

REPORT

BRAZILIAN-NORWEGIAN TRADE RELATIONS AND EXPORT OPPORTUNITIES



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Preface

On behalf of the Norwegian Consulate General in Rio de Janeiro, Menon Economics has conducted a study on Brazilian-Norwegian trade relations and export opportunities. This report provides an overview of trade between Norway and Brazil, as well as sectors with high potential for Norwegian companies. The work has been conducted by Per Fredrik F. Johnsen as project leader and Odin Dager Moe as project member. Jonas Erraia is the responsible partner.

Menon analyses economic issues and provides advice to companies, organizations, and authorities. We combine economic and commercial expertise in fields such as industrial organization and competitive economy, strategy, finance, organizational design, and social profitability. We use research-based methods in our analyses and work closely with leading academics within our field of work.

We thank the Norwegian Consulate General in Rio de Janeiro for an exciting project. We would also like to thank everyone who has contributed with discussions, data, and valuable input during the process. The authors are responsible for all content in this report.

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Executive summary

Since the establishment of diplomatic relations in 1908, Brazil and Norway have been partners in a range of areas, including political and economic cooperation. Despite being situated on opposite sides of the globe, Brazil and Norway have had a longstanding relationship going back to the first shipment of Norwegian bacalhau in Rio de Janeiro in 1843. Over the years, economic relations between the two nations have evolved and today Brazil is one of Norway's most important non-European economic partners.

In this report, we offer an overview of the economic ties between Norway and Brazil, before presenting a framework for identification of high potential markets and sectors for Norwegian companies. Using this framework, we have identified five markets, which we deem to be highly attractive for Norwegian companies. Finally, we address measures to stimulate exports to Brazil and enhance the success of Norwegian companies in the Brazilian market.

Brazilian-Norwegian trade relations and Norwegian investments in Brazil

Brazil is one of Norway's most important trading partners outside of Europe. Norwegian exports of goods and services amount to NOK 13.5 billion, of which NOK 9.1 billion were exports of goods and 4.4 billion were services. Export of goods mainly consists of chemicals and industrial goods, in addition to seafood. Export of services is primarily related to sea transportation and offshore supply services. Over time, we find that the Norwegian export of goods to Brazil has increased, whereas the export of services has declined.

Even though exports are more directly related to Norwegian job creation and GDP, imports are important through supporting production in Norwegian industries. Brazil, with an abundance of natural resources such as ores and farmable land, is an important provider of goods to Norwegian companies. Norway's import from Brazil amounted to NOK 18 billion in 2022, of which 92 percent were import of goods. Over half of Norwegian goods imports from Brazil were bauxite, an essential raw material for Norway's large aluminium industry. Other chemical products include silicon, silicon products and ammonia. In addition, Norway imports soybeans as an important input in both aquaculture and agriculture in Norway.

In addition to direct trade relations, Norwegian companies have a significant presence in Brazil through production facilities and sales offices. **More than 21,100 Brazilians work in Norwegian multinational companies.** This is the second highest of any country after Sweden. Also, in terms of foreign direct investment (FDI), Brazil is among Norway's most important partners. Only Sweden, the Netherlands and Germany attract more FDI from Norway than Brazil, meaning that Brazil is the largest FDI recipient outside the EU. **Norwegian companies in Brazil have an estimated annual revenue abroad of NOK 93 billion.**

Export opportunities for Norwegian companies in Brazil

Increasing exports is an important focus area for the Norwegian government. The stated aim of the current government is to increase exports, excluding oil and gas, by 50 percent by 2030. As a result, the government launched the export reform "The whole of Norway exports" in 2022.

To identify Brazilian export markets of particular interest for Norwegian companies, we have developed a framework which considers:

- 1) Brazil's market potential
- 2) Norwegian companies' capabilities to tap into this potential

The figure below summarises the framework.



Given Norway’s comparative strengths and market position in different industries, the distance to the Brazilian market, and existing trade relations and presence, we have identified five industries with high potential:

- Large technical potential for offshore wind, combined with experience with offshore petroleum extraction and a well-developed offshore supply industry makes Brazil an attractive market for offshore wind. Norwegian knowledge and experience from the petroleum and the maritime industries, both in Norway and Brazil, make Norwegian companies well-positioned in Brazil’s offshore wind industry. Overall, there is significant potential for Norwegian players in the **offshore wind industry** in Brazil.
- Brazil is expected to be an important player in the global **hydrogen industry**. Due to its vast renewable energy resources, the country has great opportunities to harness its clean energy to foster a low carbon hydrogen industry. This, combined with government initiatives as a part of the commitment to build a low carbon hydrogen economy, makes Brazil’s hydrogen industry attractive. The Norwegian hydrogen industry consists of both hydrogen and ammonium production and distribution, as well as equipment and technology distribution and service providers. For Brazil, Norway’s advancements in hydrogen can offer valuable insights and collaborations as several Norwegian players expect to invest in production facilities outside of Norway.
- Today, the market for offshore suppliers in Brazil is substantial and Norwegian companies are important providers of supply services. The demand for **offshore supply services** in Brazil is likely to increase as oil production is likely to rise, and both the offshore wind industry and the floating solar power market are expected to accelerate. The increased demand in the Brazilian market is an obvious opportunity for the world leading Norwegian offshore supply industry which already has a strong presence in Brazil.
- Brazilian demand for **shipping services** is expected to rise due to several factors. The government has launched a programme to incentivise more transport at sea, which will increase demand for shipping services. In addition, offshore activity is likely to rise as both petroleum production, offshore wind activity and offshore solar power increase. Increased offshore activity translates into increased demand for vessels and maritime services and technology as the demand for sea transportation increases. As a result, Norway's maritime industry with its complete value chain sees a significant growth potential in the Brazilian market.
- The Brazilian market for seafood is large, and in 2017 Brazil was the world’s 10th largest seafood importer. In addition, the demand for seafood is expected to grow. The Norwegian **seafood industry** is well positioned to capture market opportunities in Brazil. Norway is now the largest exporter of seafood in the world in terms of export value. Due to increasing demand from Brazil along with the leading position of Norwegian seafood companies, there is a potential for Norwegian seafood exporters in Brazil, especially for high-end products like Atlantic salmon.

In addition, we highlight potential opportunities in **solar power** and **battery technology**. These industries are not as clear cut in terms of both the opportunities in the Brazilian market or in terms of Norwegian companies' comparative advantage to grasp opportunities. Nevertheless, cooperation between Norway and Brazil in these sectors might be prove fruitful in the future.

1. Background and introduction

Despite being situated on opposite sides of the globe, Brazil and Norway have a longstanding relationship going back to when the first ship with Norwegian bacalhau arrived in Rio de Janeiro in 1843. Since the establishment of diplomatic relations in 1908, Brazil and Norway have maintained diplomatic missions in each other's capitals, fostering closer political and economic cooperation. The ties between the two countries have mainly been driven by economic and trade interests, as well as cultural exchange.

Economic relations between Norway and Brazil have been particularly strong in recent decades. Norway has been a major investor in Brazil, especially in the fields of oil and gas, shipping, and renewable energy. Norwegian companies have played an important role in the development of Brazil's oil and gas sector, with significant investments in exploration, production, and technology transfer. Moreover, Brazil is an important trading partner for Norway, primarily in the export of fisheries products and machinery. On the other side, Brazil exports commodities such as iron ore, soy beans and meat to Norway. The trade relationship has been mutually beneficial and has contributed to the growth of the bilateral economic ties.

In recent years, environmental issues and sustainable development have gained prominence on the bilateral agenda. Norway has provided significant financial assistance to Brazil in its efforts to combat deforestation in the Amazon rainforest through the Amazon Fund. This collaboration has demonstrated a joint commitment to preserving the environment and promoting sustainable practices. Overall, the historical ties between Norway and Brazil have been shaped by economic interests, cultural exchanges, and shared concerns for environmental sustainability. These ties continue to strengthen, creating a solid foundation for future cooperation in various fields.

The report is structured as follows: In chapter 2 we present an overview of Brazilian-Norwegian trade relations before we dive into Norwegian investments in Brazil in chapter 3. In chapter 4 we present identified export opportunities for Norwegian companies in Brazil.

2. Brazilian-Norwegian trade relations

Brazil is one of Norway’s most important trading partners outside of Europe. Norwegian exports of goods and services amount to NOK 13.5 billion, of which NOK 9.1 billion were exports of goods and 4.4 billion were services. Export of goods mainly consists of chemicals and industrial goods, in addition to seafood. Export of services is primarily related to sea transportation and offshore supply services. Over time the export of goods has increased, whereas the export of services has declined. Norway imported goods and services from Brazil totalling NOK 18 billion in 2022, the majority of this was goods imports (92 percent). Most Norwegian goods imports from Brazil are made up of bauxite, silicon products, ammonia, soy beans, coffee, fruit and vegetables.

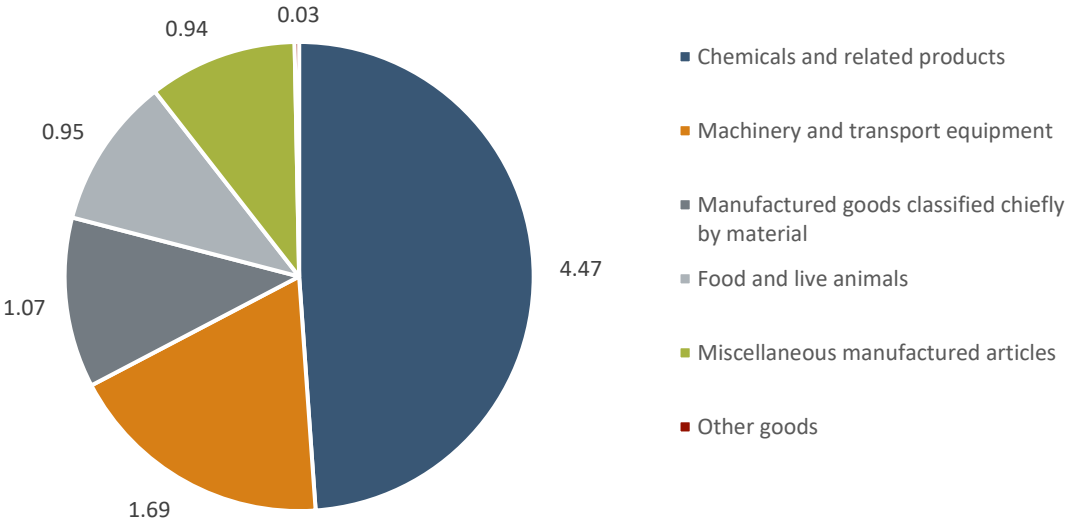
In this chapter we present an overview of the trade in goods and services between Brazil and Norway, and its development over time.

2.1. Norwegian exports to Brazil

2.1.1. Trade in goods

In 2022, the value of Norwegian exports of goods to Brazil amounted to NOK 9.1 billion, which accounted for around 0.4 percent of Norway’s overall export market. Brazil ranked as the 21st largest export market for Norwegian goods in 2022, and the 8th largest export market outside of Europe. The graph below illustrates the distribution of total goods exports from Norway to Brazil across various commodity categories.

Figure 1. Exports of goods from Norway to Brazil. Measured in NOK billion. 2022. Source: Statistics Norway

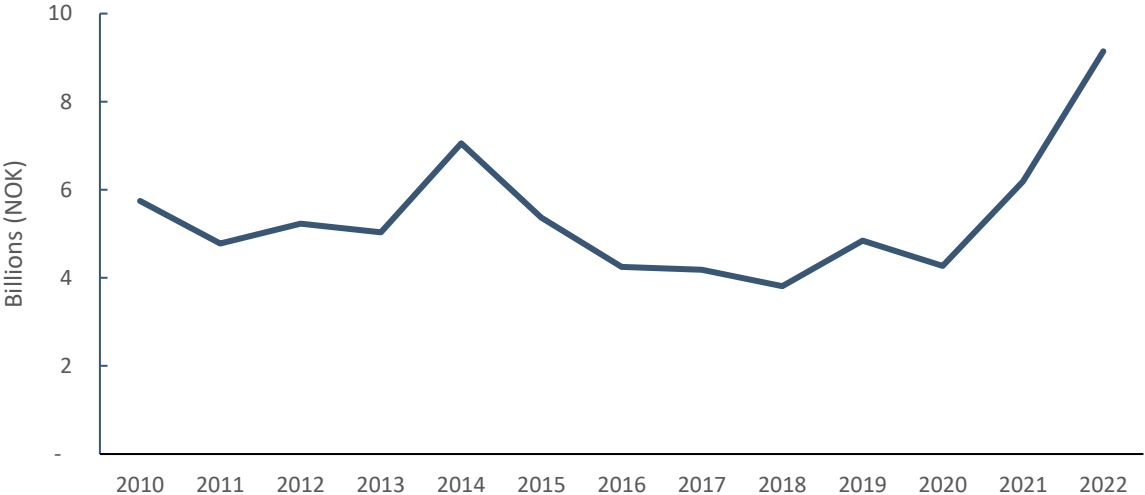


In terms of export value, *chemicals and related products* comprised nearly 50 percent of Norway’s goods exports to Brazil, amounting to NOK 4.5 billion. In addition, within the *chemicals and related products* category, the largest subcategory was *chemical materials and products*, which had an export value of NOK 3.9 billion. Yara is one of the largest producers of fertilizers in the world, has production both in Norway and Brazil and makes up a large portion of chemical export. Other products include silicon where Norway has large producers like Hydro and Elkem. In 2022, Brazil stood out as the largest export market for Norwegian chemical materials and products.

The second largest commodity group, in terms of export value, was *machinery and transport equipment*. This category is dominated by machinery and equipment supplied to the offshore industry, including products like measurement instruments. Exports of manufactured goods exceeded NOK 1 billion, primarily driven by the export of non-ferrous metals like nickel. Norway also exported food and live animals, as well as miscellaneous manufactured articles, each worth just shy of NOK 1 billion. The former category mainly consists of seafood, while the latter includes professional and scientific control instruments, probably supplied to the offshore industry.

The graph below illustrates the historical development of the value of goods exported from Norway to Brazil between 2010 and 2022. The data reveals a notable surge in export value from 2013 to 2014, followed by a decline starting in 2015 and continuing thereafter. However, from 2020 to 2022, there was a resurgence in exports, with the export value in 2022 doubling over just two years.

Figure 2. Exports of goods from Norway to Brazil, 2010-2022. Source: Statistics Norway



The significant increase in the value of exports since 2020 is a result of both higher export prices and increased volume exported. Since 2020, there has been a remarkable 116 percent increase in the export value, while the volume of exports increased by 76 percent.

In short, there are two possible reasons for the increase in overall export prices: composition effects (more exports of goods with high prices relative to goods with lower prices) or an increase in the price of each good. The composition of goods exported to Brazil remained relatively stable from 2020 to 2022. The most noteworthy change in this context was the increase in the share of chemical materials and products in the export volume, which rose from 87 percent to 92 percent. This category encompasses products with relatively low export prices. Hence, it is reasonable to assume that composition effects have not had a major impact on the overall increase in export prices. Instead, the sharp increase in commodity prices, especially prices on aluminium, is more likely to have driven the increase in overall export prices.

The significant growth observed from 2020 to 2022 can be attributed mainly to the increased exports of chemical materials and products. The export value of these commodities in 2022 was nearly five times higher than in 2020, fuelled by a substantial rise in export prices for these goods. More specifically, prices increased by more than 160 percent, while export quantity increased by 88 percent. Within the chemical materials and products category, the growth in exports of fertilizers has been particularly strong. This is also reflected in Yara’s annual

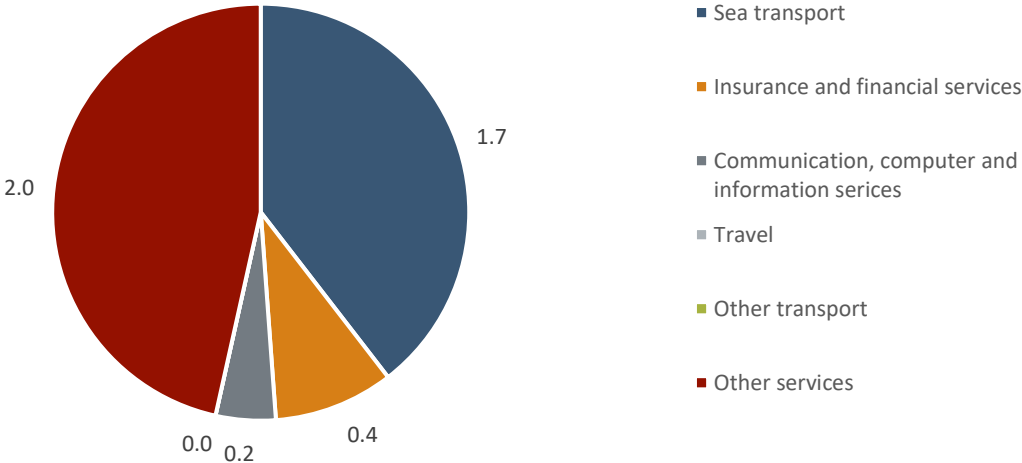
report from 2022, where they state that external revenues from Brazil increased by 34 percent from 2021 to 2022.¹

Additionally, the strong growth in export value was also supported by a robust increase in exports of professional and scientific control instruments, likely driven by heightened demand from the offshore industry following the surge in oil prices. Moreover, the export value of non-ferrous metals experienced a growth of over 60 percent over the two-year period.

2.1.2. Trade in services

In 2021, the total value of Norwegian exports of services to Brazil amounted to approximately 4.4 billion NOK, accounting for roughly 1.2 percent of Norway's overall export market for services. Since Statistics Norway does not publish service exports to Brazil by service category, we do not have information on the specific services Norway exports to Brazil. However, we do have information on the services Norway exports to Latin America and the Caribbean as a whole. From 2011 to 2021, service exports to Brazil represented between 36 and 54 percent of the service exports to this region. Therefore, it is reasonable to assume that the composition of service exports to Latin America and the Caribbean can provide an indication of the composition of service exports to Brazil. Hence, we use the industry composition of service exports to Latin America and the Caribbean as a key to distribute service exports on industries in Brazil. The graph below illustrates the export of services from Norway to Brazil in 2021.

Figure 3. Estimated exports of services from Norway to Brazil. Measured in NOK billion 2021. Source: Statistics Norway

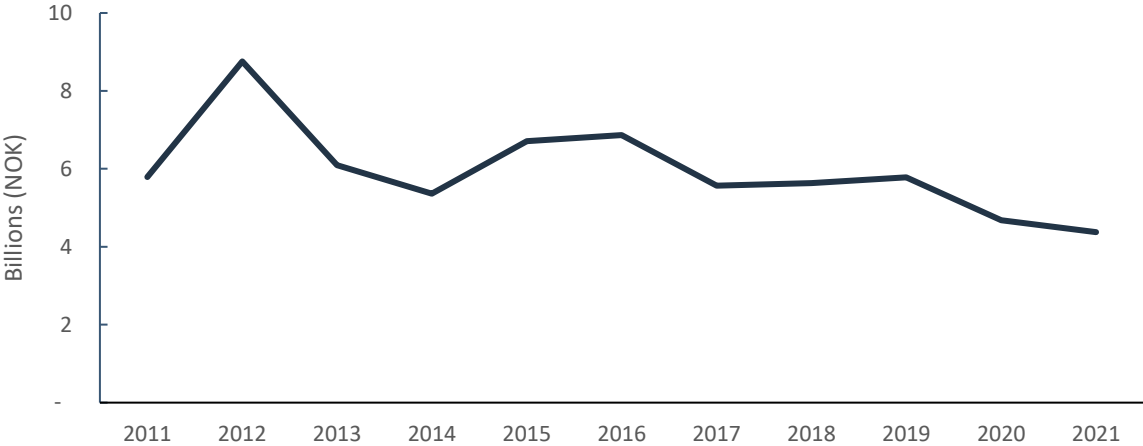


The largest share of service exports was in "other services" and "sea transport." The former likely includes services related to offshore activities. Norwegian companies such as Dof, Subsea 7 and Solstad Offshore have all entered into agreements with major offshore players in Brazil, including Petrobras, to provide offshore services in recent years.² Although "sea transport" might also include some offshore activity, it mainly contains export of services related to the maritime transportation of goods.

¹ <https://www.yara.com/siteassets/investors/057-reports-and-presentations/annual-reports/2022/yara-integrated-report-2022.pdf/>
² <https://cdn.sanity.io/files/loal7n8w/inno-prod/1e33174e3605252275547dbde91a445196748292.pdf>

Total service exports from Norway to Brazil have declined by 25 percent from 2011 to 2021. Over the same period, exports from Norway to Latin America and the Caribbean have decreased by 14 percent. This decline can primarily be attributed to a decrease in exports of "other services" and "sea transport." Given Brazil's significant share of the Norwegian export market in this region, it is likely that decreased exports in these sectors have contributed to the decline in service exports to Brazil as well.

Figure 4. Total value of exports of services from Norway to Brazil, 2011-2021. Source: Statistics Norway



2.2. Imports from Brazil

Even though exports are more directly related to Norwegian job creation and GDP, imports are important through supporting production in Norwegian industries. Brazil, with an abundance of natural resources such as ores and farmable land, is an important provider of goods to Norwegian companies.

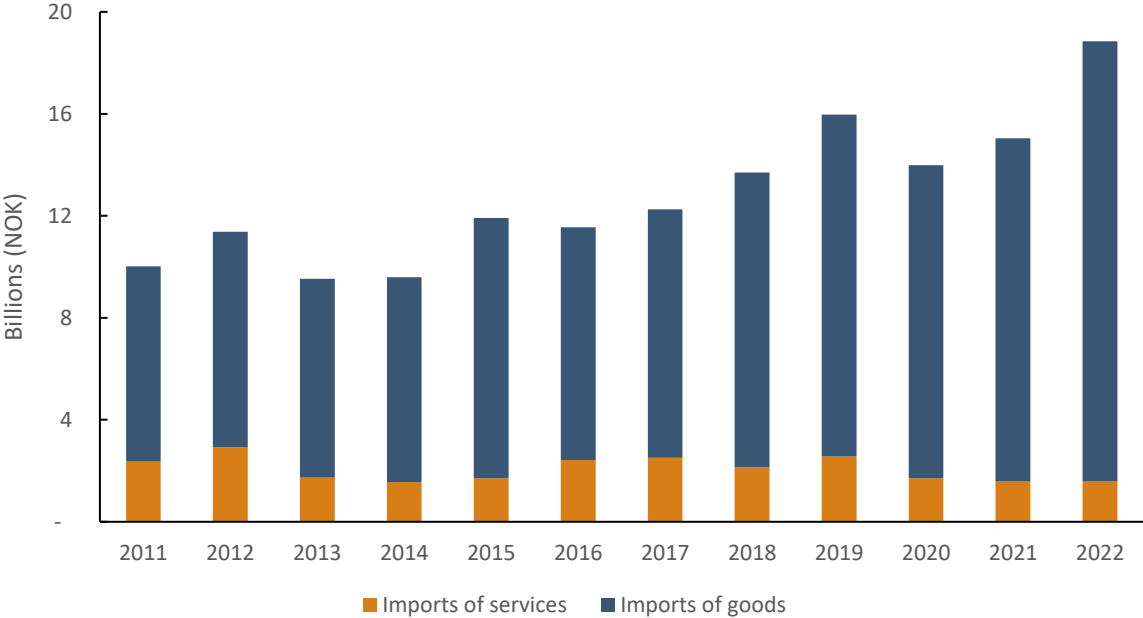
Norway imported goods and services from Brazil totalling NOK 18 billion in 2022. Out of this, NOK 17 billion, or 92 percent, was import of goods. A substantial 47 percent of the goods imported were classified as "Metalliferous ores and metal scrap". Ores are essential input factors in several Norwegian industries, such as aluminium production, construction, and the process industry. Bauxite, containing aluminium oxide, for Norway's large aluminium industry amounted to NOK 8.1 billion in 2022. This is an essential input in Hydro's production. Other products include silicon products and ammonia. In 2022, Norway imported "Metalliferous ores and metal scrap" for a total of NOK 54 billion, with 15 percent of this import originating from Brazil. Additionally, "Feeding stuff for animals" accounts for a significant portion of Norway's goods import from Brazil. Brazil is the world's largest producer and exporter of soybeans. Norway imported soybeans worth almost NOK 2 billion in 2022. In addition to soy beans, Norway imported NOK 3 billion worth of other preparations used in animal feeding. Brazil is also one of the leading coffee producers in the world, and Norwegian imports of coffee amounted to almost NOK 1 billion, as Norway is one of the world's largest consumers of coffee per capita. Finally, Norway also imported large amounts of fruit and vegetables from Brazil.

Similar to service exports, we do not have access to data for service imports from Brazil to Norway by service category. However, in contrast to the export side, service imports from Brazil constituted only 17 percent of the total service imports from the region. Therefore, the composition of service imports in Latin America and the Caribbean may not necessarily be representative of service imports from Brazil.

Import from Brazil to Norway has seen nearly a 90 percent increase in the period from 2011 to 2022. As depicted in the figure below, this growth has been exclusively driven by an increase in goods imports. The growth in goods

imports has mainly been fuelled by an increased import of "Feeding stuff for animals" and "Oil seeds and oleaginous fruits".

Figure 5. Imports of goods and services from Brazil to Norway, 2011-2022. Source: Statistics Norway



3. Norwegian investments in Brazil

Norwegian investments in Brazil are considerable, both through Norwegian companies and Norges Bank Investment Management (NBIM). Brazil has the second most jobs in Norwegian multinationals abroad with 21,100 employees. Furthermore, Brazil attracts the most FDI from Norway outside of Europe, generating revenues of NOK 93 billion for Norwegian multinationals and value for Norwegian owners, and thus contributions to Norwegian GDP. Manufacturing is by far the industry in Brazil with the most jobs in Norwegian multinationals with 13,200 employees, as Norwegian industrial giants like Hydro and Yara have more employees in Brazil than in Norway. It is not only Norwegian businesses that invest in Brazil. The Norwegian government is heavily invested through NBIM, which currently has USD 5.7 billion in investments in Brazil.

Brazil is the fifth largest country in the world by area with vast natural resources and a flourishing economy. As a result, Brazil attracts investments from across the globe. Norwegian investments in Brazil are considerable, both in terms of Norwegian companies' investments as well as the Norwegian "oil fund", NBIM.

3.1. Norwegian multinationals in Brazil

Several large Norwegian multinationals have offices and production facilities in Brazil. In terms of number of jobs, Brazil is the country in the world with the second most jobs in Norwegian multinational companies after Sweden. This is a remarkable feature, considering the distance between the two countries and Norway's tight economic and cultural relations with other large markets, such as the US, Germany, and the UK. The figure below shows the number of jobs in Norwegian multinationals by country.

Figure 6: Top 10 countries by number of jobs in Norwegian multinational companies. Source: Statistics Norway

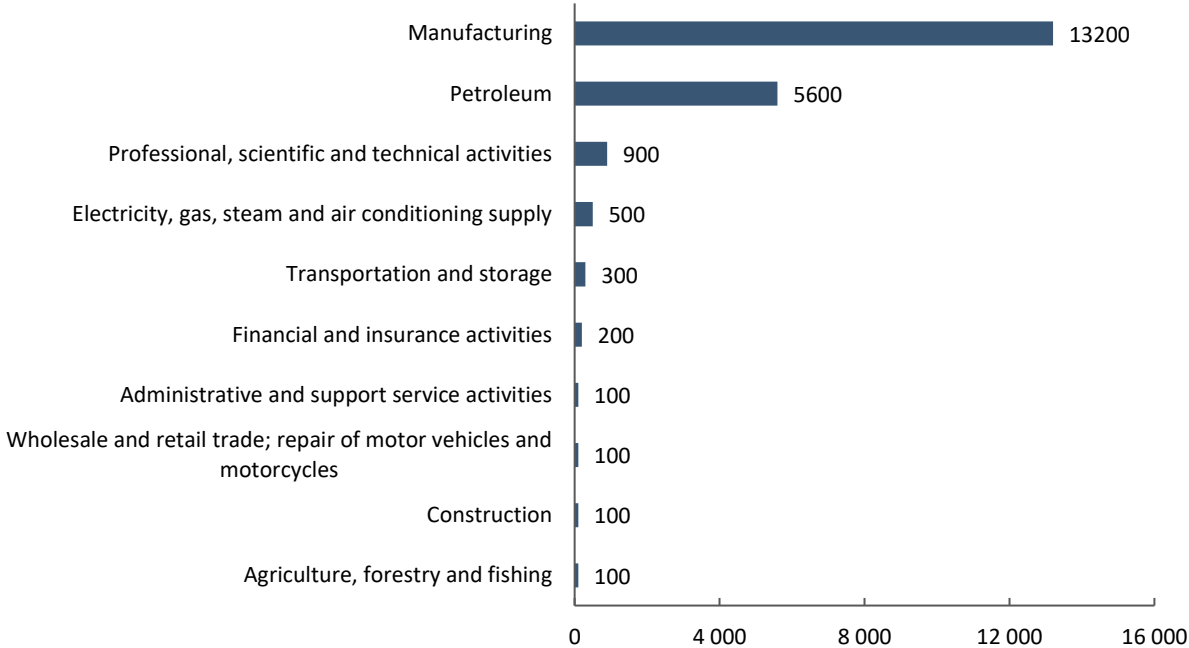


Norwegian multinationals have 21,100 employees in Brazil, the most of any country except close neighbour Sweden. This reflects the fact that Norwegian multinationals have made considerable investments in production facilities in Brazil.

In terms of foreign direct investment (FDI), Brazil is among the largest recipients. Brazil attracts the most FDI from Norway outside of Europe. Only Sweden, the Netherlands and Germany attract more FDI from Norway than Brazil. Through their investments in production in Brazil, Norwegian companies generate vast income streams. Norwegian companies in Brazil have an estimated revenue abroad of NOK 93 billion and the employment in Brazil accounts for 82 percent of employees in Norwegian companies in South America.³ Through revenues in Brazil, Norwegian multinationals generate value for Norwegian owners and contribute to the Norwegian economy.

We have calculated employment by industry in Norwegian multinational companies by utilizing data from Statistics Norway and Orbis.⁴ Statistics Norway provides employment data by industry for South America. To estimate industry-specific employment in Brazil, we employed a combination of the South America-wide industry distribution along with company-level data from Orbis. Given that Brazil accounts for over 80 percent of employment in Norwegian multinational companies in South America, we have a high level of confidence in the accuracy of this estimate. The figure below shows how the employment of Norwegian multinationals in Brazil is distributed across industries.

Figure 7: Number of employees in Norwegian multinationals by industry in 2022. Source: Statistics Norway, Orbis and Menon



Manufacturing is by far the industry in Brazil with the most jobs in Norwegian multinationals. 63 percent of jobs in Norwegian multinationals are in the manufacturing industry. Norwegian industrial giants like Hydro and Yara actually have more employees in Brazil than in Norway. Hydro has 6,200 employees across 11 locations in Brazil, while Yara has 5,200. Combined, these two companies constitute more than half of the employment in Norwegian multinationals in Brazil. Other manufacturing companies with considerable Brazilian employment include Elkem, Jotun, Kongsberg Automotive and Denofa.

³ Revenue abroad is estimated under the assumption that the share of Brazil’s employment among Norwegian multinationals in South America is the same as its share of South American revenue.
⁴ Orbis is an international database containing company information for more than 460 million companies.

Norwegian companies in the petroleum industry have 5,600 employees in Brazil. Large companies such as Equinor and Aker Solutions have large operations in the oil and gas industry in Brazil. Equinor has more than 800 employees in Brazil, the most out of any country outside of Norway. The industry also captures offshore suppliers like Seadrill and PGS.

Norwegian companies which provide professional scientific and technical activities collectively employ 900 persons in Brazil. Within the industry, there are several providers of engineering, consulting and research services related to the petroleum industry, such as TGS, IKM Subsea, Resman and Rystad Energy.

Other industries with a considerable number of jobs in Norwegian multinationals are electricity producers, most notably Statkraft with over 200 employees in Brazil. In addition, there are 300 employees in transportation, which mainly covers shipping companies, and 200 in financial activities which mainly consist of investment companies.

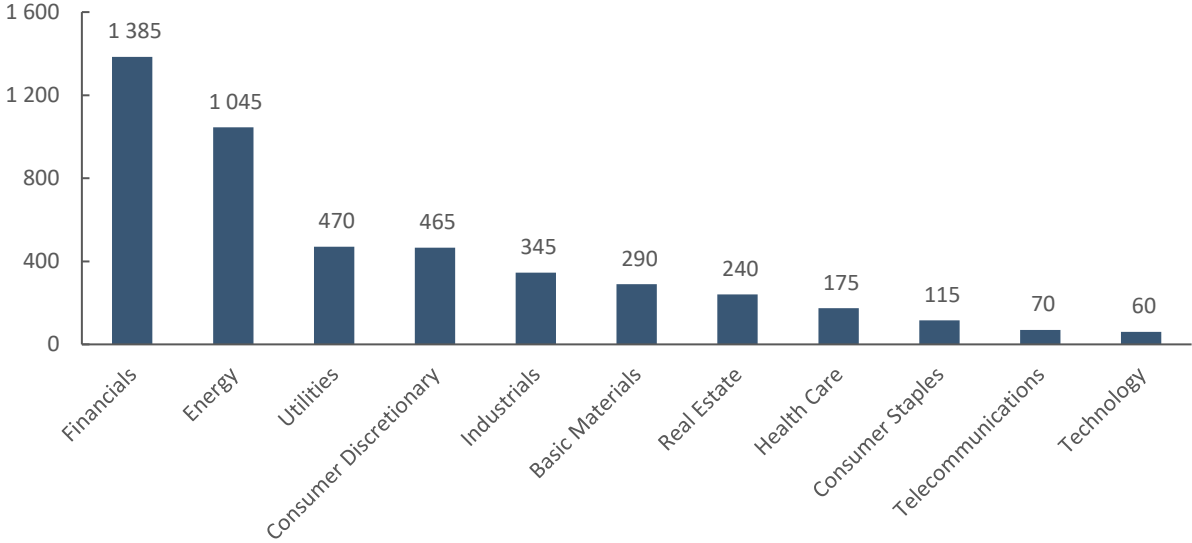
3.2. Investments by NBIM

Norges Bank Investment Management (NBIM) is the largest sovereign wealth fund in the world, and invests in a wide range of asset classes, including equities, fixed income, and real estate, across various regions and markets. The goal of the fund is to preserve wealth for current and future generations of Norwegians. The fund's objective is to invest in a globally diversified portfolio to achieve the highest possible return while adhering to principles of responsible and ethical investing.

The fund's investments are benchmarked against a reference index established by the Norwegian Ministry of Finance. The reference index is determined based on indices from FTSE Group and Bloomberg Barclays Indices. The index largely dictates how the fund is invested, both in terms of the ratio between stocks and bonds and the sectors and countries in which the fund invests. Brazilian companies accounted for 0.66 percent of the reference index as of the end of July 2023.

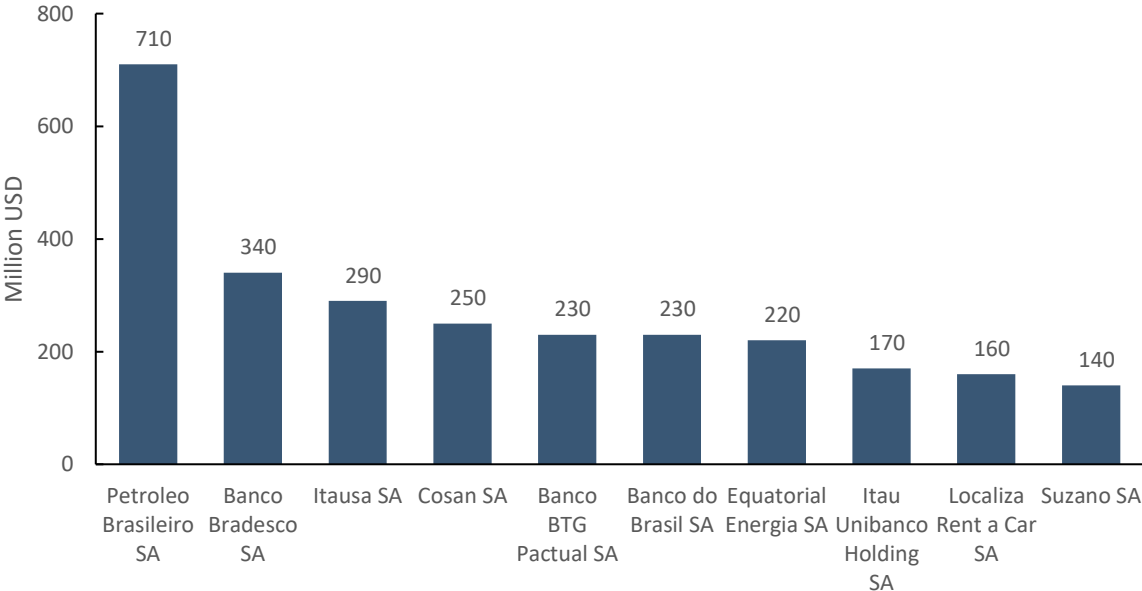
Currently, NBIM has invested approximately USD 5.7 billion in Brazil. This constitutes approximately 0.5 percent of all the fund's investments. Out of this, approximately USD 4.7 billion is invested in a total of 127 publicly traded companies. The remaining billion is invested in Brazilian government bonds. The figure below illustrates how the fund's equity investments in Brazil are distributed across different sectors.

Figure 8. NBIM’s equity investments in Brazil as of August 2023, distributed across different sectors. USD million. Source: NBIM



As seen in the figure, over half of the fund’s investments in Brazil are allocated to the financials and energy sectors. In the former category, the fund has a total of 12 investments, with the largest investments in companies like Banco Bradesco, Itausa, and Banco BTG Pactual. Out of the fund’s investments of approximately USD 1 billion in the energy sector, over USD 700 million is invested in Petrobras. This is also the fund’s largest individual investment in the country. This is also shown in the figure below, which displays the fund’s top 10 individual investments in Brazil.

Figure 9. NBIM’s largest equity investments in Brazil as of August 2023. Source: NBIM



4. Export opportunities

We have built a framework that is designed to identify industries with high potential. Firstly, there must be specific opportunities in the sectors or factors which make Brazil an interesting market. Secondly, we consider whether Norwegian companies have something to offer in the Brazilian industry. Considering Norway's comparative strengths and market position in different industries, the distance to the Brazilian market and existing trade relations and presence, we have identified five industries with high potential for Norwegian companies. The five industries are offshore wind, hydrogen, maritime industry, offshore suppliers, and seafood.

Increasing exports is an important focus area for the Norwegian government. The stated aim of the current government is to increase exports, excluding oil and gas, by 50 percent by 2030. As a result, the government launched the export reform "The whole of Norway exports"⁵ in March of 2022. The aim of the program is to reach the export ambitions by uniting government, businesses, and organisations to promote Norwegian businesses. One of the initiatives of the reform is the creation of a national export council to advise the government. The reform seeks to align the government with businesses to work strategically to develop proposals for 5-10 major strategic export initiatives/industries. As of September 2023, five export industries are explicitly mentioned as of special interest for Norwegian exports. These five industries are offshore wind, the maritime industry, the design and finished goods industry, health care and life science, and tourism.

As we have seen in the previous two chapters, the Brazilian economy is already quite important for both employment and GDP in Norway. This does not mean that the possibilities for economic trade and cooperation have been exhausted. On the contrary, we have identified a series of high-potential sectors where both Norwegian companies and the Brazilian economy will benefit from increased trade. These will be presented in the following chapter. In addition, we provide action points for the Norwegian government to capitalise on the opportunities in Brazil.

In this report, we have built a framework that is designed to identify high-potential sectors. For any given sector in Norway, we start by considering whether the market in Brazil is of particular interest for Norwegian companies. Brazil is very distant from Norway, both in terms of geographical location and culturally, compared to e.g. neighbouring European countries or even the US. There must be specific opportunities in the sectors or other factors which make Brazil an interesting market. Three factors are particularly relevant when considering if Brazil is an interesting market for the sector in question:

- Market size
- Ambitions
- Resource availability

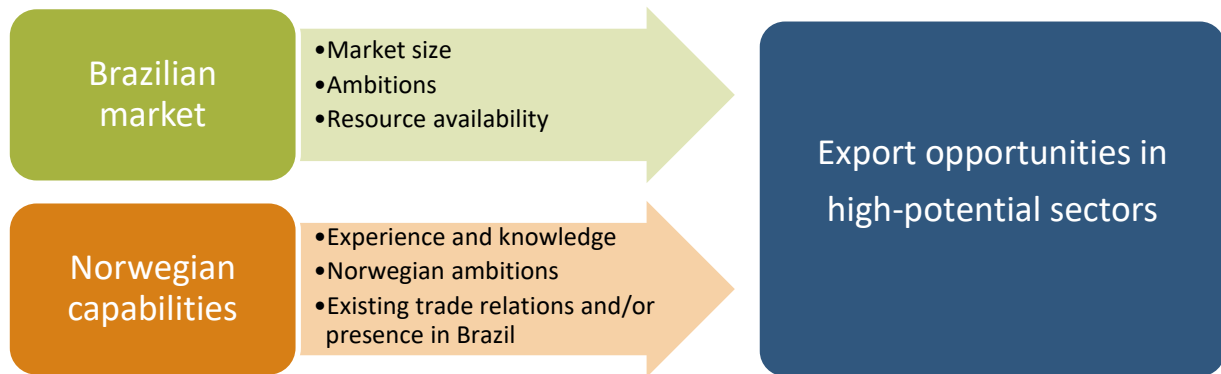
Secondly, we consider what Norwegian companies have to offer in the industry. It is not sufficient that the Brazilian market is considered attractive for Norwegian companies if the Norwegian companies do not have the capabilities to tap into this potential. Specifically, we consider comparative advantages of Norwegian companies. We have identified three factors which we believe are important prerequisites for Norwegian companies to capitalize on the opportunities in the Brazilian market:

⁵ "Hele Norge eksporterer" in Norwegian

- Established sector in Norway with accumulated knowledge and experience
- Norwegian ambitions
- Existing trade relations and/or presence in Brazil

The figure below summarizes the framework.

Figure 10: Framework for identifying high-potential sectors for Norwegian companies in Brazil



Considering Norway’s comparative strengths and market position in different industries, the distance to the Brazilian market and existing trade relations and presence, we have identified five industries with high potential for Norwegian companies. The five industries are:

- Offshore wind
- Hydrogen
- Maritime industry
- Offshore suppliers
- Seafood

In the following we will provide a deep dive into the five industries, using the framework presented above. In addition, we highlight floating solar power and battery technology as industries with more immature value chains in a Norwegian-Brazilian context. Nevertheless, these two industries are of particular interest.

4.1. Offshore wind

Offshore wind is regarded as a necessary part of the transition to a low carbon society, through its potential to provide clean, reliable, and abundant energy. Today, offshore wind plays a relatively minor role in the energy mix in both Norway and Brazil. However, as the technology continues to improve and costs decrease, this is expected to change and for both countries, offshore wind is likely to play a significant role in their energy landscapes.

Brazil has 7,367 kilometres of coastline and 3.5 million square kilometres of maritime space under its jurisdiction. As a result, the technical potential for offshore wind in Brazil is large. A study by the Brazilian Energy Research Office, EPE, concluded that Brazil has potential to generate 700 GW in shallow water⁶, and the Energy Sector Management Assistance Program (ESMAP) estimates a technical potential in Brazil of 1,228 GW, including deep

⁶ https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-456/Roadmap_Eolica_Offshore_EPE_versao_R2.pdf

waters.⁷ Although the studies point to a large potential, the uncertainty related to the technical potential is considerable.

To our knowledge, the Brazilian government has no explicitly stated ambitions or goals for offshore wind, even though the industry is a priority. However, Brazil's government set out legal guidelines for the designation of key areas for offshore wind projects in 2022. As a part of these, parameters were set out to assign the use of physical space and the best use of natural resources for the development of offshore wind initiatives. As of June 2022, applications for 133 GW worth of future offshore wind projects were under review by the environmental regulator, Ibama. A growing interest in offshore wind has led to a surge in environmental license requests, totalling over 176 GW in requests for an average capacity of 2.7 GW per project.⁸

The industrial base of Brazil is highly complementary to offshore wind. It includes shipyards and the established presence of leading suppliers of turbines and other long lead items. In addition, Brazil has experience with offshore petroleum extraction and a well-developed offshore supply industry. Overall, Brazil's geography, in addition to Brazil's industrial base makes Brazil well positioned as an attractive market for offshore wind.

There is significant potential for Norwegian offshore wind companies in Brazil. Norwegian companies have advanced offshore expertise and technological insight, and they deliver high quality goods and services in addition, many of the relevant companies already have a presence in Brazil and/or have international experience. Examples of offshore wind technologies where Norwegian companies are leading include cables, floating wind concepts, and installations and maritime operations. Some Norwegian companies are already present in the Brazilian offshore wind market, most notably Equinor which signed an agreement with Petrobras for 7 projects with a combined capacity of 14.5 GW. Further, cooperation will promote synergies and provide international market access for Norwegian companies entering the offshore wind market.

Barriers for Norwegian companies include an immature legal framework for the offshore wind industry in Brazil, even though the framework is under development. Especially urgent is the need to define the rules for the right to use the sea.⁹ The Brazilian offshore wind industry is in its early stages with a lot of uncertainty, compared to the more mature industry in Europe. This uncertainty increases the risk Norwegian companies faces when considering investment decisions in the Brazilian offshore wind market.

4.2. Hydrogen

Hydrogen has received significant attention in recent years, due to its potential as a versatile energy carrier with a pivotal role to play in the global energy transition. Given its high energy content and environmentally friendly combustion products (primarily water), hydrogen is considered by many as an important fuel of the future. It is particularly important for the so-called hard-to-abate sectors, which cannot be electrified, including the production of fertilizer and steel.

The Green Hydrogen Organisation (GH2) expects that Brazil will be a key player in the global hydrogen market.¹⁰ Due to its large renewable energy resources, Brazil has opportunities to harness its clean energy to foster a low-

⁷ <https://documents1.worldbank.org/curated/en/902341586847107376/pdf/Technical-Potential-for-Offshore-Wind-in-Brazil-Map.pdf>

⁸ <https://www.spglobal.com/commodityinsights/en/ci/research-analysis/walking-the-tightrope-of-the-brazilian-offshore-wind-developme.html>

⁹ <https://gwec.net/wp-content/uploads/2023/08/GWEC-Global-Offshore-Wind-Report-2023.pdf>

¹⁰ <https://qh2.org/countries/brazil>

carbon hydrogen industry. The Brazilian government has already set out initiatives as a part of the Brazilian government commitment to build a low carbon hydrogen economy. The initiatives include:

- The commitment of 20 years of support R&DI in low carbon hydrogen
- Hydrogen being defined as a priority area for public and publicly oriented investment on energy R&DI
- The establishment of a Brazilian Energy Compact on Hydrogen at UN High Level Dialogue on Energy in 2021
- Launch of the Guidelines for National H2 Program¹¹ (PNH2)

Norway has a range of resources and industry experience, which makes it particularly well suited to drive innovation in hydrogen production and technology development. Norway, like Brazil, boasts an abundance of clean energy, predominantly from its hydropower resources, making it an ideal hub for producing green hydrogen through electrolysis. Furthermore, Norway's extensive natural gas reserves offer the opportunity for blue hydrogen production, through which low carbon hydrogen is derived from natural gas with carbon capture and storage techniques. This interplay between green and blue hydrogen production methodologies could contribute to an optimised and flexible hydrogen economy. Going hand in hand with these possibilities on the production and technology side is the offtake on the demand side. Norway's strong maritime industry and process industry, especially fertilizer production, provides both a potential consumer base for hydrogen fuel and expertise in handling large-scale energy operations.

These competitive advantages mean that the Norwegian hydrogen industry already has developed into one of the most advanced in Europe. Today it consists of both hydrogen and ammonium production and distribution, as well as equipment and technology distribution and service providers. The Norwegian hydrogen industry's own expectation is that international sales will increase from NOK 1 billion in 2021 to roughly 60 billion in 2030.¹² Several Norwegian actors expect to invest in production facilities outside of Norway. The potential for exports of hydrogen between Norway and Brazil is limited due to high transportation cost. However, for providers of equipment (electrolysers), technology distribution and service providers can be an important Norwegian contribution in the Brazilian industry.

For Brazil, Norway's advancements in hydrogen can offer invaluable insights and collaborations. The blending of technology, resources, and industry in Norway provides a blueprint for how Brazil might integrate hydrogen into its own energy systems.

4.3. Offshore suppliers

The market for offshore suppliers in Brazil is substantial. Today, the market is primarily characterised by services delivered to the oil industry, as Brazil has significant offshore oil production. The country also has substantial oil reserves that it aims to exploit in the coming years. Specifically, the government has a stated goal to increase oil extraction by nearly 80 percent by 2029. It is also expected that gas production will almost double by 2030. In addition, offshore suppliers will be important in offshore wind, floating solar power, and carbon capture and storage (CCS).

Today, Norwegian companies already provide a significant number of offshore services to Brazil, especially in the oil services sector. In other words, Norwegian companies already have strong relations with the companies

¹¹ *Programa Nacional do Hidrogenio*

¹² <https://www.menon.no/wp-content/uploads/2022-134-Verdien-av-den-norske-hydrogennaeringen-1.pdf>

operating the oil fields outside Brazil and are therefore well positioned to continue delivering offshore services in the years to come. For example, the Norwegian company DOF Group was awarded three new service contracts with Petrobras as late as in September 2023.

The competence that these companies possess also puts them in a good position to deliver services in the offshore wind industry. Norwegian companies like Subsea 7, DNV and TGS have already positioned themselves to participate in the upcoming concession rounds for offshore wind. Norwegian companies might also have a competitive advantage in the market for services related to floating solar power. This follows from the fact that the floating foundations used in the two different installations have several similarities, and that Norwegian companies already possess significant knowledge about the technology for floating offshore wind.

As in other industries, assistance in interpreting and staying updated on regulatory changes will be crucial for Norwegian actors. With the new Brazilian government that took office earlier this year, the focus on green transition has increased, which could lead to faster shifts towards more renewable energy sources, including offshore wind and floating solar energy. To enable Norwegian companies to become important service providers to companies in these markets, it is therefore essential that they can quickly grasp the regulatory changes that are coming and position themselves accordingly.

4.4. Maritime

The maritime industry in Brazil is a vital part of the country's economy, serving as a critical link in its international trade and contributing to the development of its offshore energy resources. As previously stated, Brazil boasts the longest coastline in South America, stretching over 7,000 km along the Atlantic Ocean. A large economy with significant exports of agricultural products, minerals and oil makes Brazil an important market for shipping companies.

Brazilian demand for shipping services is expected to rise due to several factors. Domestic transport in Brazil is heavily dominated by road transport, and the government launched a programme to incentivise more transport at sea, which will increase demand for shipping services¹³. In addition, offshore activity is expected to rise as both petroleum production, offshore wind activity and offshore solar power increase. Increased offshore activity is expected to increase the demand for sea transportation, including vessels and maritime services and technology.

The Norwegian maritime sector consists of everything from ship owning companies, shipyards, and equipment and service providers. These companies form an industry cluster, which is considered among the most innovative and complete in the world. The maritime industry in Norway has undergone significant structural and content-related changes. Over the past decades, the industry has pivoted from being predominantly focused on deep-sea activities to serving the oil and gas sector. In recent years, the industry has also diversified to serve various maritime sectors, leading to a diverse and broad-based Norwegian maritime industry.

The Norwegian maritime industry already has a large presence in Brazil. Shipping companies operating in several market segments have a local presence in Brazil, such as UMOE, Wilhelmsen, DOF, Solstad, Odfjell, Bonheur, Seadrill, Klaveness, Kongsberg, Vard and DNV.

The green transition and cutting emissions are on the agenda both for the Norwegian and Brazilian maritime industries. The Norwegian industry is in the forefront of the green transition of the maritime industry. Norwegian

¹³ <https://www.ibanet.org/brazil-federal-programme-cabotage>

shipyards are leaders in low and zero emission vessels, and Norway is among the leaders in terms of development and implementation of green maritime technology.¹⁴ This makes the industry well positioned for the green transition, both in Norway and abroad. Overall, the green transition and rise in demand for shipping related services in Brazil stand out as an opportunity for Norwegian maritime companies.

4.5. Seafood

With a population of over 200 million, the Brazilian market for food products is enormous. As a result, the Brazilian market is an attractive one for the Norwegian seafood industry. Seafood consumption is increasing in Brazil and in 2017 it was the 10th largest importer of seafood in the world.¹⁵ According to the Marine Stewardship Council Brazil, the main imported fish are salmon, from Chile; polish, fished in the Pacific Ocean and processed in China; the fish-panga, Southeast Asia; and cod caught in the North Atlantic.¹⁶

Some of the Chilean import of salmon is from Norwegian companies with production facilities in Chile, such as Mowi. However, with growing demand from Brazil, and given Norwegian companies' market position in the production of Atlantic salmon both in Norway and abroad, we see a particularly high potential for Norwegian companies in the salmon market.

In 2022, Norway exported 15,300 tonnes of seafood to Brazil for a total of NOK 935 million. This made Brazil the 26th largest export market in terms of export value. Segments where Brazil is an important importer are tusk (largest market), saithe (3rd largest market) and cod (9th largest market). Along with Portugal, Brazil is the most important market for bacalhau.

The seafood industry stands out as an important part of Norway's heritage and culture, but also as a forward-looking industry representing a substantial fraction of Norway's exports. Seafood demand and production is expected to rise by 12 percent by 2032.¹⁷ In 2022, Norway overtook China as the world's largest exporter of seafood in terms of export value with NOK 146 billion in exports.^{18,19} In general, the increasing demand from Brazil along with the leading position of Norwegian seafood companies indicates that there is a high potential for Norwegian seafood exporters in Brazil, especially for high-end products like Atlantic salmon.

To further tap into the potential in the Brazilian market, Norwegian companies are dependent on reaching the Brazilian consumers. Promotional campaigns directed at Brazilian consumers may be effective for increasing exports. Promoting the low-carbon footprint and sustainability of seafood, in addition to promoting recipes for dishes, have proved to be effective initiatives to open new market segments.

¹⁴<https://www.menon.no/wp-content/uploads/2022-29-Gronn-Maritim-2022-Teknologi-Utslipp-Verdiskaping-og-Sysselsetting.pdf>

¹⁵ <https://research.rabobank.com/far/en/sectors/animal-protein/world-seafood-trade-map.html>

¹⁶ <https://www.brazil.tm/en/fish-import>

¹⁷<https://www.oecd-ilibrary.org/docserver/08801ab7-en.pdf?expires=1695249072&id=id&accname=guest&checksum=8AFF8A466263ED1A60C32CE2B7B79248>

¹⁸ <https://www.seafoodsource.com/news/premium/supply-trade/norway-becomes-top-global-seafood-exporter-but-ecuador-is-coming-up-fast>

¹⁹ Source: Statistics Norway

4.6. Other emerging green technologies

Norway stands at the forefront of the global green transition, with traditions of environmental sustainability, innovative energy solutions, and renewable energy production. There is a broad political consensus in Norway that the country should be a leader in developing a more sustainable future. On the technological side of the green transition, Norway has particularly strong foundations for developing solutions and products that can be produced and deployed globally, including in Brazil.

4.6.1. Solar power

Solar power production in Brazil has been on the rise in recent years. With its abundant sunlight and vast landmass, has substantial potential for harnessing solar energy. Besides being geographically well-positioned, Brazil has also seen the development of large-scale solar farms and photovoltaic power plants. As technology advances, solar panels become more efficient, and energy storage solutions improve, the cost-effectiveness and reliability of solar energy are likely to increase. This, in turn, will contribute to further growth in the solar sector.

Floating solar power has gained traction as a viable renewable energy source in various parts of the world. Both Norway's and Brazil's primary source of electricity is hydropower, which accounts for the majority of its energy production. Both countries have a well-established hydropower infrastructure that meets a significant portion of their energy demand. Floating solar can complement this existing infrastructure by utilizing water bodies associated with hydroelectric facilities.

Brazil has a number of suitable locations for floating solar installations. The potential for floating solar generation in Brazil on artificial bodies of water is estimated to 43 GW.²⁰ This only includes locations such as hydroelectric plants and dams, and not the potential on lakes or at sea.

On the Brazilian onshore solar market both Scatec Solar and Norsk Solar have developed solar power plants. In Norway, Norwegian companies such as Sunlit Sea are developing solutions for floating solar power at sea. Norwegian companies can play a role in the development of large floating solar parks and given Brazil's interest in floating solar power as a renewable energy source there is an opportunity for Norwegian technology companies. However, the potential will depend on a combination of technological advancements, economic feasibility, regulatory support, and environmental considerations. Collaborative efforts between government, industry, and local communities will be essential in realizing the potential of floating solar power.

4.6.2. Battery technology

The world needs more battery cell production in the coming years as societies all over the world are moving towards electrification and for renewable energy storage. Brazil is among the top ten car manufacturers globally and several automakers will start producing electrical vehicles in the country in 2024. As one of the largest producers and markets for cars and the transition to electrical vehicles ahead, Brazil will have an increasing demand for battery cells. Battery cell production in Brazil is in the early stage, with some producers like WEG already having production lines in operation.

Norway has ambitions of being a leader in developing a more sustainable future, with battery as one of the key areas of ambition in green technologies. The Norwegian battery technology value chain is of relevance in a

²⁰ Lopes, M. P. C., Nogueira, T., Santos, A. J. L., Branco, D. C., & Pouran, H. (2022). *Technical potential of floating photovoltaic systems on artificial water bodies in Brazil*. *Renewable Energy*, 181, 1023-1033.

Brazilian context. Norwegian companies cover a wide spectrum, from the production of anode and cathode materials to the actual cell production, and from module assembly to recycling. Battery cell producers from Norway include Freyr Battery, Morrow and Beyond. In addition, companies such as Vianode (anode material) and Hydrovolt (recycling) have potential to deliver battery technology globally.

Research and innovation form a cornerstone of Norway's strategy. By fostering tight-knit collaborations between its universities, research institutions, and industry magnates, Norwegian companies are well positioned to move to the cutting edge of battery technology. Innovations to enhance longevity and efficiency, and to make batteries more sustainable, might prove helpful for the Brazilian battery production industry.

4.7. Measures to capitalize on export opportunities

In terms of exports, Norway performs poorly relative to other comparable countries.²¹ Exports as a share of GDP is relatively low, and the last 20 years the growth in exports has been lower than in all its neighbouring countries. As a result, increasing exports is an important focus area for the Norwegian government. It is difficult to increase exports at an overall level, as they are often driven by deep structural factors in the economy. Despite this, there are some measures the Norwegian government can do to facilitate Norwegian exports.

Menon documented that Norwegian export promotion efforts are disaggregated²², and one reason for this is that responsibility is divided among many ministries. Through better coordination of the ministries' efforts and leveraging each other's strengths, one can better promote Norwegian export interests.

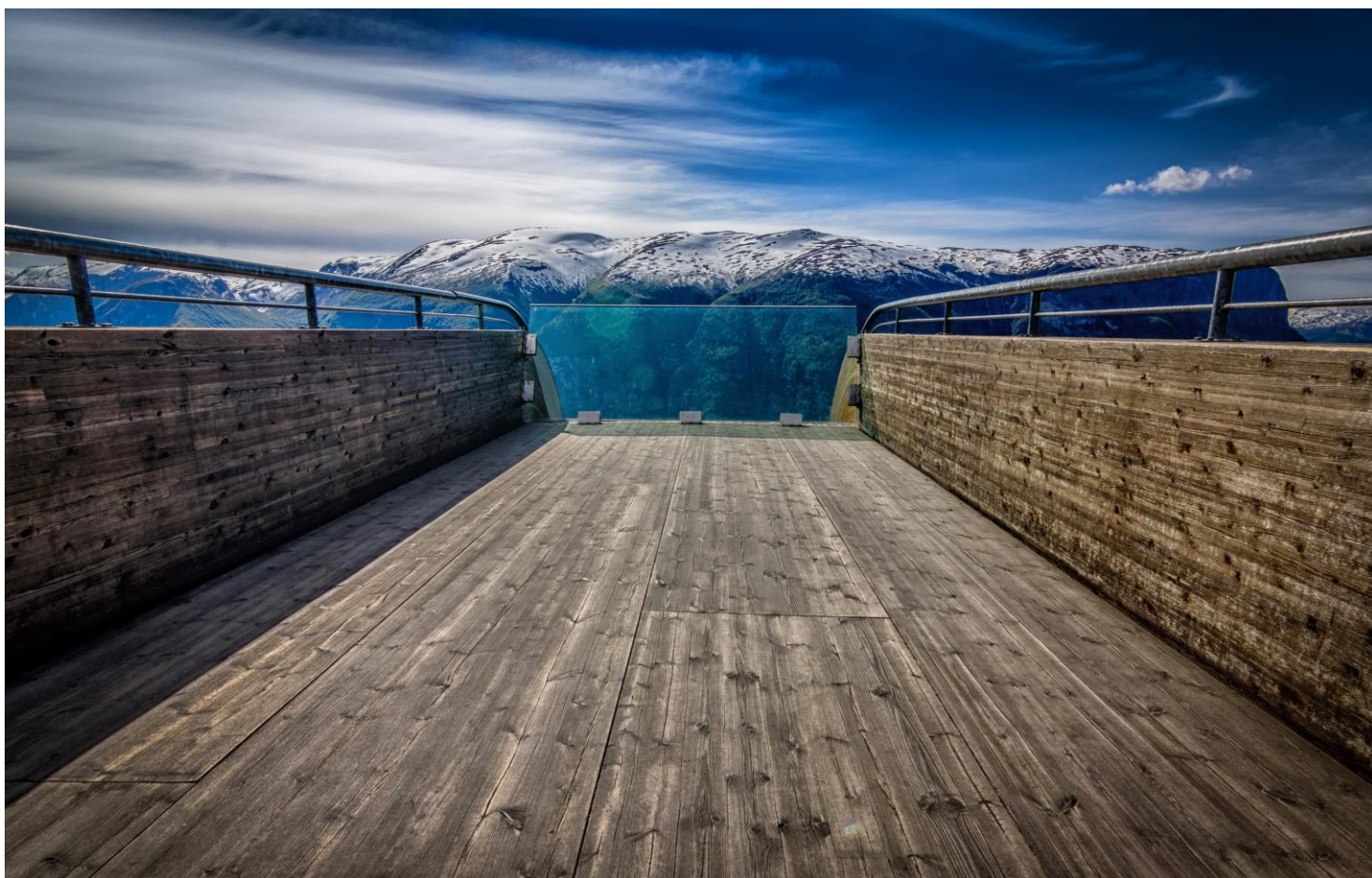
With the significant changes that countries must undergo to reduce their emissions, there is reason to expect an increase in the need for information gathering and dialogue on how regulations should be implemented. The Norwegian Ministry of Foreign Affairs can contribute to cooperation and dialogue, which will likely be important for several of export industries, including the maritime sector and petroleum sector.

As documented in this report, Norwegian companies with operations or customers in Brazil are doing well. For the established industries, there are not significant barriers for Norwegian companies in Brazil. However, there is room to improve the apparatus to support Norwegian businesses in a broader range of industries. This is especially relevant for emerging industries relating to the green transition, as well as other industries where Norwegian companies does not have a foothold yet.

A broad apparatus that works strategically with industry expertise is more likely to be effective in the promotion of Norwegian export interests. Through interviews with representatives of Norwegian players in Brazil, the Norwegian government were told to look at how other Scandinavian countries work. Denmark and Sweden have several industry experts that work strategically to promote their interests and open doors for companies from their respective countries. This is highlighted as an effective measure to internationalise for businesses seeking foothold in new geographic markets.

²¹ See <https://www.menon.no/wp-content/uploads/2023-79-Eksportmeldingen-2023.pdf> for further analysis.

²² <https://www.menon.no/wp-content/uploads/2021-18-Oppskrift-pa-norsk-eksportsuksess.pdf>



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