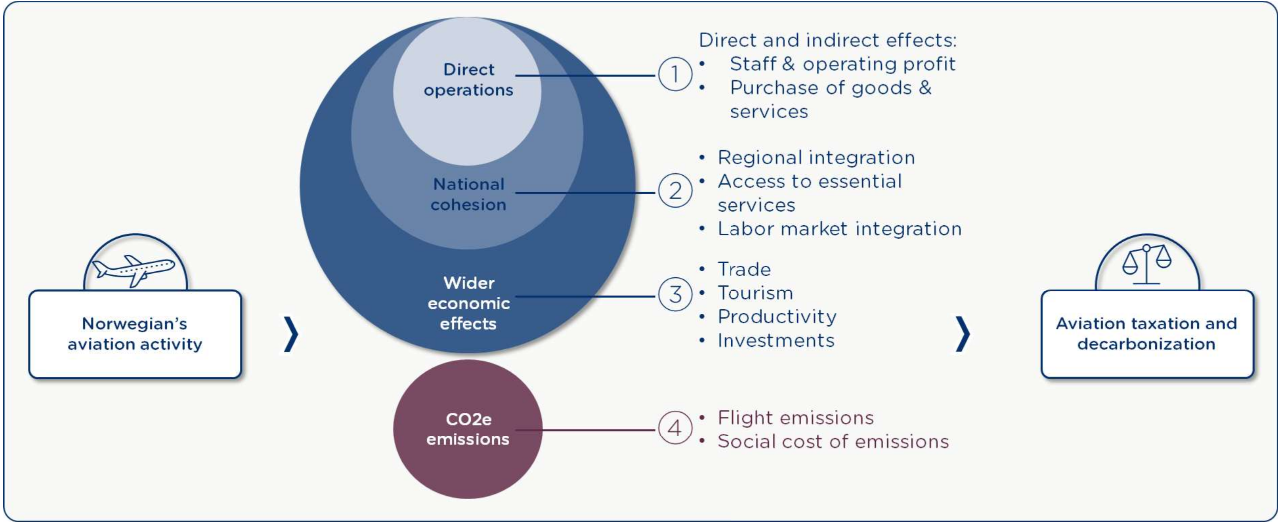
[1] Norwegian also has significant operational activity outside of the Nordic countries, especially in Spain and Latvia. For the purpose of this report, such value is not included due to the report's Nordic scope.

Figure 1: From Activity to Impact: How Norwegian Creates Societal Value

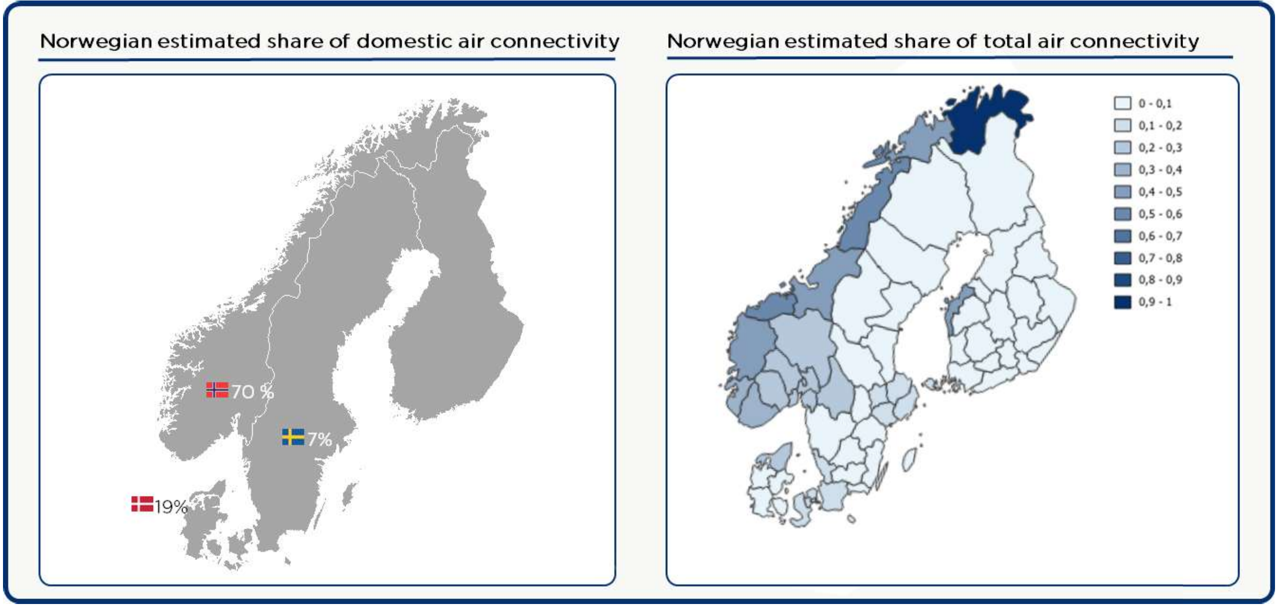


Notes: The figure illustrates the roadmap used throughout the report

Norwegian's Role in Nordic Aviation

Norwegian operates a broad network of short-haul, point-to-point routes, while Widerøe connects remote communities, often through publicly supported PSO routes. Together, these operations contribute to everyday mobility and help sustain regional development across the Nordics. Norwegian thus provide a significant share of the air connectivity that links regions both domestically and internationally. Focusing first on domestic routes, the left panel of Figure 2 shows that Norwegian offers approximately 70% of all domestic air connectivity in Norway, with smaller shares in Denmark (19%) and Sweden (7%). When turning to Norwegian's share of air connectivity to all destinations, defined in chapter 3, regional differences exist. The share is highest along the west coast of Norway, where Norwegian supplies more than 50% of all air connectivity to any destination, while all four Nordic countries have regions, where Norwegian accounts for more than 25% of all air connectivity in the region.

Figure 2: Estimated share of domestic and total connectivity from Nordic airports by Norwegian. 2024.



Notes: Connectivity shares based on Norwegian data, Eurostat and web-scraping of public flight websites.

Report Outline

In Chapter 1, we establish the most direct economic value generated by Norwegian. This involves taking a closer look at the effects of Norwegian's operations, including employment and overall value added in the Nordics that is produced by Norwegian in the region. This chapter thus showcases a very tangible part of Norwegian's value creation, namely the value the company directly creates through its employees and operations.

In Chapter 2, we broaden the perspective to explore how aviation supports national cohesion and societal value in the Nordic countries. We examine how Norwegian's domestic routes contribute to factors such as labor market participation, access to essential services, and connectivity across geographically dispersed regions. By doing so, we move beyond direct economic metrics to highlight the wider social role Norwegian plays in linking people and places, reinforcing that the airline's value extends well beyond traditional business operations.

In Chapter 3, we expand the perspective to estimate the total socioeconomic benefit facilitated by Norwegian's operations. While the previous chapters examined the direct value generated by Norwegian's activities and the broader social benefits of domestic air connectivity, this chapter brings all effects together and add an international dimension to give a single quantitative estimate of Norwegian's contribution.
We assess how Norwegian's route network enhances connectivity between Nordic regions and, in turn, supports value creation through mechanisms such as trade, investment, productivity, and tourism. The idea is that connectedness enables regions to specialize and interact more efficiently. These benefits are ultimately reflected in key economic indicators such as gross domestic product (GDP) and gross value added (GVA). Using Norwegian's contribution to regional air connectivity as a reference point, we estimate

the proportion of this overall value that can be attributed to the airline. Given Norwegian's relatively large market share of Nordic departures, the company plays a major role in facilitating these wider economic effects.

In Chapter 4, we examine the societal costs of aviation, focusing on the environmental impact of Norwegian's operations. We assess emissions from their flights, quantify the associated externalities, and estimate the resulting societal costs.

Finally, in Chapter 5, we explore the role of taxation as a tool for decarbonizing aviation. We assess the efficiency of different tax instruments applied to Nordic flights and examine how tax revenues can be allocated to support sustainability while maintaining connectivity. By analyzing both the behavioral incentives created by tax policy and the long-term use of revenues, the chapter adds an economic policy lens to the analysis. It brings together value creation and environmental responsibility in assessing Norwegian's role in a sustainable Nordic society.

Contents

Reader's guide

Throughout the chapters of this report, we make use of three types of boxes to support the main text. These boxes are used to either provide additional methodological detail, present use-case examples, or show key figures and results.

They are designed to give the reader easy access to supporting information without interrupting the flow of the main narrative. The report can be read and understood without reading every box, but they offer useful context and added insight for those who want to dive deeper.

Light blue boxes provide methodological notes and assumptions.

These sections provide deeper insight into the data sources, estimation techniques, and analytical choices that underpin the results presented in the main text. While the report can be read and understood without referring to these boxes, they are included for readers who wish to explore the technical foundation behind the findings. In short, they provide transparency and context for those seeking a deeper understanding of the methods used.

Dark blue boxes provide use-case examples

These sections provide examples of the presented results to provide context and ease interpretation. The examples complement points made in the main text, but also provide standalone cases for the value facilitated by aviation and Norwegian.

Light grey boxes include figures and graphs with main results

These sections provide graphical representations of the main results, the mechanisms through which effects occur, and additional context. Each chapter also includes a summary box highlighting key findings in a consistent format. Together, these sections present the core figures and outcomes derived from the analysis

1. The Direct Economic Contribution of Norwegian's Operations

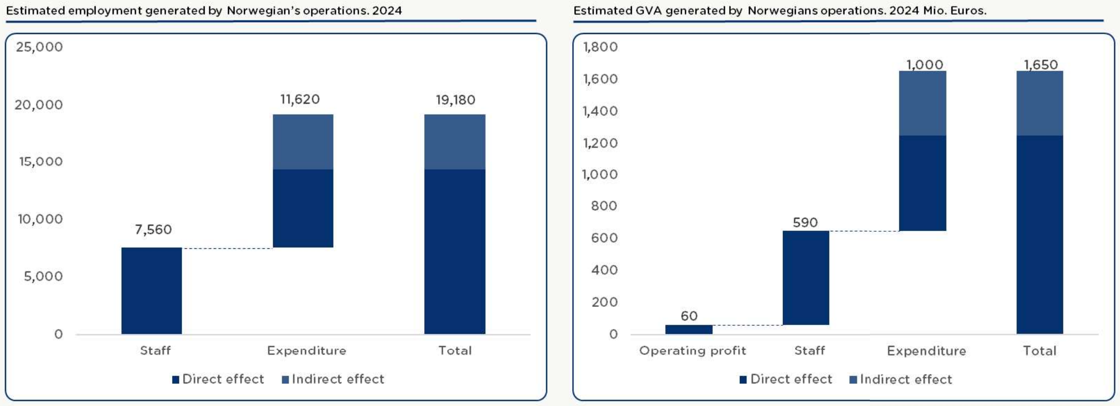
Like any business, Norwegian contributes to societal value through its core operations. It employs people, purchases goods and services, and generates economic output. While these contributions are not unique to aviation, they form a vital part of Norwegian's overall impact on the Nordic economies. Because the company's operations and workforce are largely based in the region, much of their value, through wages, procurement, and business activity, accrues domestically. This is particularly relevant in a sector where many actors operate across borders and may not anchor the same level of local economic impact. Due to Norwegian's significant coverage across local regions in the Nordics, this also means that Norwegian plays a unique role in sustaining economic activity beyond major urban centres.

While later chapters in this report examine broader societal effects, such as mobility, cohesion, and trade, this chapter focuses on the immediate and measurable value created simply through Norwegian's presence as a business. Specifically, it covers the employment generated directly and indirectly through Norwegian's operations, and the gross value added (GVA)[2] these activities produce. GVA reflects the company's contribution to economic output by capturing the value added to goods and services, while employment figures highlight Norwegian's role in supporting jobs and incomes across the region.

Summary: Chapter 1

Norwegian generates gross value added (GVA) and employment across the Nordics through multiple channels. Direct GVA and jobs arise within the company's own operations, while indirect effects are created through Norwegian's purchases from subcontractors and service providers.
We estimate that Norwegian's operations are associated with approximately **19,180 jobs** and **1.650 billion Euros** in GVA across the region. The largest share of both jobs and value is located in Norway, with around 12,000 jobs and 1.1 billion Euro in GVA. In Sweden, Norwegian supports about 5,400 jobs and 430 million Euro in GVA, primarily through indirect effects linked to procurement. In Denmark and Finland, Norwegian sustains an estimated 1,200 and 450 jobs respectively, mainly through locally employed staff.

Figure 1.1: Employment and GVA produced by Norwegian. 2024.



Note: Based on detailed expenditure data provided by Norwegian, and National input-output tables. See also box 1.

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[2] Gross value added (GVA) is a measure of economic output that captures the value added by an activity, sector, or company to the economy. It reflects the difference between output and intermediate consumption. GVA is conceptually close to GDP and forms its core: GDP = GVA + taxes – subsidies on products. In this report, GVA is used to quantify Norwegian's contribution to economic activity, as it isolates the value generated by the company and its supply chain, independent of fiscal policy effects.

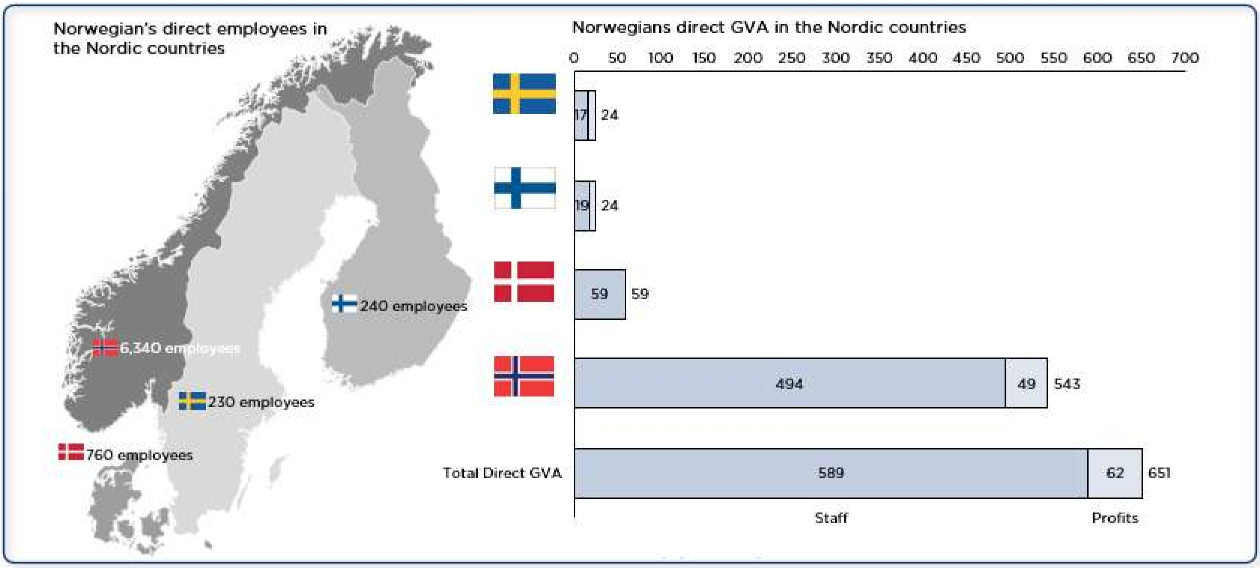
It is important to note that this report does not assume that all value linked to Norwegian's operations would disappear in the company's absence. Some of the effects described could, in principle, be recreated by other operators under different market conditions. However, Norwegian's current presence in the Nordic market, particularly its regional coverage, brand recognition, and low-fare model, suggests that these contributions are not easily replicated and would not necessarily remain anchored locally.

1.1 Direct value created within Norwegian

In general, the value generated by Norwegian in the Nordics can be estimated using either a top-down or bottom-up approach[3]. We apply a bottom-up approach, which estimates the economic value of Norwegian based on detailed company data - namely employee compensation, operational expenditure, and operating profit across the Nordics. This allows for an accurate and geographically specific analysis of where value is generated, since we can trace how Norwegian's operational revenue is translated into economic value in the specific geographies.

The first and most tangible value created by Norwegian in the Nordics is through their Nordic workforce. The left side of Figure 1.2 shows Norwegian's Nordic employees as of December 2024.

Figure 1.2: Norwegian's direct employees and GVA in the Nordics. 2024.



Note: Data provided by Norwegian. Employees (headcount) as of 31-12-2024. Employees based outside the Nordics not included.

Norwegian employs 7,570 people across the Nordics. 6,340 of these are based in Norway, 230 in Sweden, 240 in Finland and 760 in Denmark. This workforce spans a wide range of roles, including pilots and aircraft technicians, cabin and ground crew, as well as administrative personnel. Due to the seasonal nature of the aviation industry, the total number of employees typically increases during peak travel periods.

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[3] A top-down approach typically estimates economic impact using aggregate sectoral averages, applying multipliers to high-level company figures such as total revenue or employment. A bottom-up approach, by contrast, builds the estimate from detailed internal data, such as compensation, procurement, and operational costs, allowing for more precise, geographically specific results.

While the roles of the employees vary, they all contribute directly to socioeconomic value creation in the Nordics, value that would not necessarily be captured if the same services were delivered by foreign operators without a local base. Job creation itself carries social value, but it also translates into measurable economic output. Stylistically, the gross value added of an employee consist of the sum of the wage paid to the employee plus any company profits from this employee's labor[4]. The direct value contribution of Norwegian through these channels is shown on the right side of Figure 1.2. The largest component, employee wages, amounts to approximately €590 million in GVA in 2024.[5]

The second component of direct economic value generated in the Nordics is Norwegian's operating profits. Since the company operates with a profit margin, these profits accrue to its owners and contribute to regional value added. In 2024, this amounted to approximately €60 million in GVA in the Nordics, based on estimates of company ownership[6].

In total, Norwegian produces significant direct regional value in the Nordics. More than 7,500 employees are directly employed in the Nordics by Norwegian. These employees generated €650 million in GVA in 2024. This GVA figure consists of 590 million € in employee wages in the Nordics and a 60 million € profit margin accruing to Nordic owners. Together, these two components—operating profits and wages—constitute the company's direct contribution to GVA in the region.

1.2 Indirect value through expenditure on goods and services

In addition to its direct workforce, Norwegian generates employment and economic value through its spending on goods and services. This includes purchases from suppliers such as maintenance providers, catering companies, and airport handling agents. A significant share of Norwegian's revenue flows into these supply chains, supporting jobs and value creation indirectly across the Nordic economies. We call such effects indirect effects of Norwegian's operations.

The method used to estimate these indirect effects - by tracing Norwegian's operational expenditure across sectors - is described in Box 1.

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[4] Depreciation of assets are handled under expenditure on goods and services

[5] From a national accounts' perspective, the direct gross value added of an employee is equal to the renumeration that employee receives. The compensation to Nordic employees by Norwegian was 589 Mio. € in 2024 (Norwegian annual report, 2024).

[6] Since Norwegian is listed as a company on the Oslo stock exchange, the ownership of the company is international by nature. We estimate the Nordic ownership share of the company to be approximately 55% based on the 20 largest shareholders (Norwegian annual report, 2024). Actual share of Nordic ownership might not be exactly equal to the estimated share.

Box 1. Estimating indirect value from company expenditure

This section describes the methods used to quantify the indirect effects of Norwegian's operations on employment and gross value added. For the analysis, Norwegian has provided detailed cost breakdowns within the company across different expenditure types and countries. This includes fees paid to airports, fuel expenditure, administration, buildings, depreciation of assets and so on.

The method to calculate employment and GVA from this expenditure is based on national statistical Input-Output (IO) tables for all four Nordic countries.

The IO-tables track flows of goods, services, and labor between industries across the economy and provide a detailed, structured overview of how sectors are interconnected. They show how much each industry buys from and sells to others to produce its output. By linking production, income, and employment data, IO tables make it possible to trace how activity in one industry generates ripple effects across others.

The first ripple effect generated by Norwegian is within its direct subcontractors. When Norwegian purchases baggage handling at an airport or fuel from a supplier on the runway, this supports jobs and value added for these subcontractors. Next, these subcontractors also require input from their subcontractors – e.g. manufacturers of baggage trolleys or oil refineries. All of these ripple effects are captured in so called multipliers – indicating both the number of jobs created at Norwegian's subcontractors and the companies providing input to these subcontractors.

By applying the multipliers from the input-output (IO) tables to Norwegian's spending across different sectors, we estimate the number of jobs, and the amount of gross value added (GVA) supported by this expenditure. In practice, this involves "shocking" the IO tables, that is, modelling how demand for goods and services from Norwegian creates ripple effects throughout the economy.

To ensure accuracy, we have adjusted the data to include only spending that can reasonably be expected to benefit suppliers within the four Nordic countries. Further methodological details are provided in the supplementary material.

Using the country-specific multipliers derived (see Box 1), we estimate that Norwegian's expenditure on goods and services support approximately 11,600 jobs across its supplier network in the Nordics. This includes 5,850 jobs in Norway, 5,120 jobs in Sweden, 450 jobs in Denmark, and 210 jobs in Finland, as shown in figure 1.3. These jobs are not directly employed by Norwegian but are sustained through the company's operational demand for goods and services. The estimate *excludes* induced employment effects arising from employee consumption, which would provide additional job effects.[7]

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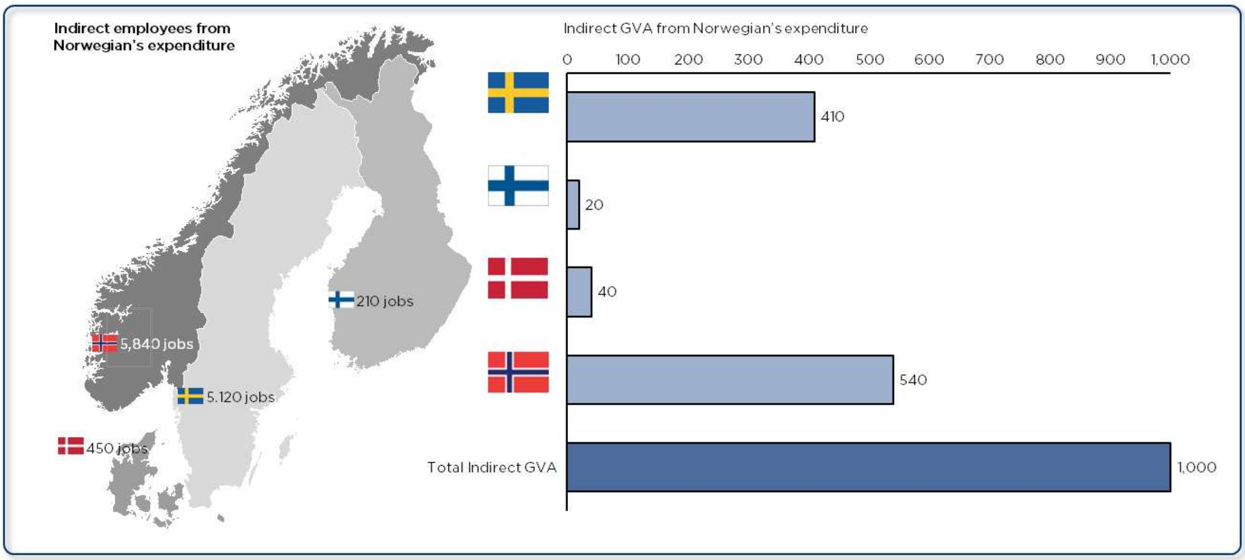
[7] Induced employment effects refer to additional jobs created when employees spend their wages in the wider economy (e.g., on housing, food, or services). These effects are not included here, as they assume that such spending—and the resulting jobs—would not occur without the initial employment, which may overstate the net impact.

Figure 1.3: Indirect employment and GVA from Norwegian. Jobs and Mio. € (2024-prices).



Notes: Estimations based on national Input-Output table and data from Norwegian. Figures are rounded, and might not sum to the total shown.

The right panel in figure 1.3 presents the country-specific breakdown of total indirect GVA occurring from Norwegian's expenditure. Significant GVA is created, especially in Sweden (410 million €) and Norway (540 million €). Although smaller, 40 million € is sustained in Denmark and 20 million € in Finland. The relatively large difference in job creation across countries reflects differences in both aviation activity (e.g. number of routes), and the placement of significant expenditures in specific countries. The total estimated gross value added created by Norwegian's expenditure is approximately 1 billion €.

2. National Cohesion and Mobility facilitated by Norwegian

In this chapter, we broaden the perspective to examine how aviation supports national cohesion across the Nordic countries. Specifically, we explore how domestic air connectivity links people, jobs, and essential services within national borders — and how this contributes to regional integration. Whereas the previous chapter focused on the immediate, measurable economic contributions of Norwegian's operations, this chapter highlights aviation's role in enabling internal mobility between municipalities. These connections support broader, long-term societal outcomes such as trade, productivity, and inclusive growth.

Summary: Chapter 2

Norwegian plays a vital role in strengthening national cohesion across the Nordics by enabling domestic air connectivity. In 2024, Norwegian accounted for approximately 70% of all domestic flights in Norway, 19% in Denmark, and 7% in Sweden. This connectivity supports regional integration, labor market mobility, and access to essential public services.

Air travel substantially reduces travel time between Nordic municipalities, improving internal mobility. In Norway, aviation lowers average travel times between municipalities by 33%, compared to 18% in Sweden and 2% in Denmark.

This improved connectivity also expands labor market access. In Denmark, 19,900 commuters would face travel times over 3 hours if relying solely on roads, compared to just 3,200 when air travel is available. In Norway, the number drops from 114,700 to 65,700, and in Sweden from 118,800 to 61,100.

Access to university hospitals is similarly enhanced. In Norway, 514,000 residents across 77 municipalities save an average of 3 hours in travel time when flying to major hospitals. In Sweden, 223,000 people in 10 municipalities benefit from an average reduction of 2 hours. Due to its smaller geography, Denmark sees minimal impact in this area.

While aviation is often discussed in the context of international travel, its domestic role for national cohesion is difficult to measure and therefore often overlooked. Nevertheless, its role in national cohesion, particularly for countries that span a large geographical area, is essential for tying the country together since road-based transport can be limited by the long distances, sparse populations and difficult terrain. A clear illustration of this dynamic can be seen in Northern Norway, where air travel is often the only practical way to ensure regional access to jobs, services, and opportunity. The following example highlights how a single PSO-supported route[8] helps maintain social and economic cohesion between remote communities and regional hubs.

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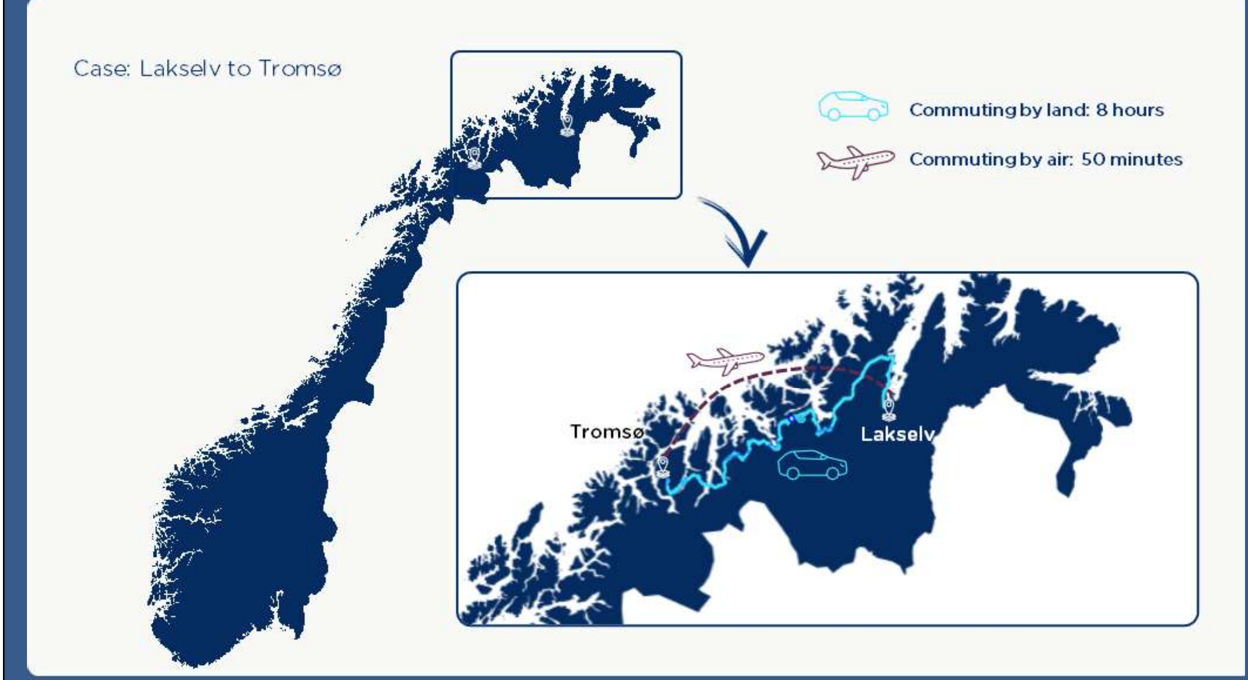
[8] PSO-supported routes are state-subsidized air routes designed to ensure connectivity in rural or remote areas where commercial operations would otherwise be unprofitable. In Sweden, they are referred to as *Allmän trafikplikt*, and in Norway as *Forpliktelser til offentlig tjenesteytelse* (FOT). Denmark currently does not operate any PSO routes.

Case: PSO routes between Lakselv and Tromsø

The connection between Tromsø–Lakselv in northern Norway ensures that residents in Lakselv, a community of approximately 2,200 people, have regular, year-round access to regional centres for healthcare, education, international connection and economic activity. Widerøe operates 2–3 daily departures on this route, enabling passengers to reach Tromsø in just 50 minutes - compared to over eight hours of driving across 460 kilometres of mountainous terrain. Without this air link, residents and businesses would face serious limitations in access outside the municipality, making the PSO support critical to sustaining the region's social and economic resilience.

Tromsø, with a population of ~42,000, serves as a regional hub with diverse industries including fisheries, aquaculture, tourism, and a growing knowledge and technology sector. The air connection allows Lakselv residents to access employment opportunities in these sectors.

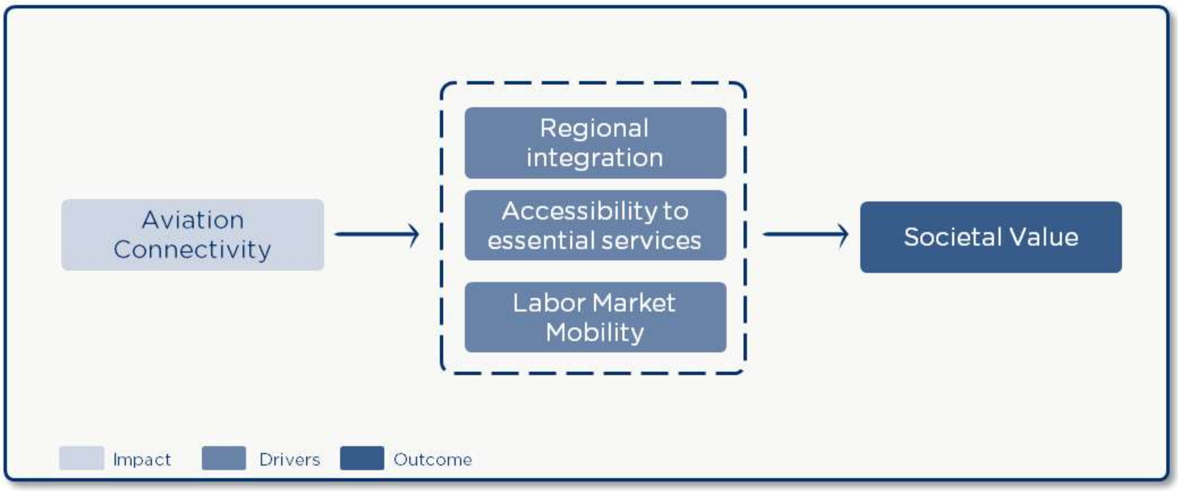


Notes: Own construction. Travel times based on google maps and flightera.net

To better understand Norwegian's role in supporting national cohesion across the Nordics, we begin by analysing the airline's share of domestic air connectivity in Norway, Sweden, and Denmark. We then examine how air connectivity influences three key dimensions of cohesion, as illustrated in Figure 2.1:

1. Regional integration
2. Labour market access
3. Access to essential public services

Figure 2.1: Pathways from Aviation Connectivity to Societal Value



Notes: The figure describes the flow of value from aviation connectivity to societal value
Source: Own construction

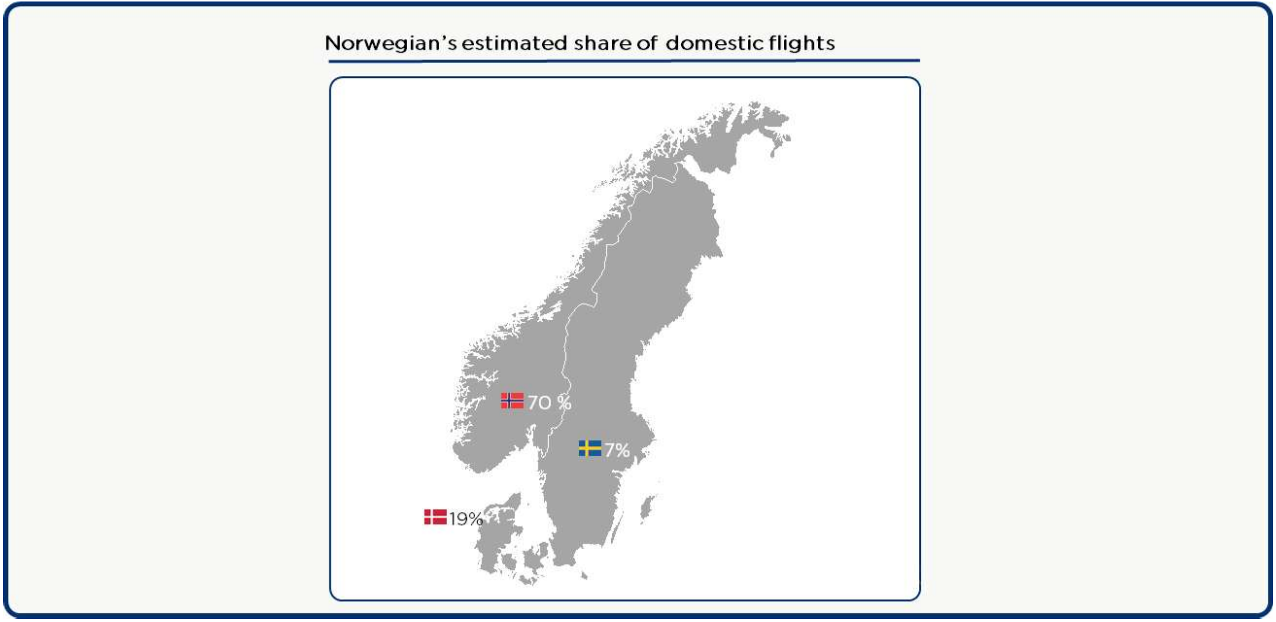
These three focus areas do not capture all aspects of national cohesion but serve as important examples of how aviation can generate broader societal value in the Nordic context.

2.1. Norwegians share of domestic air travel

Across the Nordic countries, Norwegian facilitates a substantial part of the domestic air connections available to residents. Figure 2.2 shows Norwegian's share of domestic flights in Scandinavia. In Norway, Norwegian (including Widerøe) is the main provider of such air connectivity and facilitates approximately 70% of all domestic flights. In Denmark and Sweden, Norwegian's share of the domestic air connectivity is lower, however, still constituting a substantial share. In Denmark, 19% of domestic flights are facilitated by Norwegian while the share is 7% in Sweden.

This implies that air connectivity's role in promoting national cohesion is primarily driven by Norwegian in Norway, while the airline also plays a significant role in Denmark and Sweden.

Figure 2.2: Share of domestic flights facilitated by Norwegian across Scandinavia. 2023.



Note: Finland was excluded from the original data scraping, as commuting flow data needed for several of the analyses was unavailable. While flight data is available, it was not collected at the time. **Source:** Flightera.net

2.2 Regional Integration

The first dimension of national cohesion is regional integration, the extent to which different parts of a country are physically and functionally connected. Strong regional integration ensures that travel between regions is fast, frequent, and reliable, helping to reduce both the practical and perceived distance between citizens.

Regional integration contributes to a shared national identity and societal cohesion. When people can easily visit, interact with, and understand life in other parts of the country, it fosters a sense of unity and mutual understanding across geographic and cultural divides. For example, it becomes easier for students to pursue educational opportunities in distant cities without feeling isolated from their social networks, or for individuals to maintain ties with friends and family across regions. This helps mitigate the risk of regional isolation, where certain areas become socially or culturally disconnected from the rest of the country and promotes equitable distribution of opportunities.

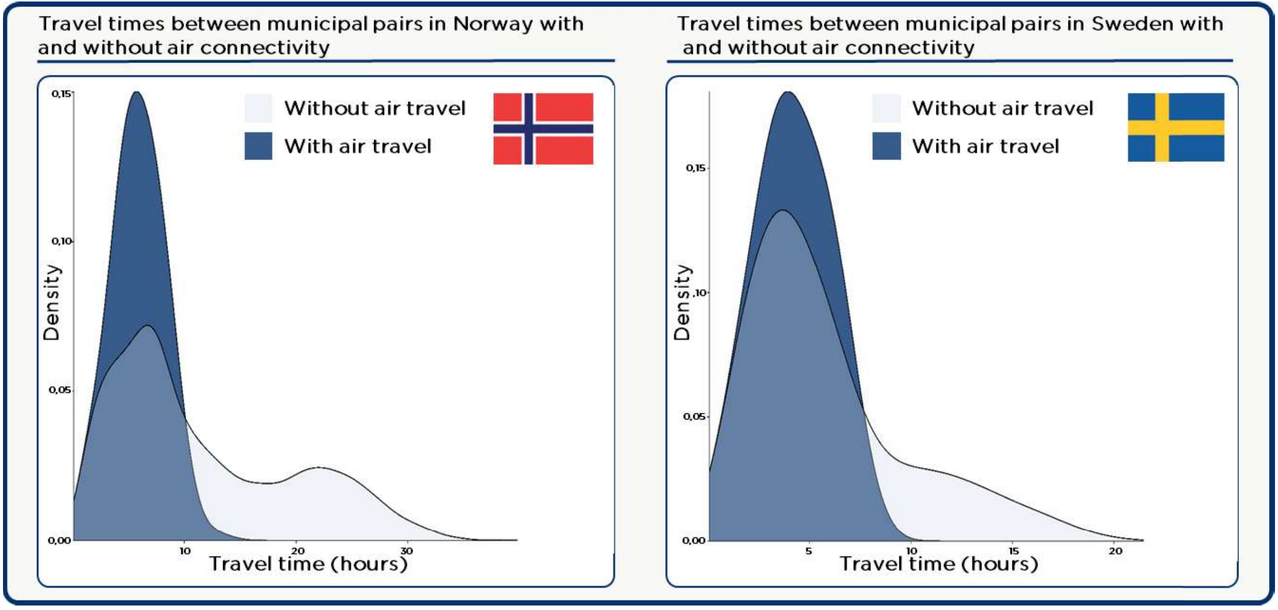
Moreover, high regional connectivity promotes national tourism and cultural exchange. Citizens are more likely to explore their own country — for leisure, family visits, or cultural experiences — when travel is convenient. This strengthens national solidarity and contributes to a shared sense of belonging. In contrast, limited regional integration may lead to fragmented development, where peripheral regions feel overlooked or left behind, undermining national cohesion.

In this context, air transport can play a vital role by bridging long distances and connecting remote or peripheral regions to the rest of the country, thereby supporting regional integration and strengthening the social fabric of the nation.

To examine this, we have developed a metric to measure regional integration as the average travel time to different parts of the country. In its essence, the metric measures the travel time from all municipalities to all other municipalities. Using this metric, we examine the countries' travel times, or regional integration, with and without air travel (see appendix 1).

Figure 2.3 shows the distribution of regional integration across municipalities in Norway measured as travel times between regions. The figure shows that air travel substantially enlarges the regional integration as more municipalities can be reached within a shorter time. In Norway, travelling from the southernmost to the northernmost regions can take more than 30 hours by road. The same journey typically takes 10–12 hours by air — including time spent getting to the airport, check-in, security, and pre-departure waiting. Hence, regions that otherwise would be multi-day-travels away are available within a single day with air connections. On average, air connectivity decreases the travel times to any municipality across Norway by 33%.

Figure 2.3: Travel times between municipal pairs with and without air connectivity



Note: Travel times by road based on distance between municipal centers by car. Travel time by air is calculated as the sum of the trip from municipal center to nearest airport, waiting time in airport (assumed to be 1,5 hours), airtime, possible connections and travel from destination airport to municipal center. Without air travel refers to travel only on road. See also appendix.

The same pattern is present in Sweden. Here, air connectivity decreases the average travel time by 18%, and the maximum travel time within the country is 10 hours relative to 24 hours, using only road connectivity. Thus, for both countries air connectivity substantially improves regional integration

As Denmark geographically is a much smaller country, air connectivity has a much smaller impact on regional integration. On average, domestic air connectivity decreases travel time by 2%, since most regions are more easily connected by road. Only travel from the north of Jutland to east of Zealand has a faster route by air. However, here the travel time reduction is only minor. Thus, the maximum travel time is only reduced to a limited extent.

2.3 Labor Market Mobility

Our second dimension of national cohesion is labor market mobility — the ability of individuals to live in one region and work in another. High labor market mobility enables individuals to access job opportunities beyond their local area, leading to better job matches and more efficient allocation of skills and resources. This benefits not only individuals but also employers, as it expands the pool of available labor and facilitates business growth. Moreover, it helps promote economic convergence by supporting regional development and reducing geographic inequality.

Labor market mobility is highly dependent on connectivity. People's willingness to commute is closely tied to travel time, comfort, and cost. While most daily commuting occurs between nearby regions accessible by road or rail, the rise of flexible work arrangements and hybrid job models is reshaping commuting patterns. Increasingly, people are open to longer-distance travel if it is not required every day — a dynamic where air connectivity can play a decisive role.

In this context, aviation can contribute significantly to labor market integration, particularly in geographically large or topographically challenging countries. Air transport allows people in rural or remote areas to take up employment in other regions without needing to relocate permanently. This supports inclusion, social mobility, and a more balanced distribution of economic activity across regions.

We use intermunicipal commuting flows as a proxy for labor market mobility. While commuting represents only one form of interaction across municipal borders, it serves as a meaningful indicator of how efficiently labor and ideas circulate within a country. A well-integrated labor market is essential for a cohesive and productive society.

When examining commuting patterns between municipalities, it is no surprise that most people travel relatively short distances to get to work. In fact, the vast majority of commuters in the Nordic countries can reach their workplace in under one hour by car: approximately 92% in Norway, 94% in Sweden, and 95% in Denmark[9].

However, in absolute terms, a significant number of workers still face long distance to their workplace. To understand how air travel can benefit those with especially long journeys, we estimate how many commuters are able to reach their workplace in under three hours due to air travel - where road travel alone would exceed three hours. The choice of a three-hour threshold represents an upper limit for a commute that can still reasonably be reached regularly within a day. While we cannot definitively say that air travel is the reason these individuals accepted their jobs, the data still offers valuable insights: it illustrates the extent to which air travel expands access to job opportunities that would otherwise be out of reach within a typical commuting window. The approach we use to calculate both road and air travel times is similar to the method described in Section 2.2.

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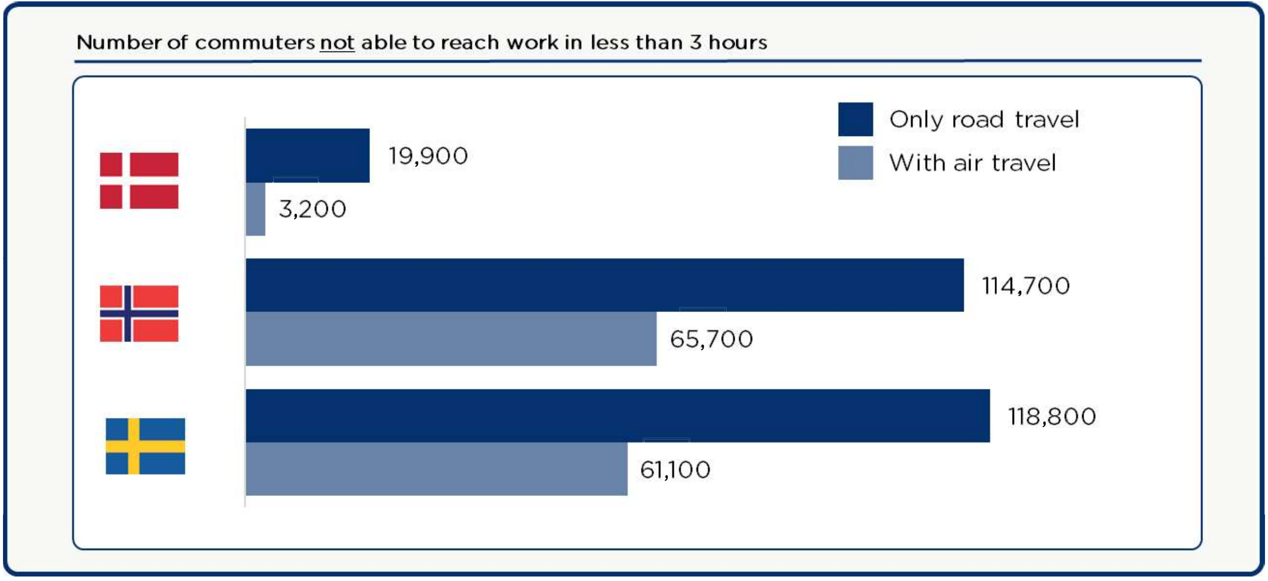
[9] Based on commuting grid data between municipalities and estimated travel times by car similar to section 2.2.

While we cannot directly infer that it is air travel that pushed individuals with very long commutes into taking their job, it provides a conceptually useful measure of the degree to which air travel allows workers to access even remote job opportunities within a reasonable travel time

Figure 2.4 shows the number of commuters, who would not be able to reach their place of work in less than three hours, both when only road options are available[10], and when air travel is also available.

Figure 2.4: Impact of air-travel on travel time for long commutes



Note: Travel times by road based on distance between municipal centers by car. Travel time by air is calculated as the sum of the trip from municipal center to nearest airport, waiting time in airport (assumed to be 45 minutes), airtime and travel from destination airport to municipal center. See also appendix.

In Denmark, approximately 19,900 people work more than three hours by car away from their residence. This number drops to just 3,200 people when we also consider the possibility for air travel. In Norway, the figure drops from 114,700 (road only) to 65,700 (with air). In Sweden, 118,800 commuters would exceed three hours by road, but only 61,100 do so when air travel is included. These figures highlight how air travel can play a crucial role in improving long-distance commuting and connecting workers to more distant job markets within a reasonable timeframe.

2.4 Access to Essential Public Services

Our final aspect of national cohesion, where air travel can play an important role, is in equitable access to essential services. “Essential services” is a rather broad concept, referring in our case to services essential for the health and welfare of citizens. Equitable access to specialized care and health services are a pivotal part of the Nordic welfare states. However, policymakers often need to strike a careful balance between the need for specialization and centralisation of sometimes rare health services and medical treatments with the need for equitable access regardless of where citizens live. Air travel has the potential to support

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[10] It is important to note, that train travel times have not been considered. While some routes potentially could be made more efficiently by train, the improvement relative to road travel, especially when rides are long, is not assumed to be considerable.

both policy goals, since efficient travel to and from specialised hospitals for all citizens can be facilitated across the often-challenging geography of the Nordics by air.

Most regions in the Nordics have access to regional or local hospitals within driving range of their home. Emergency care is thus possible for all citizens. However, such regional health offerings often only offer a select number of medical specialities, which might not be able to provide outpatient treatment for all health conditions[11]. In the Nordics, university hospitals perform the most specialised health services, and the access to such hospitals thus constitute an important pillar in the equitable access to all types of outpatients treatments for all citizens.

Using similar methodologies as for the regional integration of municipalities above, we have calculated the travel times to a domestic university hospital from all municipalities in Norway, Sweden and Denmark with and without the possibility to travel by air. While we recognize that this measure only captures parts of the broad concept of equitable access to essential health services, we argue that the option to receive outpatient treatment in a university hospital within a reasonable travel time is a useful proxy for the equitable access to health services in the Nordics.

The left panel of figure 2.5 shows municipalities with a university hospital in red. Municipalities, where air travel to a university hospital is more than 1 hour faster compared to road travel are shown in dark blue. Finally, municipalities where a university hospital can be reached only slightly faster by air compared to road is shown in light blue.

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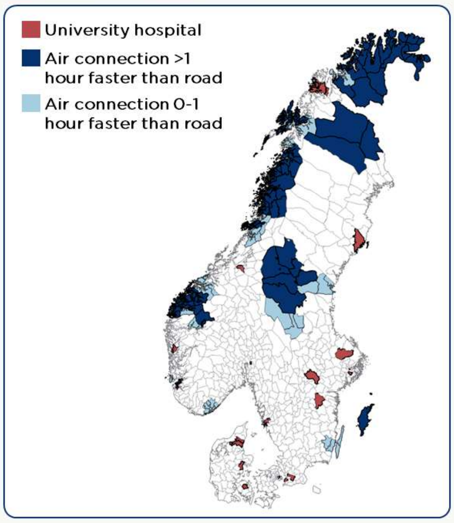
[11] Linna et al. (2010): Measuring cost efficiency in the Nordic Hospitals—a cross-sectional comparison of public hospitals in 2002 - PMC

Figure 2.5: The impact of domestic air travel on access to specialized hospital treatment.

Municipalities with air travel as fastest transport to university hospital



Impact on municipalities' access to specialised treatment from air travel.

	Municipalities with air >1 hour faster than road	Inhabitants	Average time saved (min)*	Relative time reduction (%)*
🇳🇴	77	514,000	182	45%
🇸🇪	10	223,000	117	40%
🇩🇰	-	-	-	-

*Population weighted

Note: Data for university hospitals manually sourced from multiple sources. Inhabitants based on municipal population statistics from Eurostat. Average travel times by air and is estimated (see appendix). Travel times by road based on distance between municipal centers by car. Travel time by air is calculated as the sum of the trip from municipal center to nearest airport, waiting time in airport, airtime, possible connections and travel from destination airport to municipal center. Only university hospitals within the respective country are considered. See also appendix.

The right panel in figure 2.5 show the impact of domestic air connections on travel times to a university hospital, for those municipalities where air travel is more than 1 hour faster than by road travel. In Norway, 77 municipalities or 514,000 inhabitants live where a university hospital can be reached significantly faster by air than by road (>1 hour). The time saving from flights differ between municipalities, but the travel time is on average reduced by three hours (182 minutes), or 45% lower than the travel time if only road travel was available. Hence, the air connection provides a very significant time reduction for individuals, that would otherwise have extremely long trips to a university hospital. Results are somewhat similar, although slightly smaller, in Sweden. Here, 10 municipalities can reach a university hospital faster by air than road, municipalities where 223,000 inhabitants live. The average time reduction for these inhabitants is just under two hours, 117 minutes on average, or an average reduction in travel time by 40%. Due to Denmark's limited geographical extent and the placement of university hospitals, air travel does not improve the travel times to a university hospital in Denmark.

3. Wider Economic Effects of Global Connectivity facilitated by Norwegian

In this chapter, we quantify the total societal value generated by the connectivity provided through Norwegian's route network. We define connectivity as aviation connectedness, that is, the extent to which regions are linked to other destinations by air. While the benefits of such connectivity are often indirect and not immediately visible, we present a structured approach to capture these effects in monetary terms.

Summary: Chapter 3

By providing *connectivity* Norwegian facilitates wider economic effects, since efficient travel enables tourism, trade, investments, and productivity benefits. Using statistical techniques and detailed European data, we estimate that an increase in air connectivity by 10% is associated with an increase in gross domestic product by 0.5%.

Norwegian provides a significant share of the Nordic countries' air connectivity. This amounts to 37% of all air connectivity in Norway, 11% in Denmark, 9% in Sweden and 3% in Finland.

Using these shares, we estimate that Norwegians routes facilitate 12.7 billion € in GVA across the Nordics, and 100,000 jobs. In Norway, 7.7 billion € and 53,000 jobs are facilitated by Norwegian. In Denmark, it is 16,000 jobs and 1,9 billion € In GVA. In Sweden it is 2.6 billion € in GVA and 25,500 jobs, and finally in Finland 5,000 jobs and 0.5 billion € in GVA.

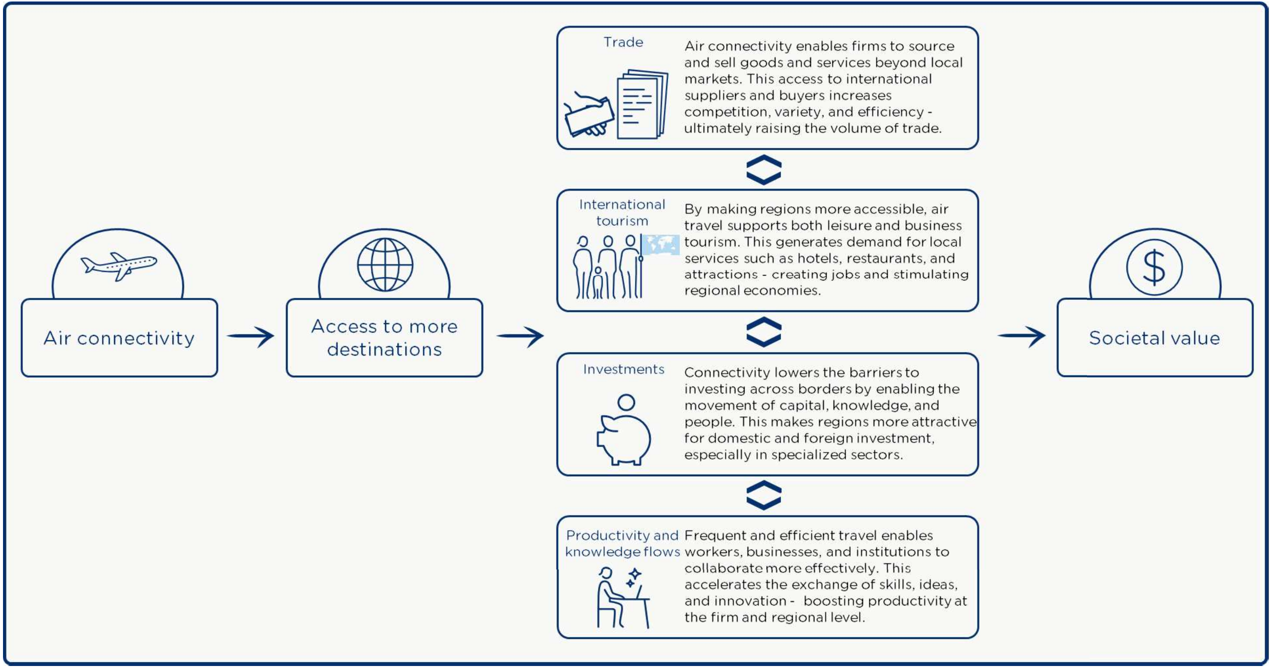
Tourism is an important channel through which air connectivity enables value creation. By using tourism spending across the four Nordic countries and estimating the share of this spending facilitated by Norwegian's flights, we provide a case example of the value generated through this specific channel. Approximately 15% of the total value facilitated by Norwegian's air connectivity is through tourism. This translates into 1.6 billion € in GVA and 15,000 jobs across the Nordics.

3.1 The Economic Case for Connectivity: A Global Perspective

It is a well-established insight that air connectivity generates societal value far beyond the convenience of travel. By linking regions to a broad network of destinations, aviation enables access to resources, skills, and opportunities not found locally - a core dynamic of globalization allowing regions to harvest benefits of comparative advantages. With the Nordic countries (Denmark, Norway, Sweden and Finland) all being small, open economies, such regional and international integration is closely tied to the relatively high levels of prosperity found. In this context, air connectivity is not a luxury but a structural prerequisite - a time-efficient mode of transport that links these economies with the rest of the world.

The value generated by connectivity is often referred to as "wider economic effects"[12] or "catalytic impacts"[13]. Figure 3.1. illustrates how these effects materialize in practice, for example, by enabling trade, tourism, and business development. The effects are not strictly linear, since improved connectivity can trigger positive ripple effects. For instance, as connectivity grows, regions may attract more investment or talent, which in turn strengthens the case for even more connections - setting off a self-reinforcing cycle of growth and exchange.

Figure 3.1: The association between air connectivity and societal value creation



Air connectivity enables firms to source and sell goods and services beyond local markets. This access to international suppliers and buyers increases competition, variety, and efficiency - ultimately raising the volume of trade.

By making regions more accessible, air travel supports both leisure and business tourism. This generates demand for local services such as hotels, restaurants, and attractions - creating jobs and stimulating regional economies.

Connectivity lowers the barriers to investing across borders by enabling the movement of capital, knowledge, and people. This makes regions more attractive for domestic and foreign investment, especially in specialized sectors.

Frequent and efficient travel enables workers, businesses, and institutions to collaborate more effectively. This accelerates the exchange of skills, ideas, and innovation - boosting productivity at the firm and regional level.

Notes: The figure outlines how air connectivity leads to increased travel, which generates societal value through trade, tourism, investment, and productivity.
Source: Own construction.

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[12] Copenhagen Economics (2016): *Luftfartens samfundsøkonomiske betydning for Danmark*

[13] Intervistas (2015): *ECONOMIC Impact of European Airports: A Critical Catalyst to Economic Growth*

While this section focusses on Norwegian's specific contribution to regional air connectivity, the broader takeaway is that aviation plays a foundational role in sustaining the economic openness and resilience of the Nordic countries.

To estimate the wider economic effects of connectivity attributable to Norwegian, we draw on a principle first introduced by Aschauer (1989) to study the impact of infrastructure on GDP, and later applied to aviation by, for example, InterVISTAS (2015) and SEO Amsterdam Economics (2024). The core idea is to quantify the relationship between air connectivity and key macroeconomic indicators, specifically GDP/GVA and employment, in order to estimate the societal value enabled by connectivity.

We then use data on Norwegian's contribution to connectivity in the Nordics to determine the share of this wider value that can reasonably be attributed to its route network. The key methodological steps are outlined in Box 3, with further detail provided in the appendix.

The key result from the analysis is, that our models suggest that a 10% increase in connectivity is associated with an approximate 0.5% increase in GDP per capita. Thus, when a region becomes more connected, its production value increases significantly. The implications of this result are expanded in the next sections. Importantly, although some variation exists across different model specifications the results are generally robust across model specifications[14]. Results are also largely in line with those found in previous studies e.g. Intervistas (2015) and SEO Amsterdam Economics (2024).

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[14] This includes connectivity measures, catchment areas of airports, included years and weighting of the regressions. Further details in the appendix

Box 3. Estimating value creation from connectivity

In this section, we quantify how air connectivity influences the economic performance of regions. We do so by estimating a set of macroeconometric models that relate connectivity to economic outcomes at the European regional level, using the EU's NUTS3 classification. This classification divides each country into small economic areas, encompassing between 150,000 and 800,000 inhabitants, and consists of groups of e.g. municipalities or "län".

First, we measure how connected a region is by looking at the frequency and quality of flights departing from nearby airports. In simple terms, the idea is that airports with more flights—and flights to important, high-traffic destinations—contribute more to a region's connectivity. The connectivity of a region is given as the sum of the following connectivity measure for all airports within 150km of the centre of the region:

$$connectitivty_{it} = \frac{\sum_{r=1} flights_{rt} \cdot w_{rt}}{1000}$$

r denotes the possible destination airports from a given airport, flights denote the number of commercial passenger departures to that destination in year t and w denotes the weight given to the destination airport. w is calculated as the size of the destination airport (measured as the number of passengers in the year) relative to the largest airport in the dataset in that year.

Second, we study how this connectivity relates to the region's economic outcomes, namely GDP per capita and employment. We do this by comparing economic performance across different regions while accounting for factors that remain constant over time, such as geographical characteristics, and common trends affecting all regions. Our main model is a fixed effects model estimated using OLS

$$\log(GDP\ per\ capita_{it}) = \beta_0 + \beta_1 \log(connectivity_{it}) + \beta_2 year_t + \beta_3 NUTS3_i + \epsilon_{it}$$

Where *i* refers to the NUTS 3 region and *t* refers to the time (year) index.

This framework provides a structured approach to measure the relationship between connectivity and value creation. The simplicity of the model has some methodological drawbacks. We address these drawbacks in the appendix and perform several robustness checks of the model. The results are generally robust to these tests. One of these robustness checks are also shown below, where we present estimates using a two-stage-least squares approach, using lagged connectivity measures as instruments, which generally produce similar results as the main model.

Our analysis is based on data from Eurostat, including data for all yearly airport-to-airport traffic for all European airports servicing more than 150,000 yearly passengers from 2007-2019, alongside GDP numbers by NUTS3 region. The results of the main regressions are given below

	FE OLS	2SLS
Connectivity	0.0634 ***	0.0576 ***
	(0.0029)	(0.0084)
Number of observations	15697	11879
$R^2_{adjusted}$	0.0316	0.9888

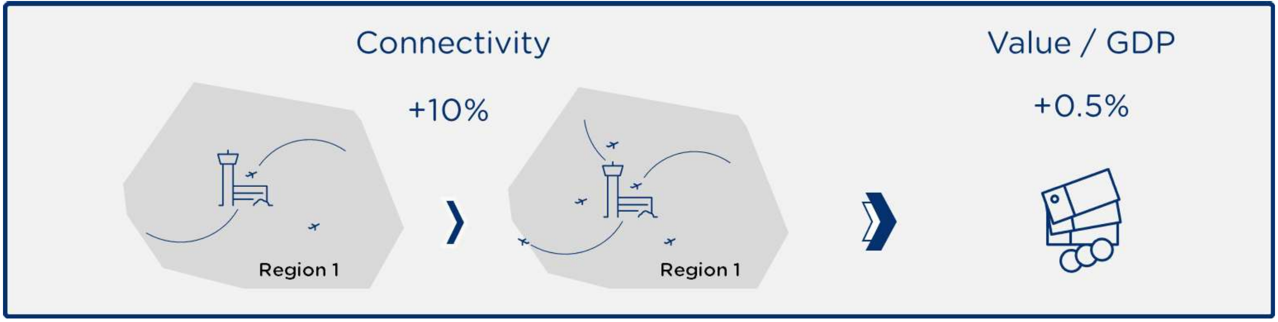
Note: *** p<0.001. Standard errors in parentheses

3.2 Norwegian's Role in Enhancing Global Connectivity

The analysis presented in Box 3 helps answer a fundamental policy question: if air connectivity increases by 10%, how much does GDP or employment grow in response? This is more than an academic exercise; it speaks directly to how infrastructure and transport policy can be used as tools for economic development. For decision-makers, this kind of analysis provides a quantitative basis for evaluating the societal returns on aviation, and by extension, the role of Norwegian's route network in supporting long-term economic performance across the Nordic countries.

Without a clear understanding of these wider effects, there is a risk that aviation policy, particularly around taxation or route regulation, may overlook the full economic consequences of reduced connectivity. In regions where alternatives to air travel are limited, this could translate into diminished access to jobs, markets, and public services. The key results from this analysis are summarized below.

Figure 3.2: The societal value associated with air connectivity



Notes: Implied effect of increasing air connectivity based on regression results.
Source: Own construction

To estimate the value of air connectivity facilitated by Norwegian, we apply these elasticity-based estimates to the Nordic aviation market. The underlying logic is straightforward: if Norwegian accounts for 10% of a region's air connectivity, Norwegian helps facilitate 0.5% of the region's GDP due to the accessibility it provides. This approach in part assumes that Norwegian's network is not simply duplicating routes that would exist regardless, but rather plays an active role in enabling or maintaining air links. In the absence of Norwegian's current operations, some of the connections supporting trade, tourism, and investment might not be available.[15]

Figure 3.3 shows our estimate of the wider economic value supported by Norwegian's route network in each Nordic country. The estimate is based on how much air connectivity contributes to GDP, combined with Norwegian's share of total connectivity in each region.

To ensure consistency with the rest of the report, we convert these GDP-based figures into gross value added (GVA). This is done using a standard adjustment ratio for each country, which reflects how much of its GDP typically consists of value added from production.

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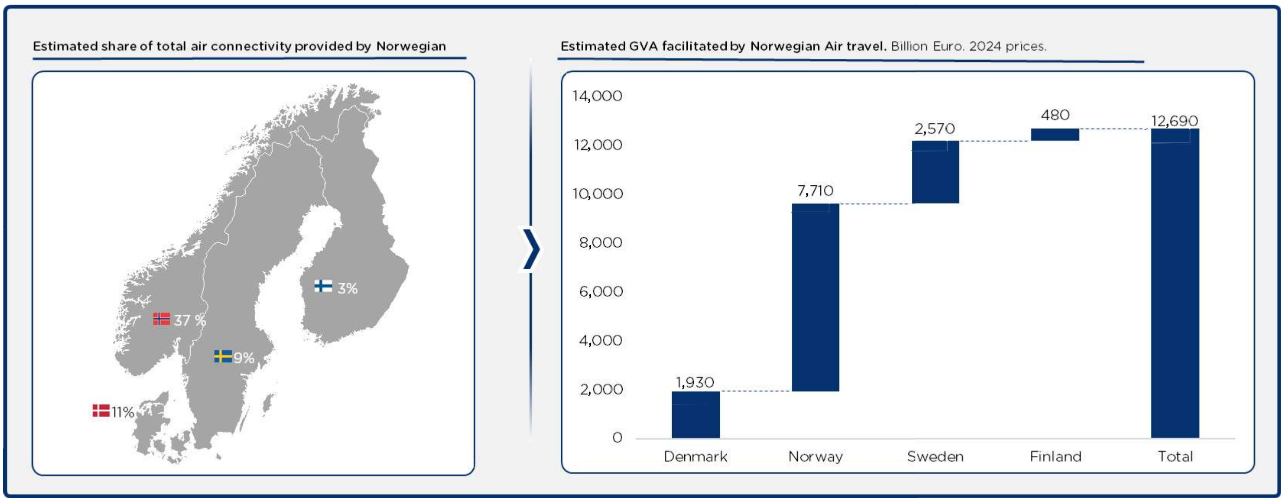
[15] The counterfactual situation without Norwegian's presence is not immediately observable. Regardless, since we observe Norwegian's presence, our interpretation that Norwegian *facilitates* value would still hold, while other airlines in principle also could facilitate similar value.

Figure 3.3: Estimated value (GVA) facilitated by Norwegian. Billion Euros (2024-prices).



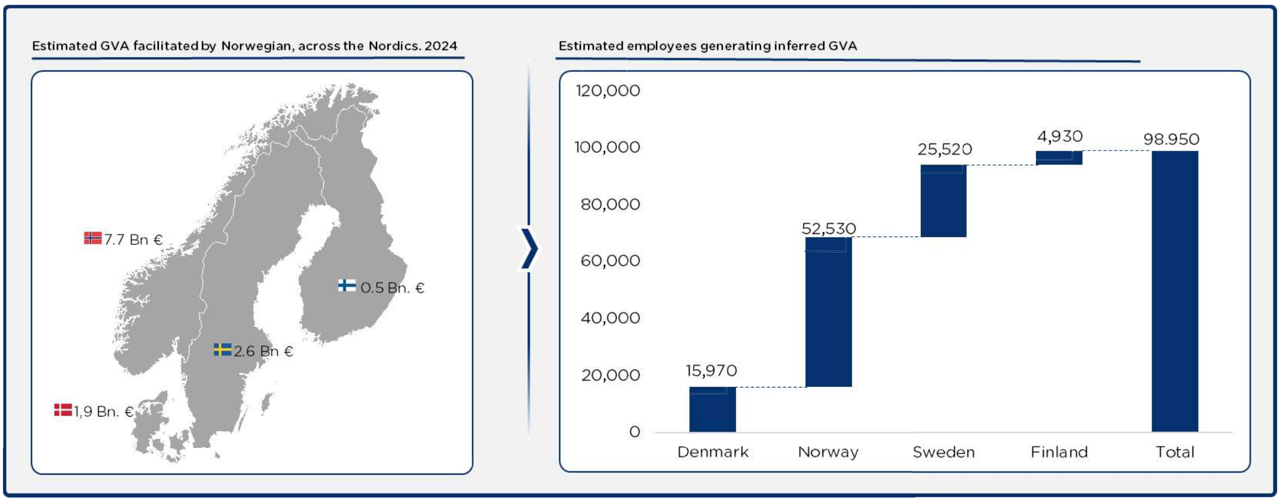
Notes: Connectivity share calculated as Norwegian's contribution to total connectivity for each NUTS3 region. GVA estimated using regression results and regional GDP and GVA figures
Source: Eurostat, Norwegian and Nordic statistical authorities.

The results presented in Figure 3.3 suggest that Norwegian's route network facilitates approximately €12.7 billion in total value creation (GVA) across the Nordics, with Norway alone accounting for approximately €7.7 billion. These figures reflect the strong relationship between regional air connectivity and economic performance, as shown in our analysis. Norwegian plays a key role in providing that connectivity, especially in regions that may not otherwise be well-served, thereby supporting trade, tourism, investment, and labor mobility.

Of course, this does not imply that Norwegian alone generates this entire value, or that the full amount would disappear if the airline ceased operations. Economic performance is the result of many factors and actors, including governments, private companies, and local communities. Still, Norwegian's regional presence and strategic focus likely help sustain routes and frequencies that are critical for socioeconomic activity—particularly in more remote or less commercially attractive areas that might not be prioritized by other carriers.

Improved connectivity does not just facilitate economic value, it also supports jobs across the Nordics. While the relationship between value creation and employment varies by sector and country, we can estimate it using national accounts. To translate the GVA estimates from our analysis into employment figures, we use country-specific ratios of jobs per million euros of GVA, based on national input-output tables. These ratios reflect how enhanced connectivity supports employment across a wide range of sectors, from corporate services to tourism. The resulting estimates of GVA and employment are shown in Figure 3.4.

Figure 3.4: GVA and jobs facilitated by Norwegians flights. 2024.



Notes: GVA estimated using regression results and regional GDP and GVA figures. Employment estimated using GVA/employment ratios from national IO-tables.
Source: Eurostat, Norwegian and Nordic statistical authorities.

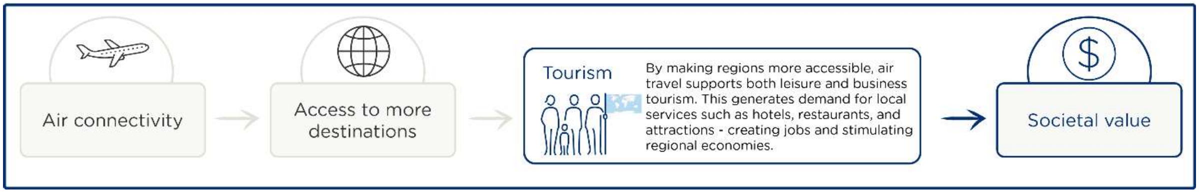
The right panel of Figure 3.4 shows that the estimated €12.7 billion in GVA corresponds to approximately 99,000 jobs across the Nordic countries. The country-specific breakdown of these jobs follows the distribution of GVA closely – with most jobs facilitated in Norway (52,000) and least in Finland (4,900).

3.3 Use Case: Tourism as a Channel of Economic Value Generation

While Section 3.1. and 3.2 assessed air connectivity's broader economic effects, these impacts can be difficult to observe directly. Connectivity facilitates trade, investments, tourism and productivity, but these processes operate across long time horizons and involve multiple actors. Tourism offers a clear and tangible example of how air connectivity generates economic value. This section uses the tourism sector to illustrate the broader mechanisms described earlier, as it is one of the most direct and visible ways in which improved connectivity translates into local jobs and value creation.

Air connectivity plays a key role in enabling international tourism. By making it easier for travelers to reach Nordic destinations, aviation stimulates local economic activity through visitor spending. This includes expenditures on hotels, restaurants, retail, and local transport, which in turn generate employment and gross value added (GVA) both directly and indirectly. As such, tourism offers a clear illustration of how improved accessibility leads to socioeconomic value at the regional level.

Figure 3.5: Tourism effects



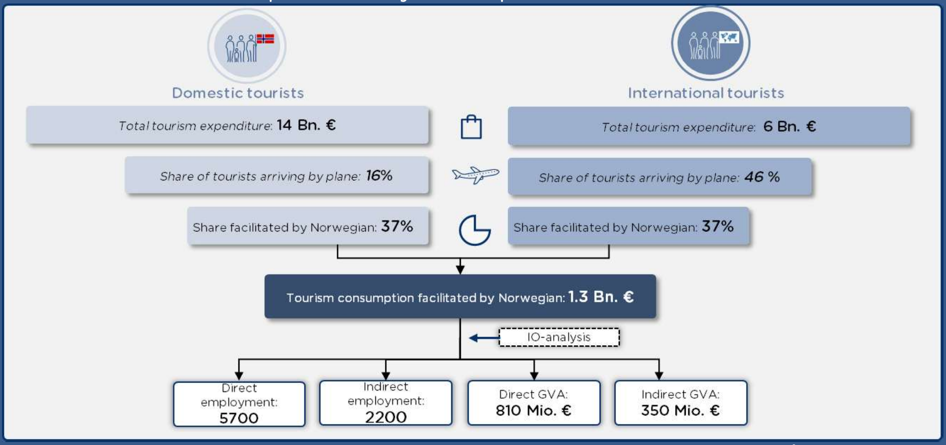
By making regions more accessible, air travel supports both leisure and business tourism. This generates demand for local services such as hotels, restaurants, and attractions - creating jobs and stimulating regional economies.

Notes: Causal channel through which air connectivity generates societal value through tourism.

Case: Tourism value added facilitated by Norwegian

To quantify the economic value generated by air-traveling tourists arriving with Norwegian, we have estimated their contributions to GVA and employment in each of the four Nordic countries. The approach follows a logical sequence: we start by estimating the share of inbound tourists arriving by air. We then assess how much these visitors spend annually across categories such as accommodation, dining, retail, and transport. Next, we translate that spending into local economic effects, including jobs and gross value added, using industry-specific multipliers from national input-output tables. Finally, we isolate the share of this tourism-driven value that can be attributed to Norwegian's operations. Figure 3.6 summarizes the inputs used in the calculation, with Norway as an example.

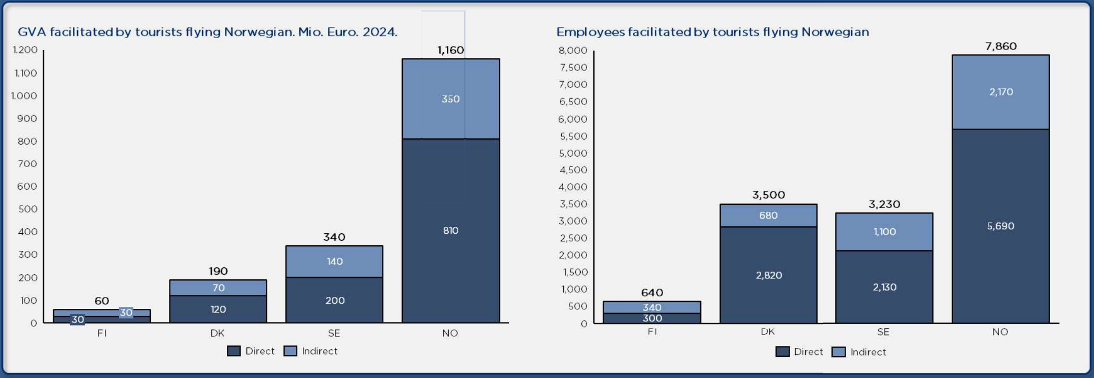
Figure 3.6 Tourism calculation input. Norway. 2024-prices.



Notes: Consumption based on 2023 numbers. **Source:** Innovation Norway and Statistisk sentralbyrå.

Air-travelling tourists who fly with Norwegian contribute significantly to the Nordic visitor economy. As shown in figure 3.7, we estimate that these travellers support approximately €60 Mio. in GVA in Finland, €190 Mio in Denmark, €340 Mio. € in Sweden, and €1,160 Mio. € in Norway. On average, 66% of this value comes directly from tourist spending in sectors such as accommodation, food services, retail, and local transport. The remaining share reflects indirect effects in upstream industries, that supply goods and services to the tourism sector. These contributions also translate into employment: Norwegian-supported tourism is estimated to sustain around 640 jobs in Finland, 3,500 in Denmark, 3,200 in Sweden, and 6,400 in Norway. The comparatively largest impact in Norway reflects Norwegian's estimated ~37% share of inbound air-travel tourism, versus just ~4% in Finland.

Figure 3.7 Total employment and GVA effects of air-traveling tourism facilitated by Norwegian



Notes*:* Sourced from national IO-tables and Tourism Satellite Accounts, 2024 prices.

The GVA and employment from tourism in figure 3.7 are a subset of the total effects found in the previous total contribution of connectivity in figures 3.3 and 3.4. Tourism constitutes between 10-15% of total tourism generated GVA, highest in Norway and lowest in Denmark. For employment, tourism makes up between 13-22%, highest in Denmark and lowest in Sweden.

4. The Societal Costs of Aviation: Emissions and Externalities

The previous chapters focused on the socioeconomic benefits of Norwegian's operations, including connectivity, mobility, and economic value creation. However, air travel also involves important societal costs. Most notably, the sector contributes to global warming, primarily through CO_2 and equivalent (CO_2e) greenhouse gas emissions from aircraft operations. These emissions impose real costs on society, even if they are not directly reflected in ticket prices or market behavior. Understanding the scale of these costs is essential for assessing aviation's overall societal impact and for informing balanced, evidence-based policymaking. This chapter explains why aviation emissions are considered a negative externality and presents an estimate of the environmental costs associated with Norwegian's operations in the Nordic countries. Other potential externalities, such as noise pollution, are not included in this analysis due to limited data and methodological challenges. Moreover, emissions remain the primary focus in current policy discussions about the environmental costs of aviation.

Summary chapter 4:

Norwegian's flights, like any other airline, emit greenhouse gasses through the combustion of aviation fuel. The emissions incur a cost on society since global warming in the long run has real costs for individuals and societies.

In 2024, Norwegian airplanes under the EU ETS emitted 2.14 Mio. Tons of CO2-equivalents. Most of this, 77%, stem from flights departing to or arriving from countries outside of the four Nordic countries. The remainder stems from domestic flights (0.37 Mio. Tons) and intra-Nordic flights (0.12 Tons).

There is no broadly accepted value for the societal costs of the emissions of one ton of CO2e. We estimate the societal costs using the preferred mean estimate from two sources - ranging from 59 € per tonne to 208 € per tonne. The resulting estimated societal costs of Norwegians emissions range from 126-443 Mio. Euro in 2024. Since the costs directly follow the emissions, the majority of these costs are for flights arriving or departing from outside of the Nordic countries, with the cost of domestic flights ranging from 22-77 Mio. €.

4.1 The societal costs of emissions

In 2023, the global aviation sector accounted for approximately 2.5 percent of global energy-related CO_2 emissions, equivalent to nearly 950 million tons. On top of this comes additional, although more uncertain effects with global warming potential (GWP), e.g. contrails, water vapor and other greenhouse gases[16]. While the societal costs of emissions are well established, they are often diffuse and difficult to observe directly because of the long-term and global nature of climate change. As a result, the environmental cost of flying a fossil-fueled aircraft is not fully borne by passengers or airlines. Instead, it is distributed across society in the form of climate impacts, what economists refer to as negative externalities. These are costs that are not reflected in market prices, and therefore not fully considered in private decision-making.

This misalignment between private and societal costs does not reflect a failure on the part of airlines or passengers, but rather a structural challenge in the current market, where the climate costs of emissions are not yet fully internalized. Addressing this gap is essential for aligning individual choices with societal goals. Understanding the scale and nature of these environmental externalities is therefore a necessary step toward balanced and effective policy design, an issue explored further in the next chapter, which examines the role of taxation and other regulatory instruments. This concept is further discussed in Box 4 below.

Box 4. Why emissions matter from a policy perspective

In economic theory, societal costs can arise in the presence of negative externalities. In essence, negative externalities are costs incurred by one party's actions on third parties. Below we illustrate this using a simple example.

Say that an airline wants to start operating a new daily departure between Copenhagen and Oslo. This route is already operated by the airline and other airlines. All airlines operating this route have costs to fly it – e.g. they must lease planes, hire cabin crew, buy fuel etc.

- Let MPC denote the Marginal Personal Costs to all airlines operating this route. The term marginal means "one unit extra", e.g. extending capacity on the route by one unit – e.g. by a new daily departure. Stylistically, our MPC is increasing, although relatively slowly, meaning the cost of opening an additional departure is larger than opening the previous one. This could be due to having to schedule the flight at less convenient times (e.g. late evenings with higher personnel costs) or inserting less efficient airplanes to operate on the specific route.
- Let MB denote the Marginal Benefit for all individuals flying the route. By flying, passengers obtain a benefit since they save time on travel and get to visit family more often or reach more business meetings. The marginal benefit is declining, since adding additional departures to the route yield a lower and lower benefit to the group. The first departure option is very valuable, since is opens the possibility of getting to a destination quicker than other options (e.g. car), while the marginal benefit of the tenth route is lower, since it "only" provides the marginal convenience of getting on a plane at a potentially more convenient time.

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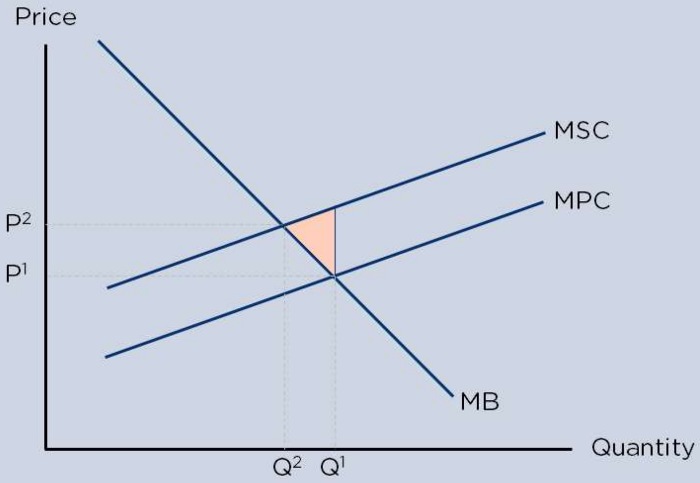
[16] Lee, D.S. et al (2020): The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018 - ScienceDirect

In traditional economic theory, the price in the market and quantity of operators on the route is set where marginal cost (MPC) meets marginal benefit (MB). In the figure below, this is in the point P^1, Q^1. In this point operators and passengers maximize their personal benefits. If operators expanded capacity, passengers would demand a lower price, which would exceed the operators' cost of offering this option. Hence, the point is optimal for passengers and operators.

In the example so far, costs and benefits are based on the operators' and the passengers' costs and benefits. However, air travel currently also imposes a cost to third actors through emissions – that is, negative externalities are present.



Let MSC denote the Marginal Social Costs of flight operations on the route. The social costs also include the costs to society of operating the route – e.g. emissions from the plane exhaust. MSC is above MPC, since the social costs comes "on top" of the private costs to the operators. For simplicity, we assume a proportional/linear effect of quantity of operated planes on social costs.

Taking the societal costs of emissions into account, the socially optimal price is now set where the marginal social costs meet the marginal benefits. This is the point P^2,Q^2. This point yields a lower quantity and a higher price than the market where emissions are not considered. The point closes a social inefficiency gap (red triangle), where flights are made with a higher social cost than the personal benefits of that flight. This is known as a deadweight loss.

One could argue that there should also be a "marginal social benefit" curve for air travel, since *positive* externalities might also exist (e.g. as explained in chapter 3). In such a case, the MSB corresponds to an upward shift of the MB curve, leading to a higher quantity supplied in the social optimum. The relative size of the positive and negative externalities thus creates a social optimum that can either be above or below the market quantity. For simplicity, we assume that the negative externality is largest, meaning the principles in the figure above still hold.

The societal problem identified in the figure above is that the private actors in the market for air travel do not reach the socially optimal point.

In the next section, we estimate the monetary value of the negative externality imposed on third parties through Norwegian airplanes' emissions. This first involves disclosing Norwegian's emissions, and second to monetize the societal costs of these emissions.

4.2 Norwegians' CO2e-Emissions

The vast majority of Norwegians' total scope 1, 2 and 3 emissions[17] are related to the fuel used to power the company's aircraft[18]. Although the combustion of airline fuel does not comprise the only effect with global warming potential (GWP) of Norwegian's operations, it provides a measurable and highly significant part of the total GWP. Effects from other sources (e.g. contrails) are less methodologically developed[19], and thus not included, which should be kept in mind throughout the discussion. Additionally, nearly all of Norwegians flights are covered by the EU ETS system, which provides a readily available overview of the emission of CO_2-equivalents (CO_2e) from airplane fuel[20]. Since Norwegian's operations are almost exclusively based on short-haul point to-point flights within the Nordics and from the Nordics to destinations in Europe and closely adjacent countries, nearly all Norwegian's flights are covered by the EU ETS. This includes all flights arriving or departing from the EEA (EU plus Norway, Iceland, and Liechtenstein)[21]. Using the emissions under the ETS scope ensures that we cover emissions from nearly all Norwegian flights in practice and ensures that a common and comparable European framework for the scope of emissions accounting is used.

The emission of greenhouse gases is an international issue. However, national emission targets do not necessarily include emissions from international flights. It is thus important to note that only a subset of emissions from Norwegian's flights are narrowly within the scope of national policy goals, namely the emissions from domestic flights. Carbon accounting practices and the goals of the Paris agreement are expanded in the appendix.

Figure 4.2 presents the total emissions in 2024 for all Norwegian's flights under the EU ETS scope, split by the departure and arrival destinations of the flights. The split is shown to underline that only parts of these emissions are part of the Nordic countries' national emission targets under the Paris agreement.

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[17] Scope 1 emissions of a company are the emissions directly within a companys control – e.g. the fuel burned in their vehicles. Scope 2 emissions are the emissions from the energy or fuel it purchases – e.g. the emissions from extracting and processing the scope 1 fuel. Scope 3 emissions are the emissions generated indrectly through the activities of the company up and down its supply chain – e.g. the emissions from producung a plane nose-wheel or drinks served on a flight.

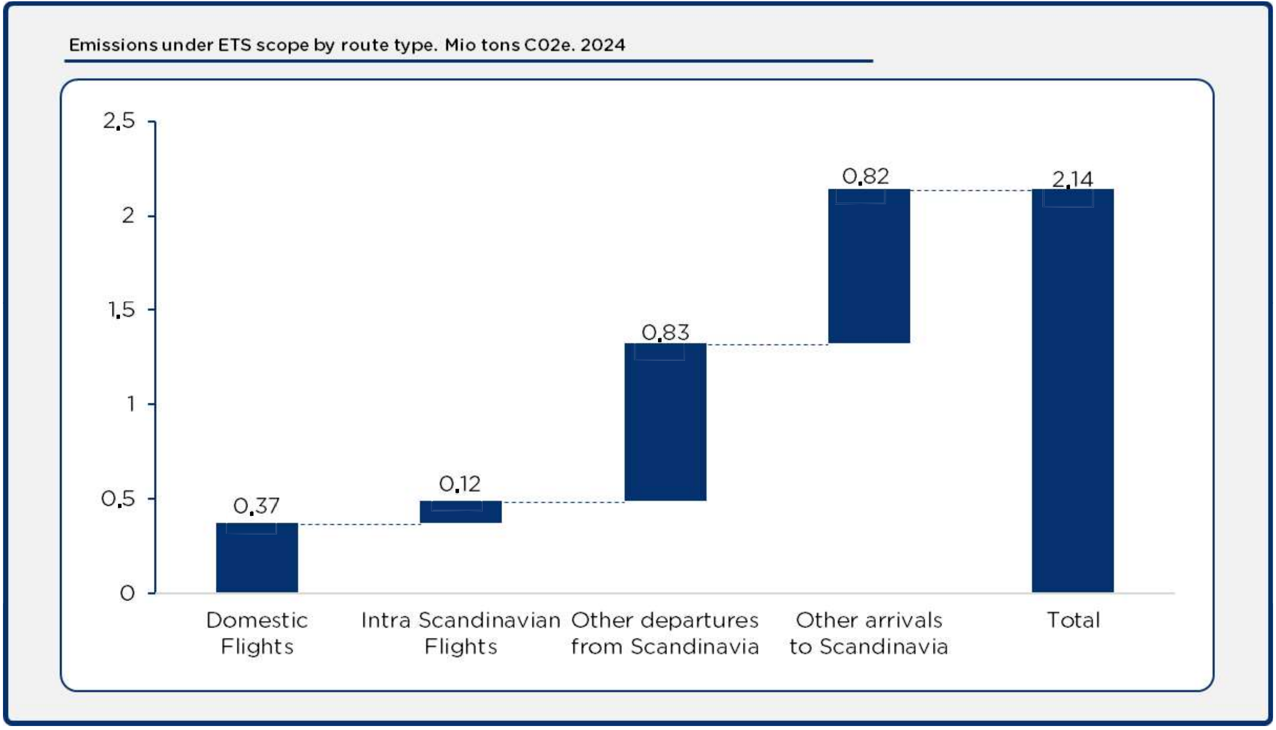
[18] Norwegian Annual report 2024

[19] Lee, D.S. et al (2020): The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018 - ScienceDirect

[20] CO_2-e takes into account the emission of non CO_2-gasses, e.g. methane, and translates these into their equivalent GWP potential of CO_2

[21] Flights departing from the UK and Switzerland to the EEA are also subject to similar, national systems (the UK and CH ETS, respectively), and are included.

Figure 4.2: Norwegian's emissions under ETS scope by route type. Mio tons C02e. 2024.



Note: Emissions data provided by Norwegian from EU ETS reporting data. CO2e calculated as fuel consumption multiplied by ETS emissions factor.

Figure 4.2 shows that Norwegian's flights under EU ETS emitted 2.14 Mio. Tons of CO_2e in 2024 in total. However, the emissions that are strictly bound by the Paris agreement are only domestic flights, where Norwegian's flights emitted 0.37 Mio. Tons CO_2e in 2024. With Nordic countries emitting 134 Mio. Ton CO_2e in their own territories in total in 2023[22], emissions from domestic flights operated by Norwegian were less than 0.3% of the Nordic countries' total CO_2 emissions. If the emissions from all flights departing from a Nordic airport by Norwegian were assigned to the Nordic countries, which is not generally included in territorial emissions, the total emissions would be 1.3 Mio. Tons or just under 1% of the territorial emissions of the countries. If also including arrivals to the Nordics from outside the Nordics, the total emissions are 2.14 Mio. Tons of CO_2e or 1.6% of the countries' total emissions.

As the discussion above shows, assigning emissions to countries is not a trivial task. A basic property of CO_2e emissions is, however, that the societal cost is the same no matter where or by whom the emissions happen. This is an important insight, discussed further in the following chapter on aviation taxation.

The basic feature of emission's global nature presents an important discussion on what the "right" societal cost of 1 additional ton of CO_2 (or its equivalents) is. The negative consequences of one more ton of CO_2 today depends both on how much CO_2 is emitted in the future, how much CO_2 is captured in the future, and which exact future events causing damages that materialize. Estimates of the actual cost per ton of

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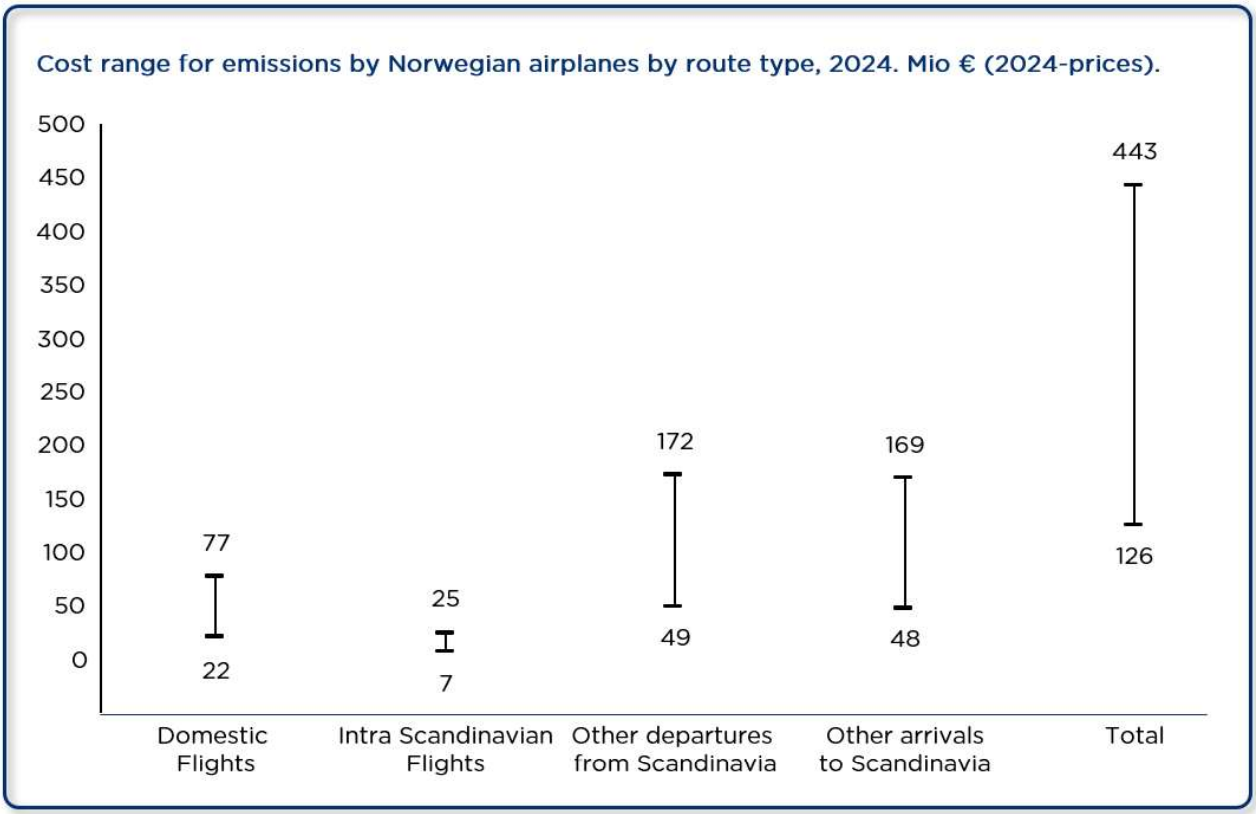
[22] Ourworldindata.org

CO$_2$ vary widely. For example, the U.S. government under the Obama administration[23] used a preferred mean estimate of around €59 per ton, while a more recent analysis published in Nature[24] (2022) suggests a preferred mean value of €208 per ton (in 2024 prices). Below, we apply these estimates to get a range for potential societal costs, since the exact cost figure is disputed. The cost range for different departures and arrivals operated by Norwegian are shown in figure 4.3. As a point of reference, the EU ETS price which is dynamically set to reach net zero by 2050 in the EU, is currently around 70 € per ton CO$_2$e - somewhere in between the indicated upper and lower bounds.

Figure 4.3 Cost range for emissions by Norwegian's airplanes by route type, 2024. Mio € (2024-prices).



Note: Lower bound corresponds to a societal cost of 59 € per ton CO2, while upper bound corresponds to a societal cost of 208€ per tonne. USD to 2024€ prices calculated using the CPI for USA, and the average Dollar/Euro exchange rate in 2024.

The figure shows that the societal costs of emissions from domestic flights operated by Norwegian range from 22 Mio. € in 2024 to 77 Mio. €, depending on the societal cost estimate used. Intra-Nordic flights range from 7-25 Mio., while both other arrivals and departures to and from the Nordics have costs between 50-170 Mio. €. Summing all these figures, the societal costs are in the range of 126-443 Mio. € for all Norwegian's flights under EU ETS.

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[23] National academies of sciences, engineering and medicine (2017): 1 Introduction | Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide | The National Academies Press

[24] Rennert et al. 2022: Comprehensive evidence implies a higher social cost of CO2 | Nature

The estimated societal costs of Norwegian’s emissions in figure 4.3 are significant. This raises the question of how best to manage these societal costs, a topic we turn to in the next chapter, which examines the role of taxation and other policy tools.

5. Aviation taxation

The previous chapters have established both the socioeconomic benefit of Norwegian's aviation services and the societal costs arising from the airline's emissions. While Norwegian's operations generate measurable benefits for employment, connectivity, and productivity in the Nordic region, Chapter 4 demonstrated that Norwegian's air travel also imposes external environmental costs, primarily in the form of CO2e emissions. These emissions represent a classic case of a negative externality, where the environmental harm is not fully borne by market participants but is instead distributed across society.

There are well-established economic arguments for using taxation to address externalities. By taxing emissions, or the aviation activities that generate them, governments can help internalize externalities and steer the market toward more socially efficient outcomes. Our analysis does not seek to recommend a specific tax level or policy package, but rather to illustrate key trade-offs and design principles balancing the duality of benefits and costs these instruments might have.

This chapter builds directly on the results established so far, and we explore whether current aviation tax policies in the Nordics effectively close the gap between private and social costs. The chapter unfolds in three main sections. It begins by outlining the theoretical rationale for taxing aviation emissions as a means of internalizing externalities. It then examines current taxation practices in the Nordic countries, covering both national measures and supranational instruments like the EU ETS and CORSIA. Finally, it explores how tax revenues can be used efficiently and equitably, with a focus on promoting decarbonization through investments in sustainable aviation fuels and clean technologies.

Summary chapter 5

For routes operated by Norwegian, a range of taxation instruments exists. Due to national taxation measures, the effective cost of CO_2e is on average well above international standards and the emissions price set by the EU ETS.

On average, we estimate that Norwegian's domestic flights are subject to an effective emissions tax of €190 per ton of CO_2e. For shorter routes, the effective rate can be even higher. In comparison, Norwegian's intra-Nordic flights face an average of €127 per ton, while routes involving departures or arrivals outside the Nordics are taxed at €79 and €39 per ton, respectively. This means flights contributing to intra-Nordic connectivity currently face a significantly higher degree of taxation than longer international routes. Given Norwegian's strong focus on intra-Nordic operations, policies targeting this segment may result in disproportionate distributional impacts.

We discuss the different tax instruments applied and provide some general comments with regards to their efficiency.

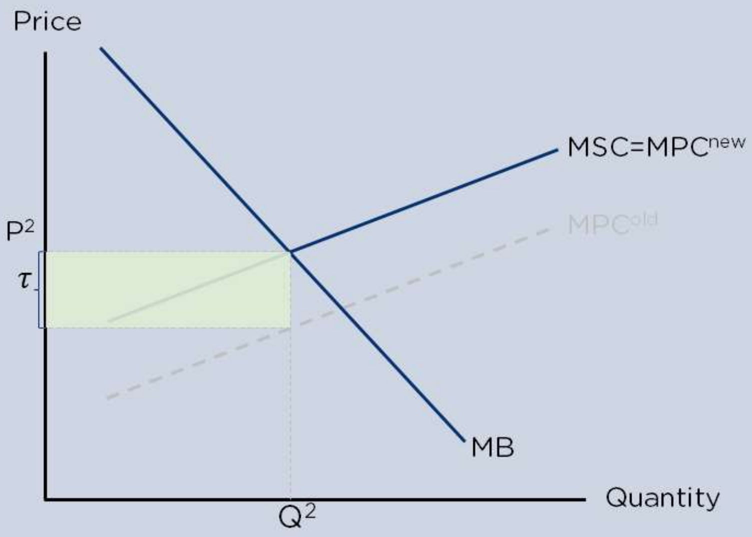
- Taxes on *air travel* increase ticket prices but do not incentivize airlines to reduce emissions. This leads to inefficient decarbonization efforts and decrease societal gains of connectivity
- Taxes on *air emissions* raise airlines' operating costs proportional to emissions, encouraging them to adopt cleaner technologies and practices. This leads to more efficient decarbonization efforts, and potentially lower strain on connectivity gains
- Revenue generated from aviation taxes can be redistributed to support aviation decarbonization efforts, such as investments in Sustainable Aviation Fuels (SAF).This has potential to support positive effects of connectivity without hurting decarbonization efforts.

5.1 The case for taxation of aviation emissions

In response to the negative externalities associated with air travel emissions, policymakers in Europe have introduced special taxation measures targeting the aviation sector. These policies are intended to **internalize the externality**—that is, to ensure that the environmental costs imposed on society are reflected in the prices paid by passengers and airlines. The underlying economic logic for such taxation is outlined in Box 5.

Box 5. The economic case for aviation taxation

Returning to our example in chapter 4, we established that the actors in the aviation market (airlines and passengers) did not reach the socially optimal number of flights (and by implication emissions). This is since the costs (negative externalities) incurred by flying was not reflected in the personal costs and benefits of these actors. However, if governments place a tax on emissions, they can effectively raise the costs of emitting – and thereby internalize the externality. Returning to our economic framework, these principles are shown the figure below. In this example, policymakers have constructed a tax instrument τ. For each flight offered in the market, airlines must pay the tax to the government, which effectively pushes the marginal personal costs of airlines upwards. In the figure, this shift is illustrated as an upward shift of the MPC curve.



In the figure, the government has constructed the tax instrument to exactly match the negative emissions externality. The tax thus leads to the socially optimal level of air travel (P^2,Q^2), and policymakers collect tax revenues equal to the green square. The tax revenues present a transfer of value from passengers and airlines to the government.

While the example suggests a straightforward implementation of a tax that reach the socially optimal level of air travel, the reality is more complex. How to construct an efficient tax instrument is unfolded in sections below.

Box 5 shows that taxation *can* be constructed to reach a socially optimal level of flights. However, reaching the point is no trivial task, and the tax instruments for air travel in the Nordics are very different in design and often additional to European taxation measures. These differences place a financial burden on Nordic passengers and Nordic airlines like Norwegian, that is higher than the one faced in many neighbouring countries and markets. We turn to these differences next.

5.2 Aviation taxation in the Nordics

This section outlines the aviation taxes applied in the Nordic countries, with a focus on how these measures seek to internalize the external costs of emissions. Some of these taxes, such as passenger levies, are determined at the national level, while others stem from supranational regulation within the EU and EEA. Although EU law[25] generally prohibits taxation of aviation fuel for international flights, member states are permitted to impose fuel taxes on domestic air travel. The table below provides an overview of relevant national and supranational legislation in place across the four Nordic countries as of 2024, with any known changes planned for 2025 indicated in parentheses. Further details on each tax instrument are provided in the appendix.

Table 5.1 Overview of applicable aviation "carbon" taxes in four Nordic countries, H1 2025.

	Sweden	Norway	Finland	Denmark
National				
Passenger tax	Yes[26] *(Abolished 06-25)*	Yes	No	Yes *(Introduced 01-25)*
Domestic CO2 / fuel tax	No	Yes	No	Yes[27] *(introduced 01-25)*
Supranational				
EU ETS	Yes	Yes	Yes	Yes
CORSIA	Yes	Yes	Yes	Yes

Note: National legislation based on government websites of the four Nordic countries. Supranational legislation based on the European Commission and ICAO websites.

Due to national taxation practices, aviation emissions are taxed very different in the Nordic countries, especially depending on the departure and destination of each flight. This leads to significant differences in the effective carbon cost per ton of CO_2e, depending on the specific route. Figure 5.2 illustrates the carbon pricing across selected Nordic routes. The calculations are based on the EU ETS carbon price, adjusted to reflect the proportion of free allowances granted to airlines in 2025. Over the coming years, these free

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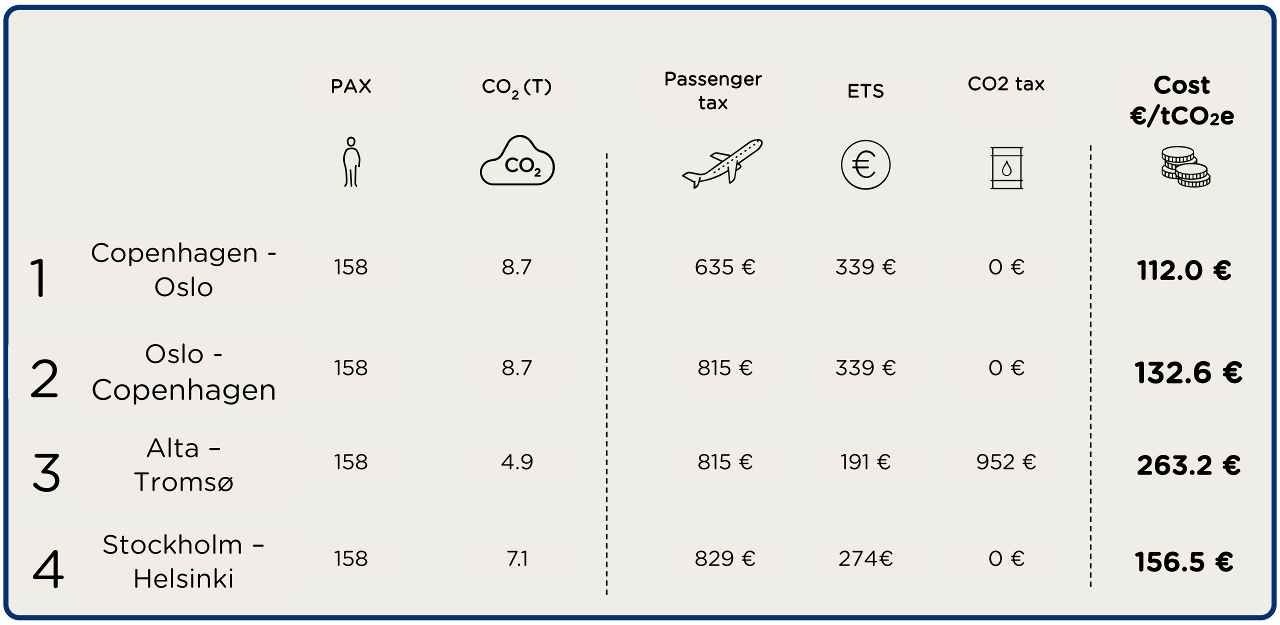
[25] The Energy Taxation Directive (2003/96/EC)

[26] Abolished medio 2025

[27] Introduced 2025: CO2 tax on commercial fishing, ferry operation and aviation | Skat.dk

allowances are set to be phased out entirely, while the overall emissions cap is tightened. This will place upward pressure on the ETS price and further increase the cost of emitting CO$_2$e from aviation.

Figure 5.2: Estimated tax price per ton CO$_2$e from aviation on Nordic routes. H1 2025.

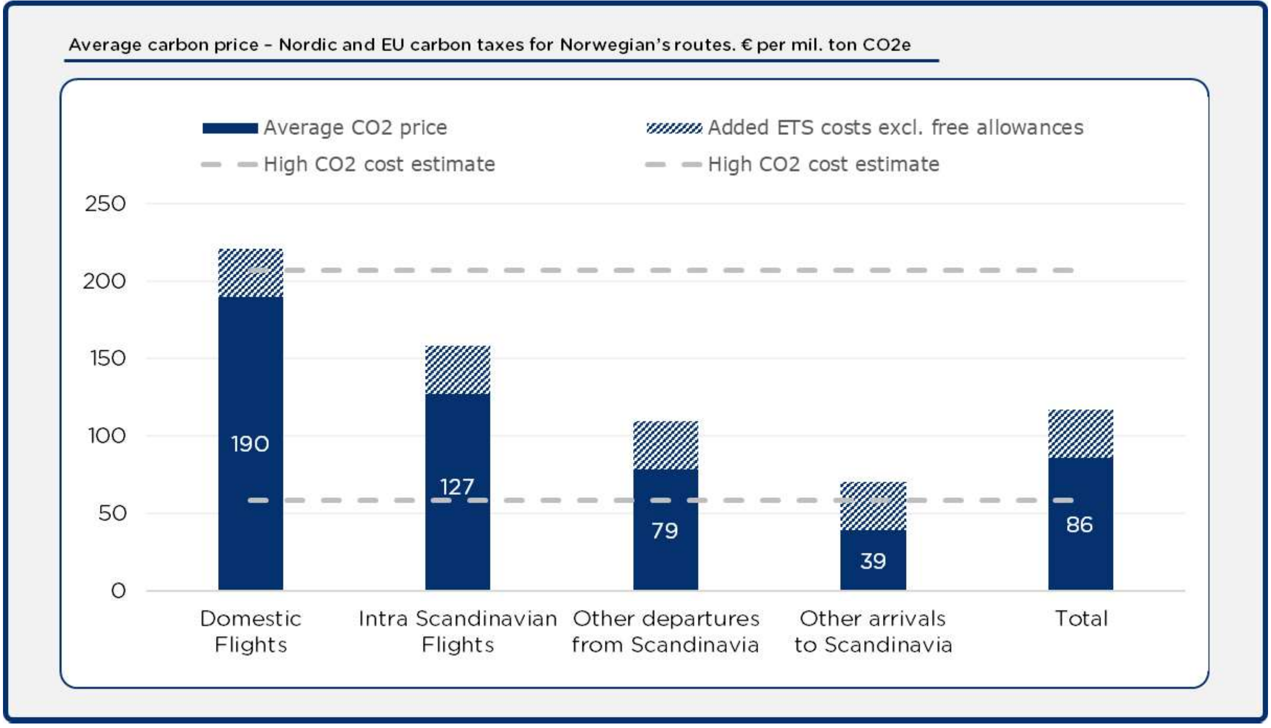


		PAX	CO_2 (T)	Passenger tax	ETS	CO2 tax	**Cost €/tCO$_2$e**
1	Copenhagen - Oslo	158	8.7	635 €	339 €	0 €	**112.0 €**
2	Oslo - Copenhagen	158	8.7	815 €	339 €	0 €	**132.6 €**
3	Alta – Tromsø	158	4.9	815 €	191 €	952 €	**263.2 €**
4	Stockholm – Helsinki	158	7.1	829 €	274€	0 €	**156.5 €**

Note: PAX estimated using load factor of 85% for a Boeing 737-800. ETS price based on approximate 2024 average price from ember-energy.org, adjusted for an assumed share of free allowances of 44%. National passenger tax rates and CO$_2$ tax for domestic flights from government websites. Assumed density of A1 jet fuel of 0,8 kg/L for fuel tax calculation.

Figure 5.2 shows dramatically different costs per ton of CO$_2$e depending on departure and arrival airports for a subset of routes operated by Norwegian. These differences are difficult to explain from a societal cost perspective, where the costs of emissions are equal regardless of how it is emitted. In figure 5.3, we have estimated the average carbon tax rate for all routes operated by Norwegian using similar methodology as in figure 5.2. The price is split by the type of route, e.g. domestic, intra-Nordic, and other departures and arrivals to and from the Nordics. The figure provides insights into the differences in carbon pricing depending on where a given flight departs and arrives.

Figure 5.3: Average carbon price – Nordic and EU carbon taxes for Norwegian's routes



Notes: CO_2e emissions based on Norwegian Carbon accounting. PAX estimated using load factor of 85% for a Boeing 737-800. ETS price based on approximate 2024 average price from ember-energy.org, adjusted for an assumed share of free allowances of 44%. Shaded section corresponds to full ETS price. Tax rates from table 2 is transformed to € using the 2024 average exchange rates. Assumed density of A1 jet fuel of 0,8 kg/L for fuel tax calculation. It has not been feasible to include local passenger taxes for departures outside of the Nordic countries, which are thus excluded – meaning that carbon cost of "other arrivals to Scandinavia" might be underestimated.

Figure 5.3 shows that the domestic flights operated by Norwegian face by far the highest average carbon price, at approximately €190 per ton of CO_2e. This figure is close to the upper bound of the estimated societal cost of emissions presented in Chapter 4 and dramatically above the current ETS price around 40 € per ton (including free allowances). The relatively high carbon price reflects the combined effect of multiple taxes applied to domestic flights, including passenger taxes, fuel taxes, and ETS charges. Intra-Nordic flights also carry a high average carbon price—around €127 per ton—primarily due to the impact of passenger taxes. In contrast, Norwegian's flights departing outside of the Nordics face a lower average carbon price of €79 per ton. This is largely because these routes are longer, making fixed taxes like the passenger tax a smaller component of the overall carbon cost per ton. Overall, the figure highlights that flights contributing to intra-Nordic connectivity are currently subject to a significantly higher degree of taxation compared to other routes. Given Norwegian's large share of intra-Nordic routes, policies targeting this segment may have disproportionate distributional effects. With the gradual phase-out of free ETS allowances, carbon prices are expected to rise further across all route types.

The next section explores the efficiency of different types of tax instruments, highlighting how they result in varying effective emissions costs and how well they balance environmental objectives with broader socioeconomic benefits.

5.3 Tax instruments efficiency and redistribution – a theoretical discussion

This section begins by examining the efficiency of various tax instruments in achieving a socially desirable level of emissions from air travel. It then considers how tax revenues can be allocated to support a beneficial redistribution that maintains connectivity while encouraging emissions reductions. Finally, we reflect on how broadly the findings and examples discussed in this chapter can be applied beyond the specific Nordic context.

As highlighted in the overview of national and supranational legislation (see appendix), aviation can be taxed in fundamentally different ways. One category targets air travel itself, such as passenger taxes in Norway and Denmark, which impose a fixed fee per seat regardless of the flight's emissions. The other category targets emissions directly, including the EU Emissions Trading System (ETS), which requires airlines to purchase and surrender allowances for each ton of CO_2e emitted. ICAO's CORSIA scheme also falls into this group, obligating airlines to buy carbon offsets for emissions exceeding a baseline, thereby imposing an implicit tax on emissions[28]. Table 5.4 summarizes these two approaches and provides examples of the most relevant instruments in the Nordic context.

Table 5.4 Categorization of aviation tax instruments

Type of instrument	Instrument	Example
Taxing air travel	Passenger tax	Flypassasjeravgift (NO)
Taxing air travel emissions	Cap-and-trade	EU ETS
	Carbon offset	CORSIA
	Fuel/CO_2 tax	CO_2 tax (NO)

The reason for making this categorization of tax instruments is that they have different potentials for effectively internalizing the externalities associated with air travel. Taxation is one of the most important tools available to governments for addressing aviation emissions. But how taxes are designed, and how the revenue is used, determines whether it is possible to both reduce emissions and maintain the benefits of connectivity. We describe these mechanisms next.

The impact of tax instrument design

How a tax instrument is designed is not irrelevant for its efficiency. Two fundamentally different types of aviation taxes targeting emissions exist.

The first type of instrument is a tax on air travel. A key feature of this kind of tax is that it does not directly influence the airline's operating costs. Instead, it is added to the ticket price and paid by the passenger. If an airline offers a ticket at price P, the final price paid becomes P plus a fixed tax amount per seat.
In practice, airlines do not always pass the entire tax on to passengers. Instead, they often absorb a portion of it within their profit margins. The extent to which the tax is passed through depends on the price

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[28] The current effectiveness of CORSIA is disputed, since only select emissions above a certain threshold is included. See also discussion in appendix.

sensitivity—or elasticity—of demand for air travel. A commonly used rule of thumb in the industry suggests that about two thirds of the tax is passed on to passengers, while airlines cover the remaining third.[29]. Higher ticket prices may cause some passengers to opt out of flying, which reduces demand. However, because this type of tax does not affect the airline's cost structure, the marginal private cost of flying remains mostly unchanged. As a result, airlines have little financial motivation to reduce emissions, since the tax applies equally regardless of fuel type, aircraft efficiency, or environmental performance.
Setting an appropriate level for the passenger tax that reflects the social cost of emissions is also challenging. The responsiveness of passengers to price changes, known as the elasticity of demand, varies across routes and markets and is difficult to estimate with precision. If the tax is set too low or too high, it may fail to capture the actual environmental cost of flying and therefore miss the socially optimal outcome.

The second type of instrument is a tax on emissions. This approach directly increases the operating costs for airlines. For instance, adding a new daily flight between Copenhagen and Oslo would require the airline to pay for the emissions generated by that flight. The additional cost is proportional to the amount of emissions produced, which pushes the airline's marginal private cost curve upward toward the level of the marginal social cost.

Determining the appropriate tax rate for emissions is a complex task. Instruments such as the EU Emissions Trading System aim to guide the market toward carbon neutrality by 2050 by setting a cap on total emissions and allowing the market to determine the price of carbon allowances. This creates a structured pathway to achieving a socially acceptable level of emissions. By internalizing the environmental cost of emissions, this kind of tax forces airlines to consider their climate impact as part of their business decisions. Airlines may respond by adopting more fuel-efficient aircraft, improving route planning, or investing in cleaner energy sources such as sustainable aviation fuels. While these actions often involve initial investments, they can also reduce the airline's exposure to carbon costs over time. In the most ambitious cases, if an aircraft operates entirely without fossil fuels, it would no longer be subject to the emissions tax. This provides a strong financial incentive for airlines to reduce their climate footprint.

In short, taxing air travel can reduce demand, but does little to encourage greener technology. Taxing emissions, by contrast, targets the environmental problem directly and incentivises cleaner operations.

The impact of tax revenue distribution

When governments impose taxes on aviation, they generate public revenues. This applies to both taxes on air travel and taxes on emissions. In this section, we focus on how these revenues can be allocated, and what environmental or social effects may follow from different choices. Just like tax instrument design has an impact on the balance between aviation emissions and benefits of connectivity, so does tax revenue redistribution.

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[29] Viden_om_luftfart_3_mulige_effekter_af_passagerafgift.pdf

The first option of redistribution is a pure revenue neutral approach, where the tax proceeds are returned to society in some form. For example, the government could use the funds to reduce income taxes or increase spending on public services such as healthcare or education. This would shift value from airlines and passengers to the broader population. This approach would likely reduce the number of flights, as higher ticket prices discourage air travel. While this can help reduce emissions, it may also limit the positive effects of aviation, such as regional connectivity and economic development.

The second and alternative form of revenue neutral redistribution would be to reduce other taxes or fees on passengers or airlines. In this case, passengers might benefit from lower ticket prices due to the removal of other charges such as value added tax, while airlines could receive subsidies or reduced fees that lower their operating costs. Although this approach lightens the financial burden for both consumers and producers, leaving the positive effects of connectivity untouched, it often has little effect on emissions. The incentives created by the original tax may be weakened or cancelled out by the relief measures. As a result, the desired changes in airline behavior—such as fewer flights or investments in cleaner technology—may not materialize.

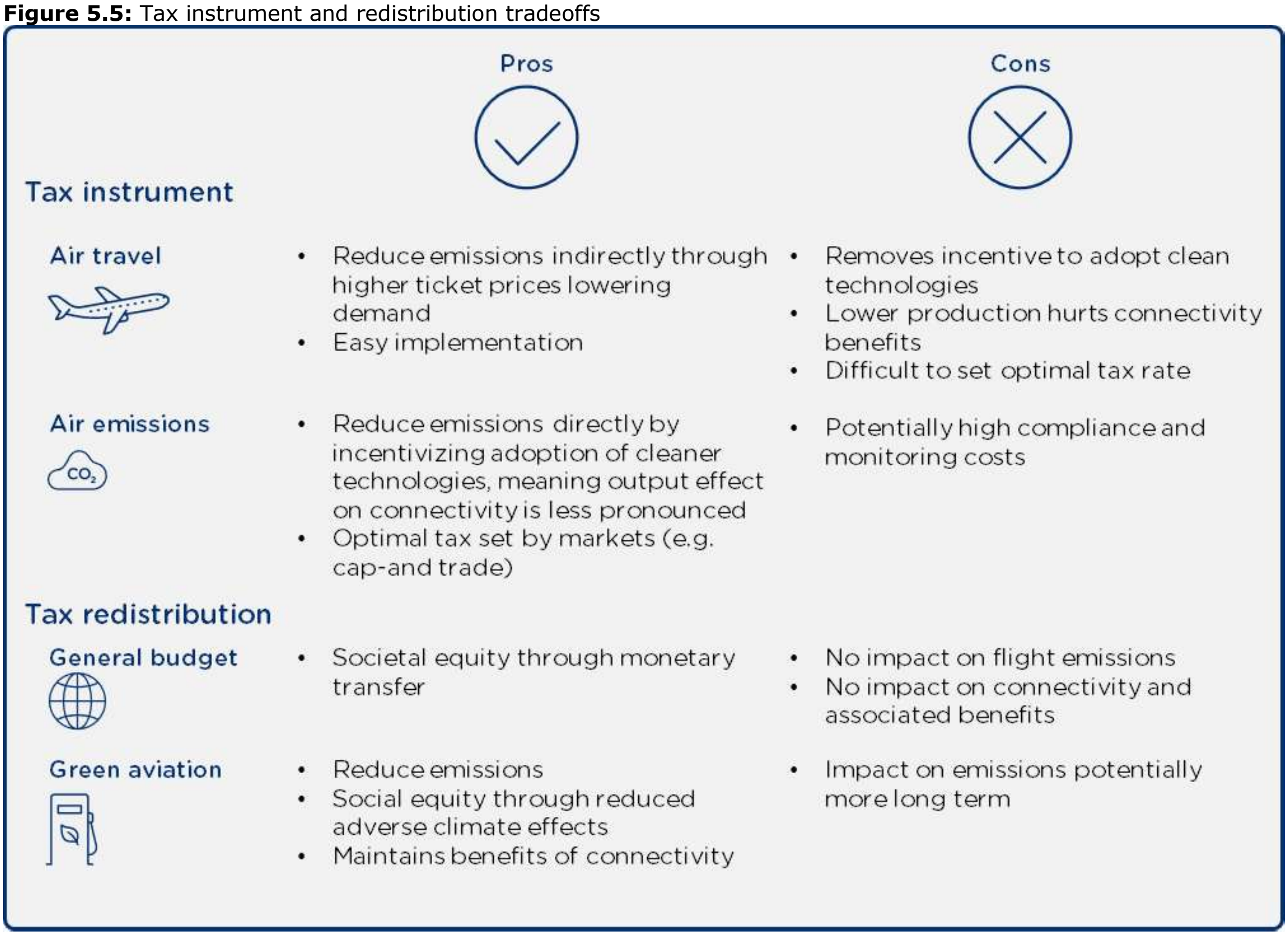
In summary, these two revenue neutral strategies tend to follow one of two paths. Either they reduce the number of flights, which helps lower emissions but may also reduce the benefits of air connectivity, or they maintain the number of flights while having limited impact on emissions. There is, however, a form of revenue redistribution that can obtain both lower emissions and maintain the benefits of connectivity.

This last approach that could allow for both continued levels of air travel and reduced emissions would be to invest the collected tax revenues in sustainable aviation initiatives. This includes funding the production and use of sustainable aviation fuels, supporting cleaner aircraft technologies, or enhancing infrastructure for electric or hybrid planes. These investments can have a long-term positive impact by lowering the marginal cost of operating flights. As airlines transition to cleaner technologies, the private cost of flying decreases due to lower fuel consumption and better energy efficiency. As a result, the social cost of emissions also falls, because cleaner technologies generate less pollution per flight. This narrows the gap between private and social costs and directly addresses the environmental externality.
Investing in sustainable aviation not only encourages technological improvements, but also helps align private incentives with broader societal goals. In other words, it brings the market closer to a socially optimal outcome while maintaining the benefits of connectivity.

As outlined earlier in Box 5, reinvesting carbon tax revenues into cleaner aviation technologies presents a promising way to reduce emissions without compromising current levels of air connectivity. By supporting the transition to more sustainable operations, such an approach could help reconcile two important policy objectives: decarbonisation and continued access.

In sum, the way aviation is taxed — and how tax revenues are used — can significantly influence both climate outcomes and regional connectivity. Emissions-based taxation, when paired with targeted reinvestment, appears to offer a pragmatic route toward aligning environmental and socioeconomic goals. These insights are summarized below.

Figure 5.5: Tax instrument and redistribution tradeoffs



	Pros	Cons
Tax instrument		
Air travel	• Reduce emissions indirectly through higher ticket prices lowering demand • Easy implementation	• Removes incentive to adopt clean technologies • Lower production hurts connectivity benefits • Difficult to set optimal tax rate
Air emissions	• Reduce emissions directly by incentivizing adoption of cleaner technologies, meaning output effect on connectivity is less pronounced • Optimal tax set by markets (e.g. cap-and trade)	• Potentially high compliance and monitoring costs
Tax redistribution		
General budget	• Societal equity through monetary transfer	• No impact on flight emissions • No impact on connectivity and associated benefits
Green aviation	• Reduce emissions • Social equity through reduced adverse climate effects • Maintains benefits of connectivity	• Impact on emissions potentially more long term

Our final remarks to the generalizability of the economic framework utilized in this chapter, is summarized in the box below.

Box 6: Qualifications to economic framework for emissions and taxation

The argumentation in the economic framework utilized in this analysis uses simplified models and arguments. Some qualifications are thus in place. Generally, however, the arguments proposed offers a simple framework for understanding key differences between taxation principles towards achieving the goal of lowering emissions from air travel.

Quantity and emissions

In the market diagrams of the chapter, the introduction of a tax results in the move from a high level of air travel (Q^1) to a lower level (Q^2). This happens since a new higher price means some passengers will choose not to fly. Since fewer passengers need to be moved by airplane, this could mean that an operator on the route between Copenhagen and Oslo chooses to close one of its daily departures. This would in turn reduce emissions. However, there is an implicit assumption in this example, where lower quantity leads to lower emissions, since operators take routes out of operation. In reality, there is no guarantee that this will occur. This is expanded below.

First, how ”much” the quantity will drop depends on the elasticity of demand for air travel. The elasticity of demand tells us how much a change in prices affect quantity demanded. If demand is inelastic, then a change in price only modestly affect quantity demanded. As previously mentioned, elasticity of demand on a route level is dependent on multiple things – e.g. number of business travelers (often more inelastic), credible alternatives (often more elastic) or route characteristics (long haul often more inelastic)[1] etc. Still, some demand response is expected for a price change.

Second, whether a quantity decrease will actually lead to less emissions is uncertain. A route might continue operating, but with a higher number of vacant seats, if the drop in passenger numbers is not high - which especially is the case if demand is inelastic. These dynamics offer important qualifications to the actual effects, that would materialize.

Competitive landscape

The price-quantity figures present a scenario where marginal costs and marginal benefits determine the price. This setting is known as Bertrand competition in economic theory, where firms offer homogenous goods and compete on price to attract customers. However, airlines might to a larger degree operate under quantity (or “Cournot”) competition. Routes are planned months ahead, while prices are set afterwards. Additionally, factors such as route capacity, service differentiation, and network effects mean that the classical Bertrand model does not necessarily hold. Even though a complete analysis of these competitive dynamics falls beyond the scope of this discussion, it is important to note that when competition takes a quantity-based form, the resulting outcome in the market tends to be a lower quantity supplied. In this sense, the competitive landscape of the airline industry might effectively yield an outcome closer to the socially optimal quantity, simply due to the fact that it is not in their best (economic) interest to set price and quantity that the Bertrand scenario might suggest.

Spillover-effects

When taxes on aviation are determined at the national level, there is a risk that airlines will shift their operations to neighboring countries or airports where such taxes are not in place, especially if passengers can easily switch between countries of departure. Such migration may undermine the environmental and economic goals of the tax, as the reduction in domestic flights could be offset by increased activity elsewhere. The degree of this spillover effect depends on factors such as geographic proximity and available route alternatives. While especially relevant when an alternative airport in another country is nearby, the actual effect of spillovers in the Nordics are outside the scope of this analysis.

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