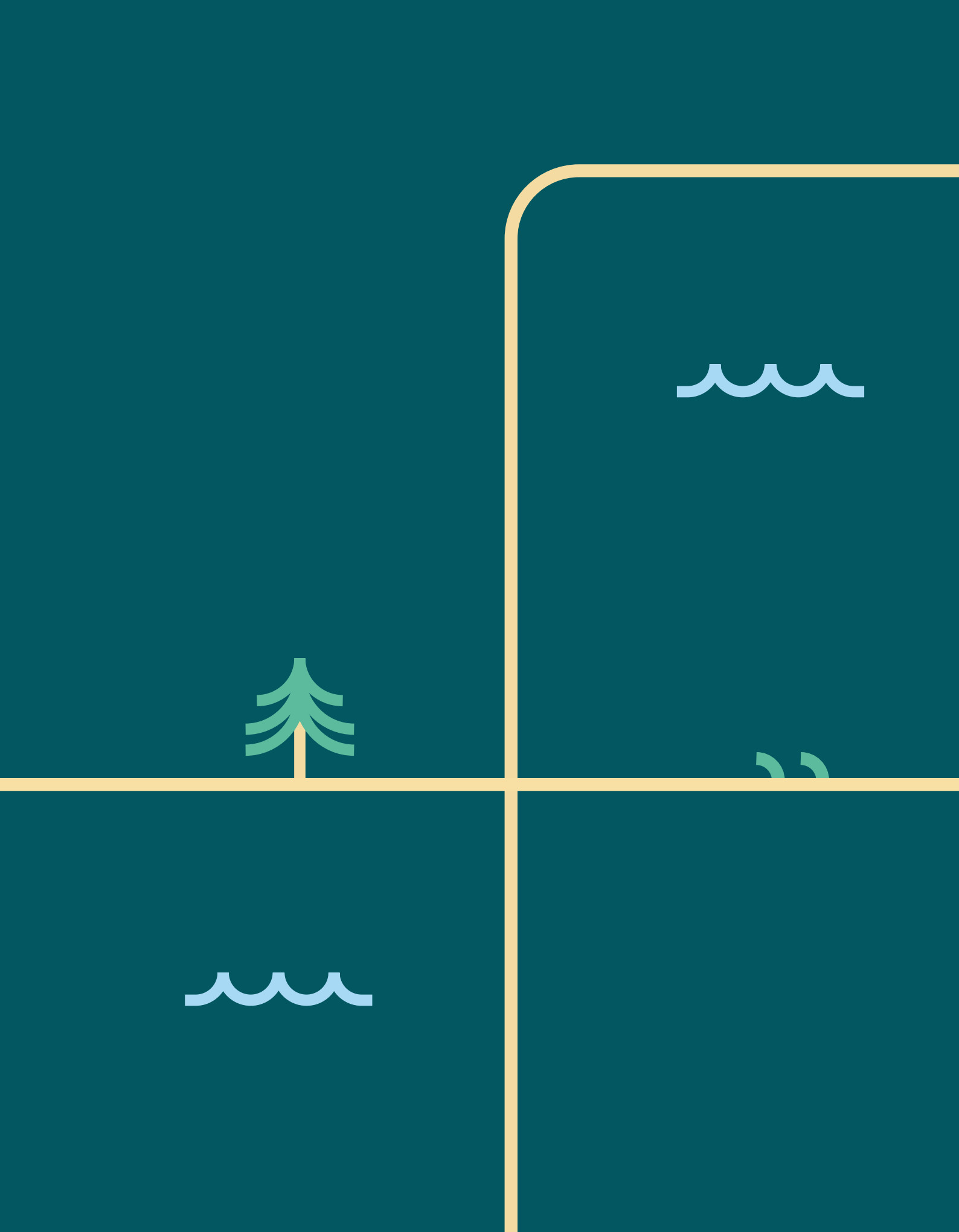
ROADMAP

THE GREEN INDUSTRIAL INITIATIVE

Norwegian Ministry of Trade,
Industry and Fisheries



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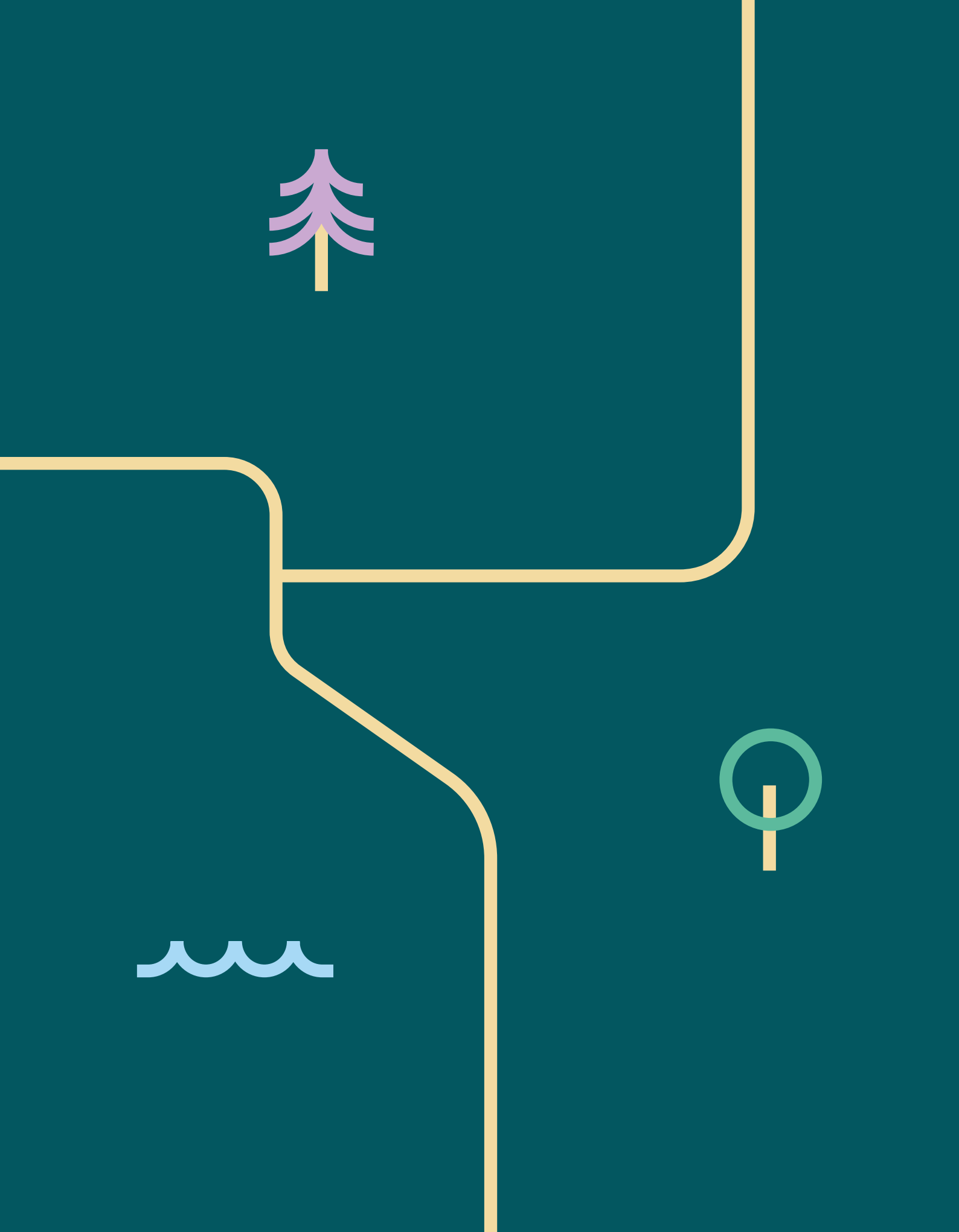

Norway will be built with green industry

Norway and Norwegian industry may have the world's best conditions for success in the green transition, but it requires higher ambitions, a faster pace, a better ability to follow through and more systematic cooperation than today.

It is primarily the companies' own responsibility to take advantage of the market opportunities and deal with the challenges that arise from the transition to a low-carbon society. The transition that is needed is nevertheless of such a scope that the state must become more involved through an active and ambitious industrial policy, which works in concert with the companies.

Hence, the Government is launching the Green Industrial Initiative. The goal is to make Norway a green industrial and energy giant based on our natural resources, knowledge environments, industrial expertise and historical advantages. This will help accelerate the transition, create jobs throughout the country, strengthen investment on the mainland, increase exports and cut greenhouse gas emissions.

The presentation of this roadmap is the starting point for the Government's proactive work for the Green Industrial Initiative. In the roadmap, we present new ambitions, policy instruments and measures. The framework conditions for green industries are broad, covering many areas of policy. Large parts of the ministerial community have therefore been actively involved in the work on this roadmap and will continue to do so in the future. A good dialogue has also been established with the social partners, climate and environmental NGOs, business organisations, companies, various levels of public administration, educational and research communities and other innovation and competence communities.

Work on the Green Industrial Initiative will be continuous to be able to adapt to a rapidly changing world. The roadmap will therefore be updated regularly. In the further work, the Government will continue to place great emphasis on cooperation with all relevant parties.

We look forward to the continuation,

Jonas Gahr Støre
Prime Minister

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Minister of Trade and Industry

Trygve Slagsvold Vedum
Minister of Finance

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Minister of Local Government and Regional Development

Summary

The Government's approach and vision for the Green Industrial Initiative

As an economy and society Norway has major challenges in store. We are facing a global climate and nature crisis, where Norway must take its share of the responsibility for cutting emissions and contributing to sustainable development. Achieving the climate goals will require a radical restructuring of Norwegian business and industry, and time is of the essence. Norway's population will become increasingly older in the years ahead, and the share of the population that is economically active will decline. In order to maintain a good standard of living and finance the welfare state in the future, we are dependent on increased productivity and value creation in the economy. These challenges are the basis for the Green Industrial Initiative.

It is primarily the responsibility of the companies to utilise the market opportunities triggered by the green transition. The Government can facilitate private initiatives and investments through sound framework conditions and an active industrial policy. The transition that is needed will require the state to become more involved through a powerful toolbox.

We have no time to lose if we are to reach our climate goals. Although faster transitions may have higher direct costs due to immature technological solutions or markets, this must be weighed against the more indirect costs of not taking action.

Common prerequisites for the Green Industrial Initiative

The Norwegian industrial sector is based on clean and reasonably priced renewable energy, and industrial companies that manage to develop and utilise high-tech solutions in many areas. Green industrial investments require access to suitable areas and infrastructure, raw materials, and not least capital and labour. Adequate access to the right competence is crucial for companies' ability to operate efficiently and create value. A well-functioning capital market and tax system are also fundamentally necessary for growth and

"Norwegian companies must have adequate, predictable and stable framework conditions that facilitate private investment and further growth. The state shall take its responsibility for putting in place the necessary infrastructure, entering partnerships that unite emission reductions and business development and contributing capital and other risk mitigation".

The Hurdal Platform

restructuring. Furthermore, access to export markets provides greater opportunities for increased sales, specialisation and economies of scale. Norwegian companies have access to global markets through membership in the World Trade Organization (WTO), participation in the European single market and trade agreements with countries around the world.

Closer interaction and strong partnerships

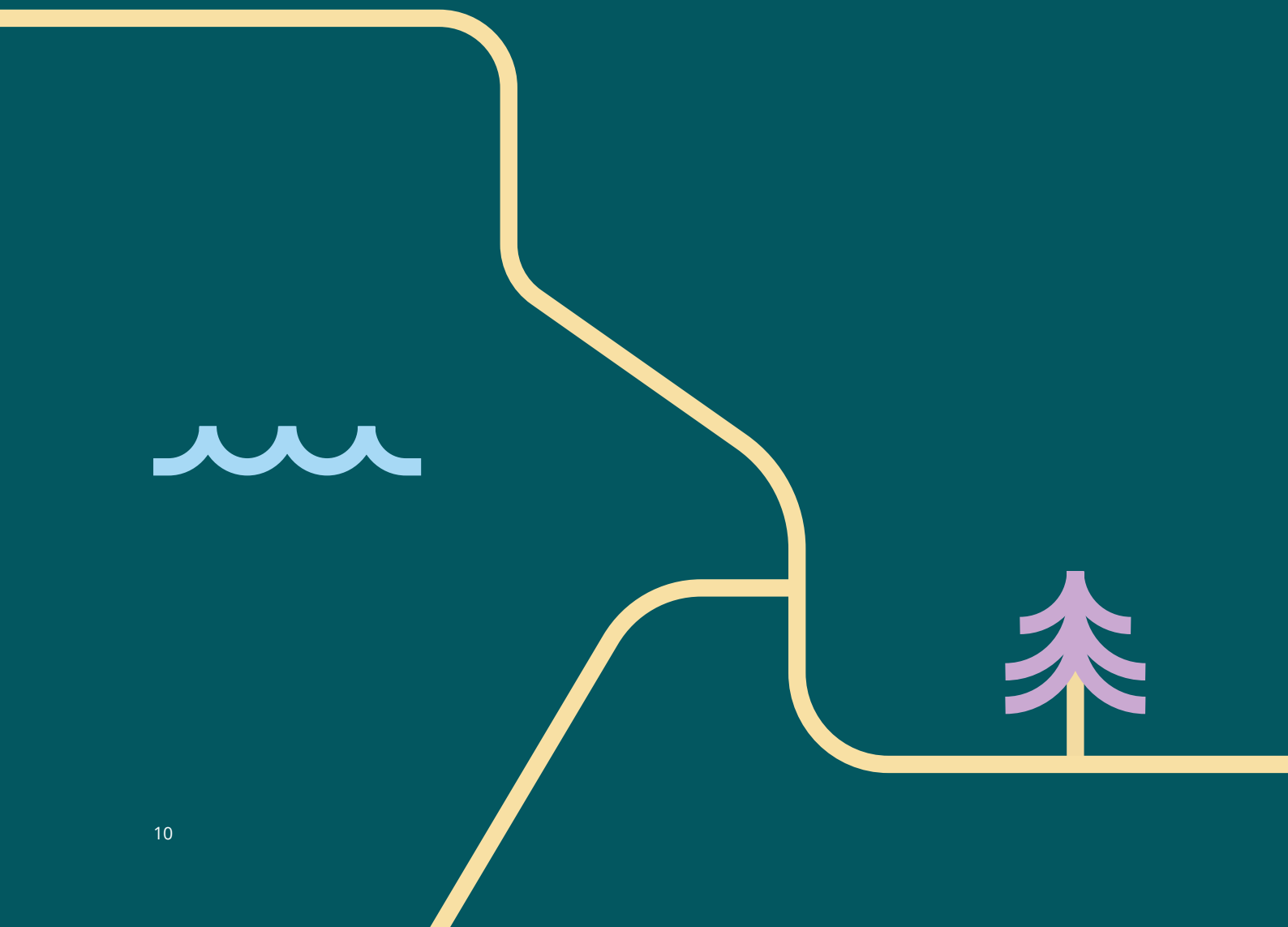
In order to put our strengths and ambitions into practice, we must prepare ourselves well and act in collaboration. The Government will pursue a comprehensive policy towards business, industry, energy, climate and the environment that is efficient, results-oriented and that in aggregate contributes to our ambitions for the green transition. Faster transition and development require both a well-coordinated effort at various levels of government, and closer interaction between business and the authorities. We will also benefit from strengthening industrial partnerships with other countries and the EU for mutual interest and benefit.

Priority areas

The Government has identified seven areas that will be prioritized in the Green Industrial Initiative. These are the value chains for offshore wind, batteries, hydrogen, carbon capture and storage, the process industry, the maritime industry, and forestry and the timber industry and other bioeconomy sectors. These areas are considered key to the work of developing an emission-free energy system and society, which provides opportunities for sustainable production in the future, and with expected high future demand in the markets.

01

The Government's approach and vision for the Green Industrial Initiative



Introduction

The Government sees a need for an all-out effort for the industrial sector. This decade, Norway will more than halve its greenhouse gas emissions. At the same time, Norwegian business and industry must take advantage of market opportunities and create value in a world that is pursuing an increasingly proactive climate policy. It is crucial that Norwegian industrial companies succeed if we are to achieve these ambitions.

Overall, the Norwegian business community has good prerequisites for successfully meeting the challenges and opportunities. We have valuable natural resources that we have shown the ability to manage well over time, well-functioning institutions, a high degree of trust, and tripartite cooperation that promotes cooperation and efficiency in the economy.

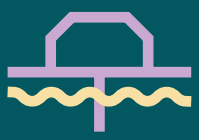
The industry can and must be a key driving force in Norway's transition to a low-carbon society with high overall value creation and sustainable government finances. The Government is ready to use the state's tools to create the best possible conditions for us to succeed.

The Government's visions for the seven priority areas

Norway will become a leading nation in offshore wind, with an industry that develops and builds superior wind power solutions. The Government's ambition is to allocate areas with potential for 30 GW of offshore wind production on the Norwegian shelf by 2040.

Norway will develop a value chain for the production, distribution and use of hydrogen produced with no or low emissions and contribute to developing the hydrogen market in Europe.

Norway will further develop a coherent and profitable battery value chain ranging from sustainable mineral extraction to recycling of batteries. Norway will be an attractive host country for profitable activities throughout the battery value chain and attract large battery investments and giga factories.



Norway will continue its work on world-leading industrial solutions for the capture, storage and use of CO_2 that create profitable jobs in Norway and that cut global climate emissions in a cost-effective way.

Norway will have the world's cleanest and most modern and energy-efficient process industry, based on high-tech solutions and high value creation.

Norway will remain an international maritime superpower, leading the way in the transition to a low-carbon future by developing, building and using zero-emission solutions and autonomous vessels.

Norway will have the world's most sustainable forestry. Bioresources from sea and land will be used for climate-friendly and profitable products including biofuels, and will contribute to the development of industrial jobs and long value chains in Norway.

1.1 The need for a green industrial transition in Norway

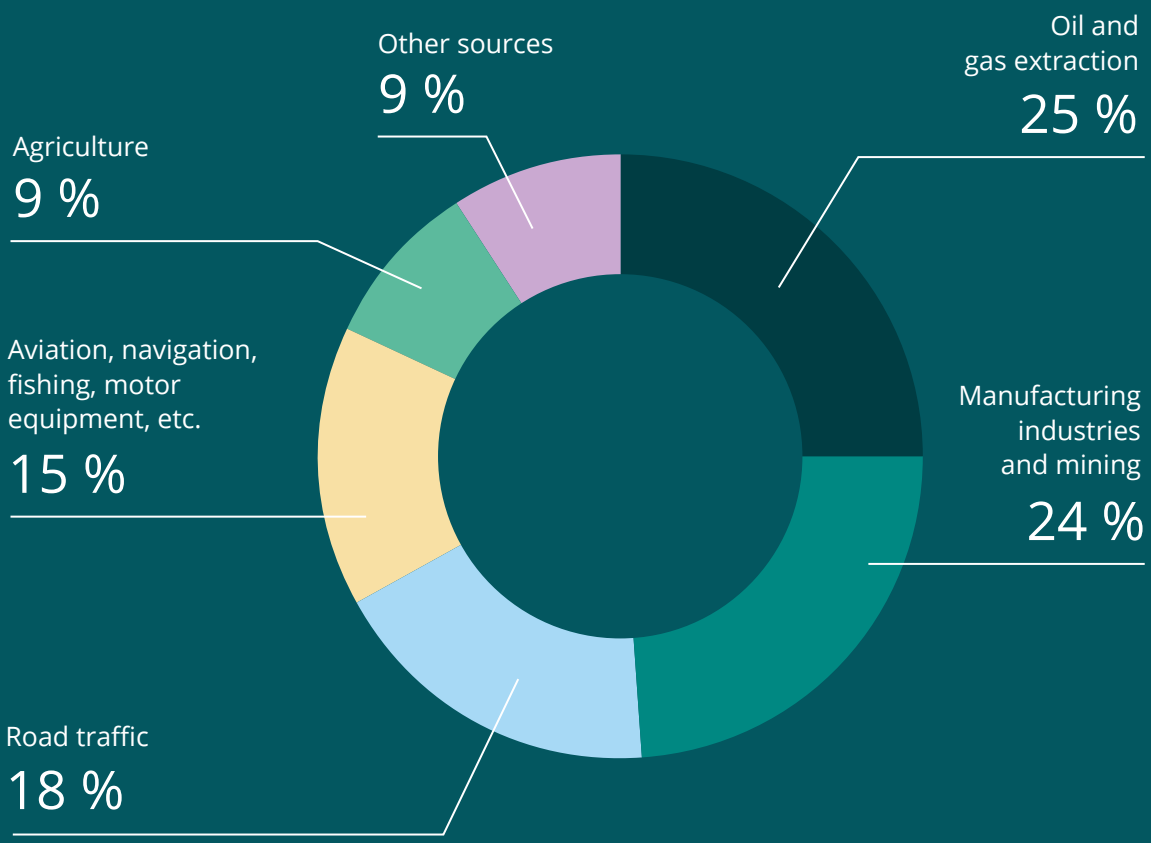
Climate change and the loss of nature pose some of the greatest global challenges of our time, and are among the most important reasons for the Green Industrial Initiative. Extreme weather and global warming are already doing great damage in all parts of the world and represent a real threat to economic growth and welfare. According to the UN's nature panel (IPBES), ten per cent of the world's plant and animal species are already almost extinct. Going forward, the risk of loss of nature and damage to ecosystems in all regions of the world will escalate with any warming of the climate.

To slow down this development, Norway, like the countries around us, has set ambitious targets for emission reductions and green transformation of the society. Through the Paris Agreement, Norway has committed itself to reducing greenhouse gas emissions by at least 50 and up to 55 per cent by 2030 compared with 1990. The climate goal is enshrined in the Climate Change Act and will be achieved in cooperation with the EU. As a sub-goal on the road to net zero emissions and a low-carbon society, the Government has also set a green transition goal for the entire economy by 2030. This is formulated in the Government platform as a goal of reducing Norwegian emissions by 55 per cent compared with 1990. This means that the Government has a national goal of restructuring both the sectors covered by the EU Emissions Trading System (ETS) and the sectors not covered by the ETS. The purpose is for the entire Norwegian business community to adapt to a low-carbon society. The green transition goal is discussed in more detail in the white paper on the Revised National Budget (Meld. St. 2 (2021–2022)).

In 2021, oil and gas extraction accounted for greenhouse gas emissions of about 12.2 million tonnes of CO_2 equivalents, while manufacturing industries and mining accounted for about 11.8 million tonnes. In total, this corresponds to just over half of Norway's greenhouse gas emissions, cf. Figure 1. If we are to achieve the climate goals and restructure the business sector in the direction of a low-carbon society, achieving effective emission reductions in these sectors are crucial. This is a formidable, but not impossible, task. This is underlined by the fact that the Norwegian industry l already has reduced their emissions significantly; since 1990, greenhouse gas emissions from Norwegian industry have been reduced by more than 40 per cent, while value creation has increased by about 30 per cent adjusted for inflation.

FIGURE 1

Norwegian greenhouse gas emissions in 2021 by sectors.
Emissions and uptake in the forest and land use sectors are not included here.



SOURCE: Statistics Norway (2022), statistical table 08940, MTIF

We will reduce emissions, and at the same time create new jobs and increase the number of green investments.

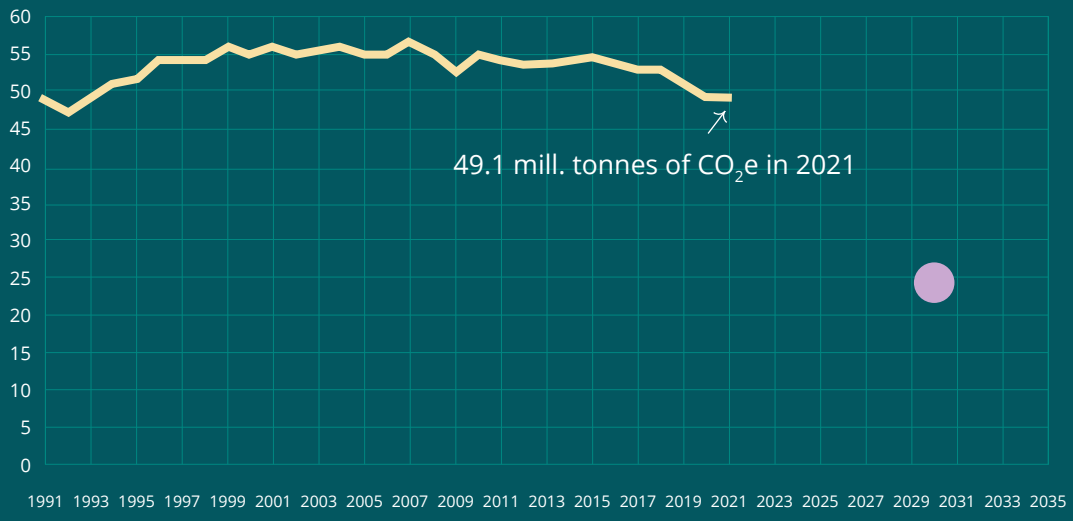
However, Norway is not alone in having to make significant reductions in its emissions in a short amount of time. All countries are demanding green solutions that can contribute to the decarbonisation of the economy. For more than 50 years, Norway has developed a high-tech value chain with world-leading expertise in the production of oil and gas. Highly qualified skilled workers, engineers and researchers with experience from the Norwegian continental shelf will be valuable in building new green value chains on the shoulders of the oil and gas sector.

The need for a green transformation in industry, in the sense of emission reductions, technological development and energy restructuring, will require large investments in new technology and new means of production. Figure 3 shows the development in industrial investments over the last fifteen years. Industrial investments will probably have to increase significantly from the current level for us to achieve our goals and targets for emission reductions, safeguarding the environment and a green transition of the whole society.

This brings us to an additional reason for the Green Industrial Initiative. We are dependent on increased productivity and value creation in the Norwegian economy to maintain our current standard of living and finance the welfare state in the future. As emphasised in the white paper *Long-term Perspectives on the Norwegian Economy 2021* (Meld. St. 14 (2020–2021)), Norway's population will become increasingly older in the years ahead and the share of economically active persons will decline. In parallel with this demographic challenge, the impulses of oil and gas extraction on the Norwegian economy will gradually diminish, and the ripple effects from petroleum activities will be reduced. Thus, we must facilitate the emergence of new business areas and new activities in established businesses. We must make it easier for more people to enter working life so that the business community acquires the skills it needs, and the proportion of non-employed and young people who are outside employment, education and training is reduced. For the Government, work for all is priority no. 1. The industrial sector can and must be a key driving force in Norway's transition to a low-carbon society with high overall value creation and sustainable government finances.

FIGURE 2

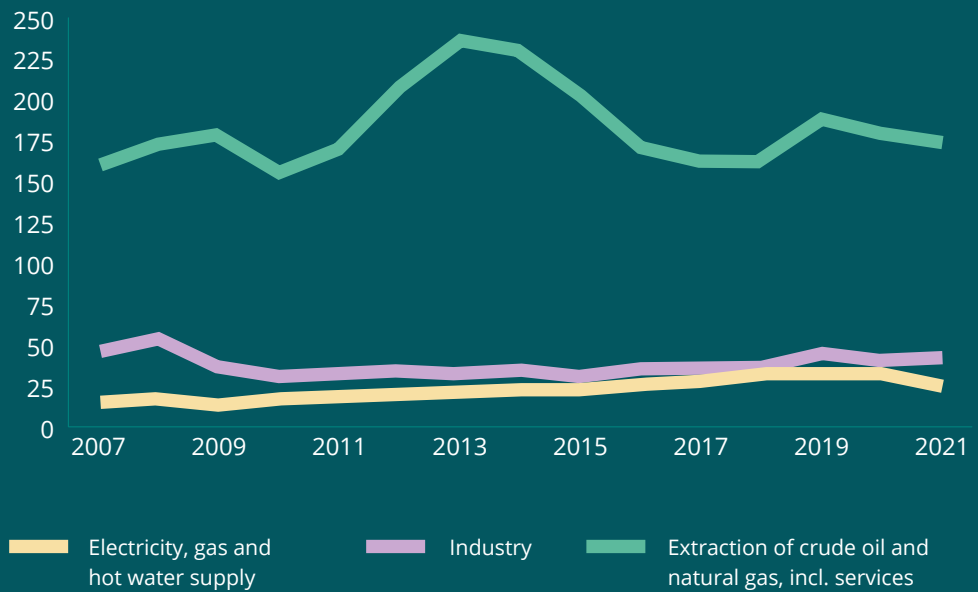
Norwegian emissions of greenhouse gases from 1990 to 2021. The 2030 transition goal as illustration.



SOURCE: Statistics Norway (2022), statistical table 08940, MTIF

FIGURE 3

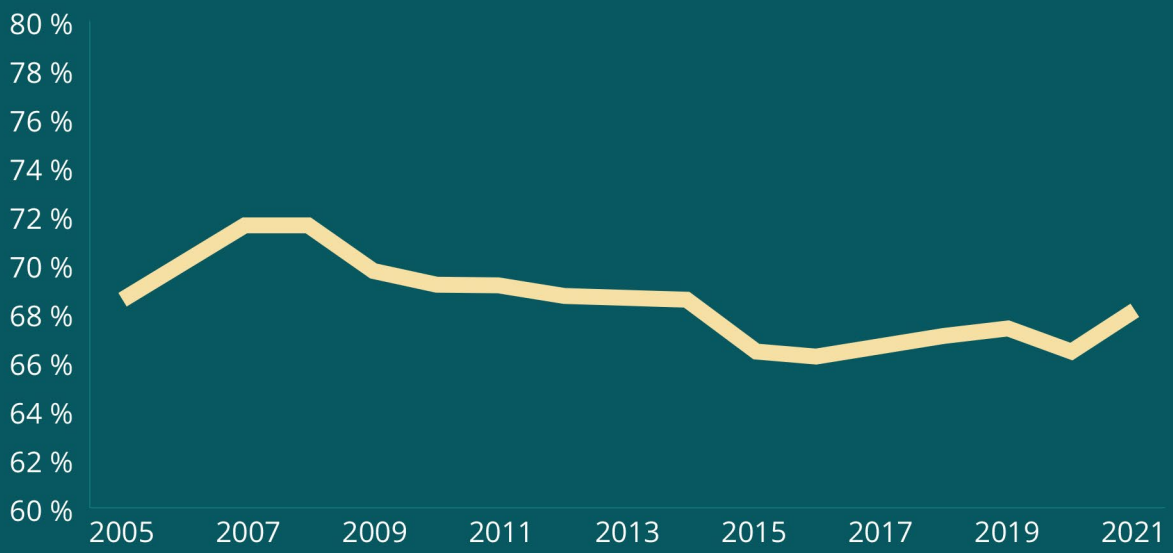
Development of industrial investment over the last 15 years. Gross investment in fixed real capital. Fixed 2015 prices (NOK billion).



SOURCE: Statistics Norway (2022), statistical table 09181, MTIF

FIGURE 4

Percentage of employed persons in the population as of Q4 (per cent) aged between 15 and 74.



SOURCE: Statistics Norway (2022), statistical table 06445, MTIF

1.2 Opportunities and challenges for the green industrial transition in Norway

Achieving the climate goals will involve a comprehensive restructuring of the Norwegian economy, and will require much from the authorities, business and industry and households. Nevertheless, this transition provides new and great opportunities for value creation. The companies that succeed in reducing emissions will probably gain increasing advantages in a global low-carbon economy, while companies that do not develop in a climate-friendly direction risk being outcompeted.

Overall, Norway and the Norwegian business community have a strong foundation for succeeding further with in a green transition. We have valuable natural resources that we have shown the ability to manage well over time. Our natural advantages have given us a unique business structure, with international weight in energy, shipping, aquaculture and the process industry. Norway is a significant and stable energy supplier, with virtually emission-free power production. A high degree of trust, a high level of organisation and the tripartite cooperation with the Norwegian model for wage settlements promotes good cooperation, a fair and just transition and efficiency in the economy. “The Norwegian model” provides a good starting point for the major transition we are now implementing.

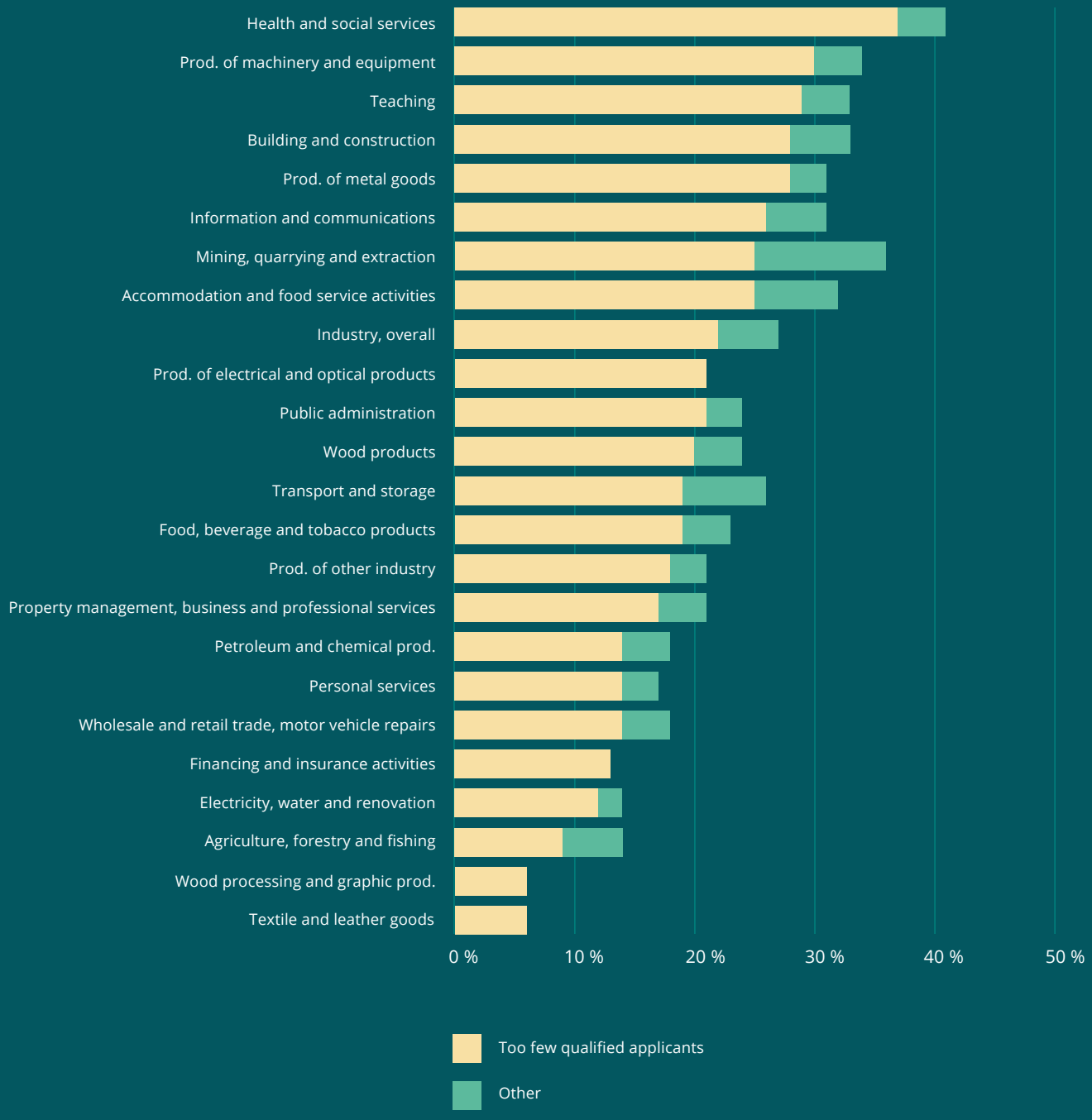
Norway is a small, open economy that conducts extensive trade with the rest of the world. Norwegian industry is closely integrated into international value chains. The European Green Deal, which is the EU's green growth strategy for a climate-neutral Europe, are central for Norwegian competitiveness. The ambitious climate and environmental policy pursued by the EU and other regions provides opportunities for Norwegian business and industry. At the same time, Norway can be an important contributor in enabling the EU and other regions in achieving their climate goals.

The green transformation also brings challenges. The further electrification of society will significantly increase the need for power.

Furthermore, secure and predictable access to necessary raw materials is an important prerequisite for green industrial production in a future where increased scarcity of certain minerals, metals and biomass is expected.

FIGURE 5

Enterprises with recruitment challenges caused by too few/no qualified applicants or other reasons, by industry. Per cent.



SOURCE: NAV's business survey, (2022), MTIF

We will carry out the largest restructuring project in Norway ever. The next ten years will be decisive for our ability to succeed in the following fifty.

We may also experience increased scarcity of labour. The shortage of skills is already being experienced in several sectors, cf. Figure 5, which underlines the need to use the workforce increasingly efficiently. Rapid technological development could contribute to increased productivity, which can reduce the challenges.

Sustainable use of Norwegian natural resources is crucial to facilitate future value creation, jobs and settlement throughout the country, and is a prerequisite for the success of the Green Industrial Initiative. Land is needed to meet the demand for renewable energy and new industrial areas. However, changes in land use has considerable negative impact on nature in Norway today. Thus, climate and nature must be seen in context, so that important nature and ecosystems are not lost in the pursuit of climate goals. Consideration for soil conservation must also be taken into account. Preserving nature is an important climate measure that makes us more resilient to climate change. Decisions on changes in land use must take into account such consequences for the environment and local communities, and must be based on holistic considerations that ensure that the Green Industrial Initiative is implemented in a sustainable manner. Restoration of nature in areas where there have previously been business activities can also contribute to a better balance in the natural capital accounts.

1.3 How do we facilitate the green industrial transition?

It is largely the industry itself that must be at the forefront to seize the opportunities and solve the challenges of the transition to a low-carbon society. However, the Government will actively facilitate the private initiatives and investments through adequate framework conditions and an active industrial policy where the state and the business community collaborate to realise the market opportunities in the green transition.

There is still great uncertainty about the further development of the technological, economic and regulatory framework for the transition to a low-carbon society. Various forms of market failure may delay the transformation and prevent us from achieving the emission targets for 2030 and 2050. Hence, the Government must and will use state instruments to facilitate green and profitable industrial development, cost-effective emission reductions and sustainable utilisation of Norwegian natural resources throughout the country. We will also facilitate the implementation of the UN's Sustainability Goals by the Norwegian industrial sector.

Pricing of emissions in the form of climate taxes and participation in the EU Emissions Trading System (ETS) are key instruments in Norway's climate policy. Pricing of emissions provides cost-effective emission reductions, pivoting production and consumption in a more climate-friendly direction. In addition to pricing of emissions, direct regulation, standards, agreements, loans, guarantees and grants for emission reduction measures and support for research and technology development are used as instruments in our climate policy. The state can also influence the business community through its role as a purchaser. In connection with public procurement, the Government will set requirements for its suppliers that stimulate the green transition in the business sector, in line with the ambition set out in the Hurdal Platform to weight climate and environmental considerations by a minimum of 30 per cent and higher where relevant. In line with the Hurdal Platform, the Government will exercise state ownership more actively to promote the community's interests related to climate and sustainability and wage and working conditions. State capital can help trigger even more private investment and ensure national control within strategically important areas in Norway.

We need to think innovatively and creatively, set ambitious goals, collaborate better and most importantly of all: Take action!

To ensure a sufficiently rapid green transformation in the industry and other businesses, state actors at all levels must be willing to consider new and smart ideas concerning more efficient and targeted use of policy instruments. While we already have effective tools to deal with some issues, others may require adjustments of current policy instruments. A more holistic approach to public investment, costs and revenues means that the use of funds in the short term is to a greater extent assessed against gains in the long term.

With rapidly changing framework conditions to stimulate the green transition, assessments of profitable activity may change just as quickly. At the same time, the reductions of global emissions that will be made over the next decade will impact how the climate of the future will look like. This provides a rationale for the state to contribute to faster global development of technology and implementation of new solutions. While the direct costs of early transformation may been higher due to immature technological solutions, the more indirect costs of not acting must also be included in an overall assessment.

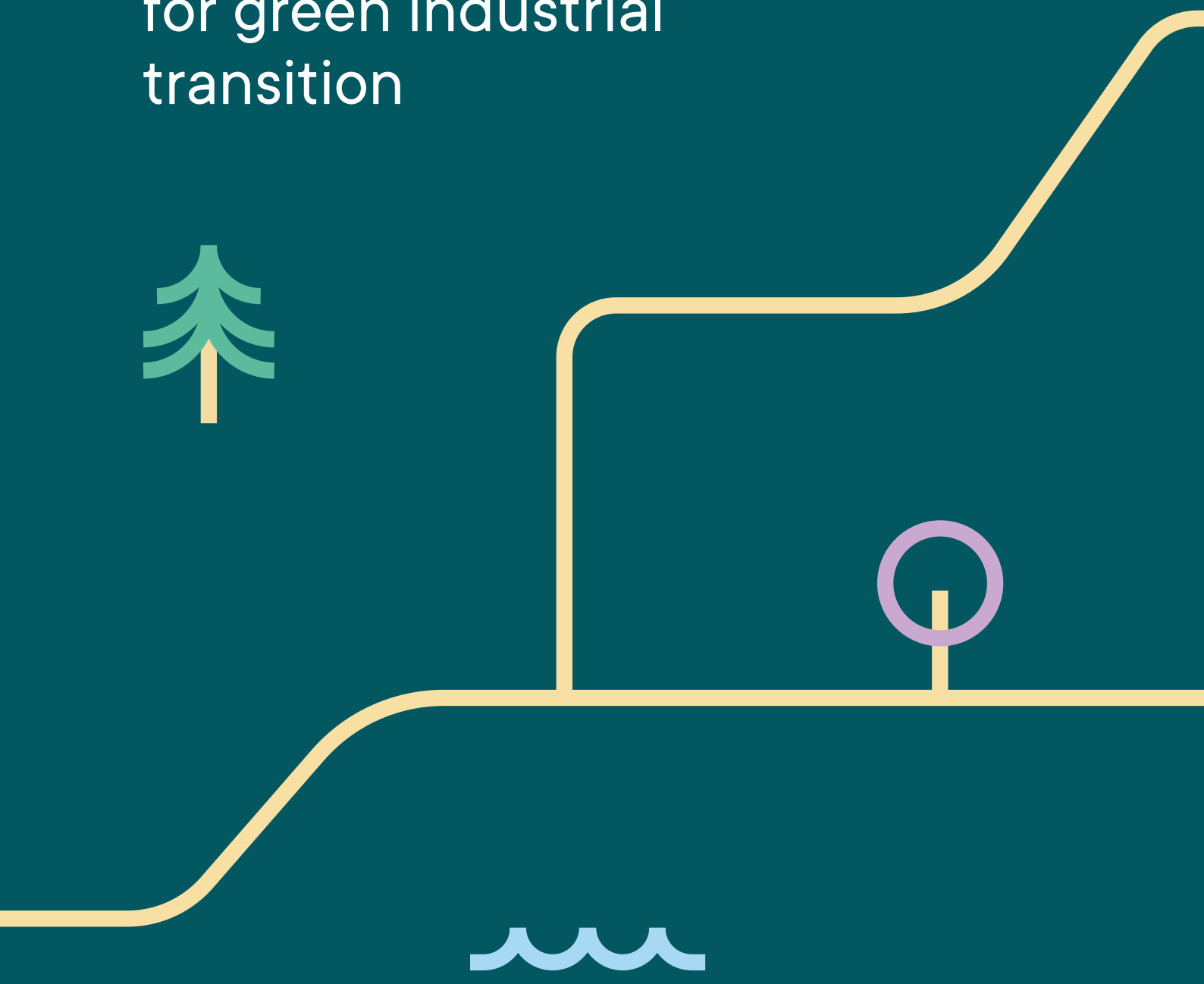
FACTS

The EU's Green Deal

The European Green Deal, which is the EU's green growth strategy for a climate-neutral Europe, will make the EU a more resource-efficient, fair and modern economy. It will move the EU towards climate neutrality by 2050 and provide an EU with a more circular economy, less pollution and better protection and restoration of ecosystems and biodiversity. The European Green Deal and the ambitious climate and environmental policy pursued by the EU provide opportunities and set the agenda for Norwegian business and industry. Circular, sustainable and renewable products and business models will succeed.

02

Common prerequisites for green industrial transition



Introduction

"Norwegian companies must have adequate, predictable and stable framework conditions that facilitate private investments and further growth. The state will take its responsibility on providing the necessary infrastructure, making partnership agreements that unite emission reductions and business development, and providing with capital and other instruments for risk mitigation".

The Hurdal Platform

The general framework conditions for business activities are crucial for the success of the Green Industrial Initiative. How efficiently the Norwegian industrial sector will be able to adapt to a low-carbon future depends to a large extent on its access to basic input factors such as renewable energy, raw materials, capital and labour. In addition, the industrial sector needs access to suitable sites, infrastructure, knowledge, technology and markets.

In the following, the Government outlines challenges and opportunities for Norwegian industrial sector and key political initiatives and processes in relation to the general framework conditions sector.

Selected measures in the chapter:

- The Government's ambition is to strengthen the capacity of the power grid and to shorten licence processing times.
- The Government will present a national strategy for the preparation of green industrial areas and industrial parks with international competitive advantages.
- The Government will prepare a mineral strategy with the goal of developing the world's most sustainable mineral industry in Norway.
- The Government will mobilise as much private capital as possible for the green transition, including through internationally competitive schemes for risk mitigation. The estimated need for government risk mitigation for the Green Industrial Initiative is NOK 60 billion by 2025.
- The Government will review the entire public policy apparatus to further sharpen efforts towards the green shift in the business sector and to support the Green Industrial Initiative.
- The Government will implement a broad skills reform for working life based on tripartite cooperation. The Government is concerned with how such a reform can be implemented with special emphasis on the industrial sector's future challenges.

The Government will further develop the export reform presented in the Norwegian export strategy "Hele Norge eksporterer", where the authorities, the business community and the public policy apparatus join forces to carry out proactive export promotions abroad concentrated around 5–10 national initiatives.

2.1 Power

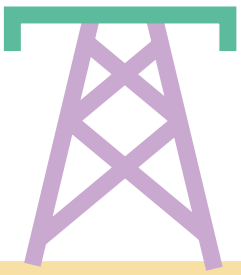
Norwegian industrial sector shall have access to clean and reasonably priced renewable energy. Renewable power production must therefore be increased. At the same time, the electricity grid must be further developed, lead times must be reduced and our energy consumption must become more efficient.

Going forward, access to power at competitive prices will be of great importance for investment decisions in the industrial sector, especially for power-intensive companies. Hence, the Government will pursue an energy policy based on the supply of renewable energy being a competitive advantage for Norwegian industry.

Opportunities and challenges

Under normal weather conditions, Norway still has a power surplus but the demand for power is expected to increase rapidly. We expect demand to increas due to the emergence of new green industrial establishments with significant power needs and extensive electrification of society in general. These changes require strengthened transmission capacity in the power grid, increased power production and a power system that can meet our needs during peak load periods. Already today, there is limited capacity for establishing new enterprises in several places in the country, due to insufficient power supply.

A high number of grid connection applications in recent years has led to case processing queues at both grid companies and energy authorities, which contributes to extending lead times.



The establishment of new industry will require more electricity. The Government has already started working on this challenge.

The power situation since the autumn of 2021 has shown that a power surplus is not a guarantee of low power prices. There is a great need for knowledge about how the changes in the power markets around us and our connection to these markets affect the Norwegian power supply system. We also need more knowledge about the extent to which limitations in the transmission capacity within Norway and to our neighbouring countries have contributed to the last year's power situation and how these factors may affect future developments.

Political initiatives and processes

The Government has appointed a broad-based Energy Commission, which will, amongst other things, assess future energy needs, possibilities for new energy production and experiences with the Energy Act over the past 30 years. The findings of the Energy Commission will provide a basis for Norway's long-term energy policy choices. In addition, the Government received the Grid Development Committee's report on 14 June 2022. The proposals in these documents will form an important basis for future measures to ensure access to reasonable power at the right time.

- The Government's ambition is to strengthen the capacity of the power grid and to shorten licence processing times.
- The Government will consider the recommendations from the Energy Commission and the Grid Development Committee. Amongst other things the Government will assess whether projects can be prioritised for grid connection based on various criteria such as maturity, high value creation potential or climate impact.
- The Government will increase its case processing capacity to contribute to faster licensing of grids and power generation.
- Through concrete measures, the Government will facilitate improved fixed-price power agreements for people and companies. Amendments of the resource rent tax are among the measures.

FACTS

The Grid Development Committee

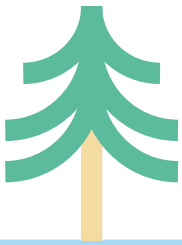
The Grid Development Committee submitted the report NOU 2022: 6 *Nett i tide – om utvikling av strømnettet* (in Norwegian only) on the development of the power grid to the Minister of Petroleum and Energy on 14 June 2022. Nils Kristian Nakstad, CEO of Enova SF, chaired the committee. The Grid Development Committee has assessed the following three main topics:

- Actions to reduce the time it takes to develop and license new grid installations.
- Principles for ensuring sound development of the power grid at a time of great uncertainty regarding consumption development.
- Possible improvements in the system for connection obligations.

The committee recommends measures that together can contribute to a significant boost for grid development in Norway:

- Significantly reduced lead time, especially for larger grid installations.
- Better utilisation of the current grid and sound grid development.
- A more standardised and transparent connection process.

The Ministry of Petroleum and Energy has now circulated the Grid Development Committee's report for broad public consultation to obtain the best possible basis for further follow-up.



- The Government is facilitating a large-scale development of offshore wind, with the ambition of taking a major step forward in the direction of profitable offshore wind power production. Offshore wind has great potential for increasing Norway's power production capacity. The Government's ambition is to allocate areas equivalent to 30 GW by 2040, with targets that include industrial development, innovation, technology development and increased emission-free power production, cf. Chapter 4.1. The Government's ambition will correspond to around 75 per cent of the Norwegian power system's capacity today. Such an investment in offshore wind will allow for the use of various grid solutions.

- The Government will increase hydropower production based on the Storting's decision on a cash flow tax for hydropower and by continuing to prioritise the upgrading and expansion of existing hydropower plants in the licensing process. There is still some potential for completely new hydropower.

- The Government will permit the development of wind power in places where there are good wind conditions and local acceptance. Due consideration must be given to safeguarding important natural assets. The Government has opened up for the processing of completely new wind power projects and has asked the Norwegian Water Resources and Energy Directorate (NVE) to receive new reports for processing. The consent of the host municipality is a prerequisite. The Government wants a larger share of value creation to benefit local communities.

- The Government will assess the ambition set out in the Hurdal Platform regarding a solar energy production target for 2030 after the Energy Commission has submitted its report. Solar power is expected to play a greater role in the Norwegian power supply system going forward to 2040. Recent years' technological development and falling costs have in addition to changed (increased) expectations about the future power price in Norway and Europe triggered increased interest in this form of energy production.

- The Government will facilitate the development of locally produced energy in Norway, including solar energy, through measures such as reviewing regulatory barriers to local energy production. The Government wants to take a closer look at how local energy production associated with local consumption in industry and commercial property can help avoid the need for new grid investments. Amongst other things, the Government will consider whether new buildings should produce part of their own power needs.

2.2 Area and local infrastructure

Norwegian industrial sector must have access to adequate sites, efficient infrastructure and high-speed internet. Green industrial establishments must be well-anchored in local communities. New establishments must be as gentle as possible on the surroundings in terms of protecting nature, the environment and wildlife, and facilitate local social meeting places.

A prerequisite for establising new industrial activities is access to suitable sites. Another important factor is that an area can be prepared for production relatively quickly after a developer has expressed interest. This applies to both industrial activities on shore and at sea or on the shelf.

Norway's scattered settlement patterns has led to extensive development of physical and digital infrastructure, such as power grids, roads, ports and broadband, across the country. Our extensive experience with power-intensive industry also means that several industrial areas offer good grid capacity, which is one of the most important criteria for large green industrial projects. However, there may be challenges associated with the above-mentioned factors in new establishments.

Utilisation of land and planning processes

In the sea areas from one nautical mile outside the baseline, state authorities plan and clarify the utilisation of areas through sector regulations for various industries and comprehensive management plans for the sea areas.

For land-based activities, the municipalities are the planning authority that holds the main responsibility for clarifying the use of land, both for business

Green Industrial Initiative will help ensure growth throughout Norway and contribute to sustainable, vibrant urban and rural communities.

activities and other purposes. In order to increase its attraction value, a potential host municipality can also actively contribute to the regulation and facilitation of plots with physical and digital infrastructure within a relatively short time.

It is important for the individual municipality and region to set aside enough attractive and sustainable commercial sites to attract new green industrial establishments. At the same time, we must avoid lossing land areas that are important for food production and biodiversity. We must also avoid increased greenhouse gas emissions from deforestation and negative impact on other socially beneficial purposes. Use of the land should therefore be assessed in the overall plans of the county authorities and the municipalities based on a comprehensive knowledge base. Establishment in existing industrial areas or on industrial plots opened for new development has the advantage of avoiding new interventions in untouched nature or topsoil, which can help reduce the undesirable effects of new industrial establishments on the local environment and community. The Government has started work on developing methods for how to keep natural capital accounts, where different types of habitats are weighted in line with their natural value. In the future, these natural capital accounts and local land accounts will be used as a basis when prioritising land use between different considerations. The Government also announced in the Hurdal Platform that a new long-term goal will be set for a maximum redistribution of 2,000 decares of cultivated land annually. Norway is a large and elongated country, and there is plenty of room for establishing new green industry. However, this does not mean that this industry can be established anywhere. A green industrial policy also entails balanced natural capital accounts. Encroachment on the natural environment in one place should ideally be matched with restoration or reclamation of nature in another place. In this way, green industry can make a positive contribution in the face of both the climate crisis and the nature crisis.

Large business establishments can be challenging to handle for the municipality and others involved as it initiates several processes related to area clarifications, associated planning of housing and infrastructure and coordination between various sector authorities. The county authorities shall guide and assist the municipalities and may in collaboration with the municipalities also take an active role in the work of facilitating green industry, including important prerequisites such as access to housing and competence.

The industrial municipality of Rana

Rana Municipality in Nordland has extensive experience in facilitating industry – 75 years after the establishment of Norsk Jernverk (steelwork) and almost 30 years after its closure (the "Rana restructuring"), Mo i Rana has become an attractive alternative for national and international green industry establishments. Along with abundant renewable energy, the region has a lot of relevant expertise and infrastructure for industry and business development. Established on the old steelworks site, Mo Industrial Park is among Norway's largest, with amongst other things a good power grid capacity and close cooperation between the actors. A large new airport and a new deep-water port are now being built to ensure sufficient capacity for goods and passenger traffic.

> The businesses community shall have access to high-speed broadband by 2025.

As of today, there are long lead times for preparing investment-ready industrial areas, as a result of time-consuming processes for regulation and research, long queues for access to grid capacity and a lack of construction and delivery capacity to carry out infrastructure. These factors may increases the uncertainty for industrial players that face longer facilitation processes.

An important prerequisite for efficient and good planning is that the municipalities and other authorities have sufficient case processing capacity. It is also important that the municipalities take advantage of the opportunities for simplification and parallel case processing that lie in the current planning system. Good impact assessments, early clarifications and good dialogue along the way between the municipality, other affected authorities and other parties, may result in more efficient processes. Such actions can, for example, contribute to speeding up the completion of housing projects that have been initiated in connection with large industrial initiatives. In many places, the provision of good housing is considered an advantage for local companies in the competition to attract outside workers with the right skills. The Norwegian National Housing Bank can, amongst other things, be a dialogue partner in the management of municipal rental housing, start loans and loans for housing quality. A vibrant and attractive centre in cities and towns is also considered a competitive advantage for a region to ensure that relocated workers stay permanently.

Physical and digital infrastructure

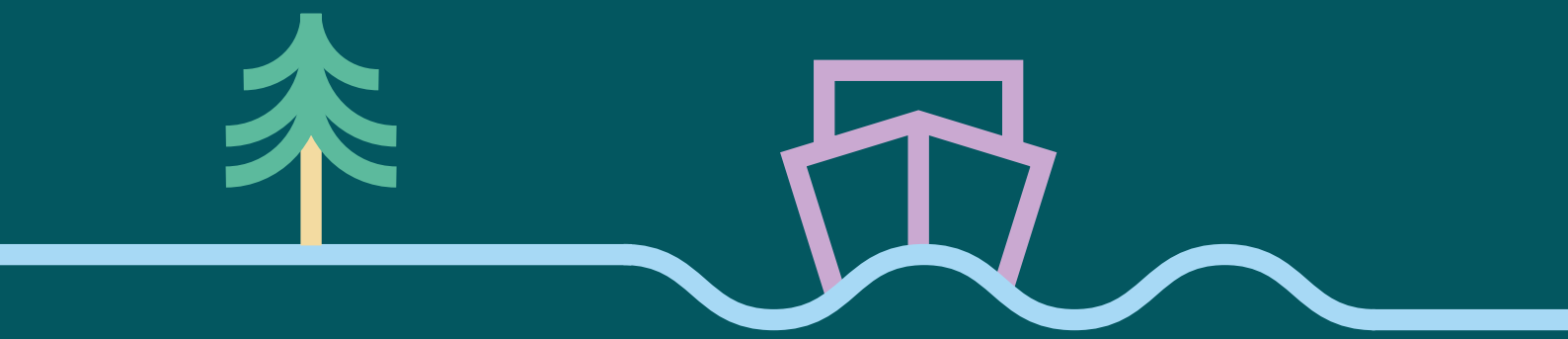
In planning new green industrial projects, a company's need for transport infrastructure is an important factor to consider. Since many new industrial projects will have a long distance from the place of production to the market, and in addition depend on the supply of input factors from outside, access to efficient and safe transport of goods is important for the industrial sector's competitiveness. Access to transport solutions with the least possible greenhouse gas emissions and impact on land use and biodiversity is also necessary to achieve Norway's climate and environmental goals.

Access to digital networks has become crucial for the industrial sector, in the same way as access to electricity or road networks. Digital accessibility requires a well-functioning digital infrastructure with good capacity, which can be scaled as needed. In order to take advantage of the opportunities offered by new technology and ever-increasing amounts of data, the industrial sector needs access to high-quality data centres, broadband and mobile networks with high security standards. The Government will facilitate access to digital networks so that companies can solve future tasks in a sound and sustainable manner. In the Hurdal Platform, the Government announced that all households and businesses will have access to high-speed broadband by 2025.

Political initiatives and processes

- The Government will work continuously to strengthen the dialogue between the authorities in the planning processes and avoid unnecessary use of objections. In recent years, changes have been made to the Planning and Building Act to streamline the planning processes and make the regional planning forum compulsory.
- The Government will prepare a guide for industrial players and relevant authorities that describes requirements in terms of location, area assessments and studies in connection with new green industrial endeavours.
- The Government will present a national strategy for the preparation of green industrial sites and industrial parks with internationally competitive advantages throughout the country.
- The Government will develop a set of overarching principles for use of areas at sea. This is intended to create predictability and a basis for coexistence across the maritime industries, while safeguarding marine ecosystems and the needs of the Armed Forces. These principles will be presented in the next report to the Storting on the comprehensive management plans for the sea areas.
- The Government will commission Design and Architecture Norway (DOGA) to develop knowledge and inspirational resources on how design and architecture can be used to create green industrial establishments that promote social and environmental sustainability.

Access to transport solutions with the least possible greenhouse gas emissions, environmentally sound land use and minimal impact on biodiversity is necessary to achieve Norway's climate and environmental goals



2.3 Raw materials

Norway will develop the world's most sustainable mineral industry, facilitate profitable reuse and recycling of raw materials, and work closely with other European countries to safeguard critical value chains.

Stable and long-term access to raw materials with a low climate and environmental footprint is a prerequisite for developing a green industrial sector. Minerals and metals are essential input factors several of the products and processes that we will be essential in the green transition. Biomass is also a key raw material for transitioning to a low-carbon society, partly because it can replace fossil carbon in several areas, for example as a biofuel.

Challenges and opportunities

The need for various minerals and metals is expected to rise, in the face of the transition from fossil fuels to renewable energy. This may lead to scarcity of raw materials and higher prices. The International Energy Agency (IEA) has warned that the world's climate ambitions are not compatible with the supply of the critical minerals needed to implement the green transition with current technologies.[1]

In addition, a large part of the world's mineral and metal extraction and processing takes place outside of Europe, which makes industrial value chains in Norway and other European countries more vulnerable in terms of predictable access to raw materials.

1 https://www.iea.org/news/clean-energy-demand-for-critical-minerals-set-to-soar-as-the-world-pursues-net-zero-goals

It is therefore important to increase Norwegian industry's access to critical raw materials. This must be done through trade, recycling and increased activity and value creation in the Norwegian mineral industry, with the aim of making it the world's most sustainable in its field.

Norway and the Nordic countries have great potential for increasing the production of critical mineral resources. According to a report prepared by Nordic Geological Surveys in 2021, the Nordic region can ensure the supply of "almost all metals and minerals necessary for the green shift".[2] This mineral wealth can provide sustainable economic growth and jobs in various segments of industry. It can also give Norway and the rest of the world access to critical minerals extracted in accordance with high sustainability, ethical and environmental standards. Additionally there is opportunities for economically profitable mineral activities on the seabed on the Norwegian continental shelf.

Norwegian R&D communities and parts of the Norwegian industrial sector are currently participating in several European collaborative projects that focus on recycling critical raw materials from secondary sources. The strategic industrial partnership with Europe, including our work with the EU's action plan for critical raw materials, will in part help to ensure access to raw materials for both Norway and Europe.

As Norway and Europe make better use of available mineral resources, efforts are being made to develop alternatives to critical raw materials. There may be significant potential in the use of bioresources from land, forests and the sea. For example, sawdust and other residual forest industry products can be used as input in battery production, and biocoal can be used as a reducing agent in the process industry.

Norway has an advantage through its access to bioresources from land, forests and the sea. These resources can provide a basis for increased extraction, provided that the resource base and environmental values are safeguarded. There are also opportunities for more efficiental standards utilisation of residual raw materials, recycling of bio-based products, and cultivation of new resources from the sea. At the same time, there are other challenges associated with bioresources, such as profitable extraction, long-term production and adaptation to changes in the climate and new environmental requirements (discussed in more detail in Chapter 4.7).

2 This September 2021 report on the potential for critical mineral resources in the Nordic countries was commissioned by the Nordic Council of Ministers: The Nordic supply potential of critical metals and minerals for a Green Energy Transition | Nordic Innovation

Norway will develop the world's most sustainable mineral industry.

Political initiatives and processes

- The Government will prepare a strategy for the mineral industry. The work is expected to be completed in the autumn of 2022. Given the importance of minerals for the trasition to a low-carbon society, the work on the Green Industrial Initiative must be seen in context with the strategy for the mineral industry.

- The Government will consider the recommendations of the Minerals Act Committee, which submits its report on amendments to the Minerals Act in June 2022. Amongst other things, the committee will look at how to better facilitate sustainable mineral extraction in Norway.

- The Government will continue the opening process for seabed minerals in line with the Seabed Minerals Act, based on the established programme for impact assessment and assignments given to the Norwegian Petroleum Directorate regarding resource assessments.

- The Government will consider new regulations and measures to improve information sharing regarding product contents for the industrial sector. Following up the EU's circular economy strategy will be important in this regard.

- The Government will contribute to the development of European value chains for critical raw materials through measures that include strategic industrial partnerships with the EU and selected countries. Extraction, processing and recycling will be important focus areas in this regard. The aim is to ensure predictable and stable access for involved parties to critical raw materials over time.

FACTS

Through the new strategy for the mineral industry the government will:

- Enable the Norwegian mineral industry to contribute to the UN's Sustainability Goals through the extraction of minerals that are necessary for electrification and the green transition in a manner that is environmentally, socially and economically sustainable.
- Work to ensure that the industry can become more circular, by reusing surplus masses as much as possible rather than landfilling them, based on the understanding that everything has value in the circular economy.
- Consider new requirements for the reuse of surplus masses, increased research efforts and other incentives or fees that may contribute to less landfilling.
- Assess whether there are areas that are suitable for mining, and areas that are not, based on considerations such as encroachments on the natural environment and waste disposal options.
- Seek new knowledge about different types of landfills, including assessing the future of marine waste disposal.
- Study how a larger part of the value creation in the mineral industry can remain locally and nationally.

2.4 Capital

The Government will mobilise as much private capital as possible for the green transition and will provide instruments for risk mitigation to accelerate industrial investment in Norway.

The transition to a low-carbon society will require large investments. The IEA estimates that to be on a net zero-emission track globally by 2050, more than a doubling of annual investments in climate-friendly energy production and efficiency will be required from the current level until 2030.[3]

Opportunities and challenges

A mixed economy depends on a well-functioning capital market that channels and collects financial capital and redistributes and spreads risk among several actors. The capital market also helps to price risk so that market participants can make sensible trade-offs between profitability and risk in projects. This makes it possible for companies to finance investments that are expected to be profitable without taking on the entire risk themselves, which also increases the willingness to invest and stimulates business development.

Even a well-functioning capital market may be insufficient for certain market segments or categories of investments. Various forms of market failure can contribute to socio-economically profitable projects not being profitable for private investors, and thus not being financed and realised. The opposite may also happen where commercially profitable projects

3 IEA (2021). *Net Zero by 2050 - A Roadmap for the Global Energy Sector*

> The need for public loans, guarantees and equity for the Green Industrial Initiative towards 2025 is estimated to amount to NOK 60 billion.

can have negative effects on society, which are not covered or taken into account by the responsible actor. An example of the latter could be companies that emit greenhouse gases or damages nature without having to cover the true costs that the activity imposes on society.

Through its policy, the state can intervene to correct discrepancies between the profitability for an individual and for society as a whole, with the goal of realising more socio-economically profitable projects. This can be done in the form of regulations or taxes (such as a carbon tax), or through public capital contributions (grants, loans, etc.). Which instruments are most effective depends on the individual case.

Public capital is mainly aimed at projects related to research, innovation and early-stage business, where market failure is assumed to be more prevalent. Some of the schemes are subsidised, for example to stimulate sharing of research and knowledge, while others take place on market terms, to increase the supply of capital in a sector/niche. The state owns several companies that invest directly and indirectly in promising companies at an early stage, such as Nysnø and Investinor.

For climate-friendly projects in the business sector, access to capital is affected by global and national climate policy. A lack of carbon pricing (tax on emissions) and climate and environmental externalities imply that climate-friendly projects for private investors/companies appear to be less profitable than they should be, while non-climate-friendly projects appear to be more profitable. There are mechanisms for pricing emissions in Norway and many other countries, especially in Europe, even though the current price is too low. The Government will therefore gradually increase the CO_2 tax to NOK 2,000 per tonne in 2030. Globally, however, only 22 per cent of emissions are priced, according to the World Bank.[4] With varying global pricing of emissions, the risk of carbon leakage can reduce the willingness to invest in climate-friendly projects in Norway and Europe.

If we are to achieve our climate goals, private capital flows must be pivoted towards sustainable investments. A survey from Menon Economics on access to capital for Norwegian climate technology cites the lack of access to risk capital for green capital-intensive industrial projects as a challenge.[5]

4 https://carbonpricingdashboard.worldbank.org/.

5 Menon Economics (2022). Kapitaltilgang for norsk klimateknologi.
(Access to capital for Norwegian climate technology; in Norwegian only) Menon publication no. 25/2022.

The lack of universally accepted principles for defining environmentally sustainable investments can make it challenging for investors to orientate themselves in a market, with the possible outcome of risks being mispriced and profitable investments not being made. This is the reason why the European Commission has proposed and adopted several EEA-relevant regulations in the financial markets area. The EU's classification system for sustainable economic activities (taxonomy) is a key measure, which will make it easier for banks and investors to identify sustainable investments. The act enshrining the taxonomy regulation into Norwegian law is expected to enter in force in the second half of 2022.

The European Commission has also proposed a new directive on corporate sustainability reporting (CSRD), which entails stricter requirements for reporting on greenhouse gas emissions, climate risk and other environmental and sustainability factors. In addition, companies will be required to prepare transition plans in line with the 1.5-degree target.

Political initiatives and processes

Transitioning to a low-carbon society will require large investments in technology and industry. Several new investment projects can be realised in Norway in the years to come. The state must be a driving force and an active facilitator in the development of new, profitable industries. Private capital will lead the way and the Government's goal is to mobilise as much private capital as possible for these projects. Norway shall have internationally competitive schemes for risk mitigation for sound commercially profitable green industry projects. The Government will provide targeted risk mitigation for sound, commercially profitable projects within the seven priority areas of the Green Industrial Initiative, including different variants of loans, guarantees and equity. The Government assume that the need for such risk mitigation for projects related to the Green Industrial Initiative is large and growing. Estimates from the public policy apparatu for the business sector indicates a scope of around NOK 60 billion by 2025.

As part of this work, the Government has already stepped-up support via Enova SF, established a scheme providing green growth loans through Innovation Norway and strengthened access to investment funds from the EU. We are also expanding Eksfin's mandate to include loans for domestic climate projects with export potential. Furthermore, the Government has significantly increased Norwegian participation in InvestEU, the EU's financial support programme. These changes make more capital available to trigger larger private investments and accelerate the green transition.

An expert committee has been appointed for climate-friendly investments which will in part assess whether the current framework conditions contribute to a well-functioning market for economically profitable and climate-friendly investments. The committee's report will be submitted by the end of June 2022.

The Government expects large Norwegian companies to report on how they are affected by and handle climate and environmental risk, and how the company's activities affect the climate and environment. Systematic reporting also from smaller companies could contribute to investments being turned in a more sustainable direction. The Government therefore also encourages smaller companies to report on factors relevant for the climate and the environment on a voluntary basis.[6]

6 See more information in the Report to the Storting (white paper) on the financial markets (Meld. St. 12 (2021–2022

- The Government will mobilise as much private capital as possible for the green transition, including through internationally competitive schemes for risk mitigation.

- The Government will provide targeted risk mitigation for sound, commercially profitable projects within the seven priority areas of the Green Industrial Initiative, including different variants of loans, guarantees and equity.

- The Government will dimension the public policy apparatus to meet the growing need for guarantees and loans for green industrial projects. Increased risk mitigation requires good projects and a willingness to invest privately. The public policy apparatus for the business sector estimates that the need for risk mitigation related to the Green Industrial Initiative may be in the order of NOK 60 billion by 2025.

- The Government will continue to strengthen Eksfin's role as a tool for major new projects in the green industrial transition. The Government will explore the need for increased limits, the opportunity to take increased risk and look at possible targeted schemes to help realise several large, green industrial projects in the years to come.

- The Government will review the entire public policy apparatus for the business sector to further sharpen efforts towards the green transition and to support the ambitions of the Green Industrial Initiative.

- The Government will prepare parameters to measure the public policy apparatus' contribution to the Green Industrial Initiative and track developments over time.

- The Government will review the recommendations of the Expert Committee for Climate-Friendly Investments and consider further measures to stimulate more profitable climate-friendly investments.

- The Government will review the Tax Committee's assessments of how more correct environmental pricing and other economic instruments can contribute to better resource utilisation, circular production and consumption patterns, and stimulate value creation based on circular solutions.

FACTS

Overview of key instruments for green a industrial sector

Through *Eksfin's* guarantee and loan schemes, financing can be provided for the export of goods and services related to green industry and for green industrial investments in Norway. Eksfin's main guarantee scheme – the Ordinary Guarantee Scheme – has a guarantee framework of NOK 145 billion in 2022. There was spare capacity of NOK 43 billion for all projects under the scheme at the end of 2021.

Innovation Norway can also provide loans to green industry. Among the relevant loan schemes, the Innovation Loan Scheme and the Low-Risk Loan Scheme have annual lending limits of NOK 3.1 and 2.5 billion, respectively, in 2022. Up to NOK 600 million of the lending limit for innovation loans is reserved for *Green Growth Loans*, which is a new loan scheme to help get more and larger green projects carried out throughout the country. Innovation Norway also has regionally-oriented loan schemes.

Green Platform is a joint competition arena under the auspices of the Research Council of Norway, Innovation Norway and Siva. The platform aims to promote green transitioning. NOK 250 million has been allocated for grants through the scheme in 2022.

The *Environmental Technology Scheme* is a grant scheme under Innovation Norway. The scheme supports pilot and demonstration projects that contribute to the commercialisation of innovative solutions based on environmental technology. Approx. NOK 505 million has been granted for the scheme for 2022.

The *Bioeconomy Scheme* is a grant scheme under Innovation Norway. The aim of the scheme is to facilitate increased value creation in bio-based industries. NOK 35 million has been allocated to the scheme in 2022.

Green investment grants are aimed at industrial companies that carry out major investment projects with a positive environmental effect. Managed by Innovation Norway, the scheme has a budget of NOK 100 million in 2022. The scheme is targeted at industrial companies and regional development.

Enova offers support with the aim of helping to achieve Norway's climate commitments and contribute to the transition to a low-carbon society. Enova's activities are aimed at late-phase technology development and early market introduction, with a view to achieving lasting market changes so that solutions adapted to a low-carbon society are preferred in the long run without support. The Climate and Energy Fund, which Enova manages, is allocated NOK 4.1 billion annually.

Gassnova will promote technology development, competence building and cost-effective solutions for the capture, transport and storage of CO_2 (CCS). Gassnova manages the state's interests in the test centre for CO_2 management technology at Mongstad (TCM). NOK 160 million has been allocated to TCM in 2022. The CLIMIT programme offers support for the development of CCS technologies, and is a collaboration between Gassnova and the Research Council of Norway. NOK 164 million has been allocated to CLIMIT in 2022.

Nysnø Klimainvesteringer AS is a state-owned investment company that will contribute to reduced greenhouse gas emissions through profitable investments. Nysnø can invest in unlisted companies, and/or funds aimed at unlisted companies, with operations in or out of Norway. The company received NOK 500 million in 2022.

Norway will participate in the EU's new investment programme InvestEU in the period between 2021 and 2027. InvestEU provides the business community with access to financial instruments on a scale not offered through our national public policy apparatus. At least 30 per cent of the investments through the programme must contribute to achieving the EU's climate goals. It is expected that Norwegian participation in InvestEU will be formalised through agreements with the European Commission during July 2022.

2.5 Research, technology development and digitisation

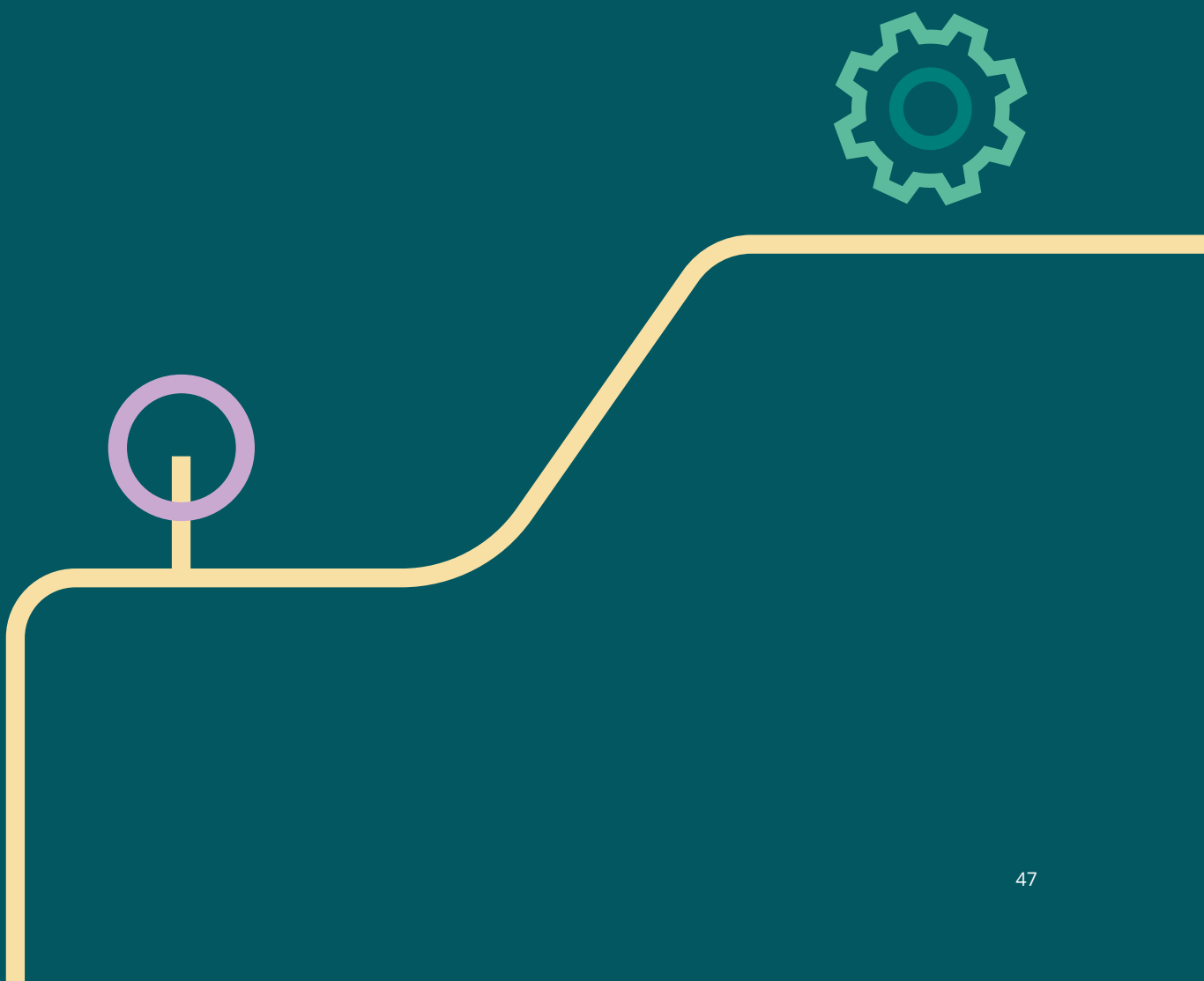
Norwegian industry will continue to develop leading environments through research, development and innovation. This requires close collaboration between different knowledge environments, the research institutes, the authorities and industry itself.

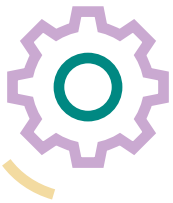
Knowledge and technology are a source of innovation and higher productivity in all parts of industry. Along with improving, automating and digitising work processes, it also involves the emergence of new products, new value chains and new business models. The ability to develop and apply new technology and knowledge will be crucial for Norwegian industrial companies' ability to cut emissions, operate profitably, and secure international positions in new markets. Technological development can also reduce the importance of labour costs when companies decide where to locate production, and lead to increased emphasis on factors such as delivery time, quality, flexibility, development opportunities, and proximity to knowledge hubs, suppliers and customers.

Opportunities and challenges

Norway has a relatively high level of public funding of research, and the business sector's own research and development efforts are increasing. Norwegian stakeholders actively participate in international research and innovation cooperation, and do well in the competition for funding from Horizon Europe,

The knowledge and research needs for the green transition will be a key theme in the Government's new long-term plan for research.





Knowledge and technology will contribute to innovation and higher productivity in all parts of industry.

the EU's framework programme for research and innovation. Norway is among the leading countries in Europe in digitalisation and is well above the EU average in terms of broadband and mobile network deployment, digital competence, use of digital services in business and society and use of public digital services.[7]

The industry's own investments in R&D have for a long time been important for enabling Norwegian industry to deliver low-emission technology and products to a rapidly growing market, both in Europe and globally. Several major research projects related to CO_2 management are underway, Norway has leading professional environments within maritime high technology, and many companies with advanced production are at the forefront of utilising digital technology.

Norwegian business and industry still invest less in R&D than the average for OECD countries. This may be partly due to the fact that much of the value creation in Norway takes place in industries with relatively low R&D intensity. There is likely a lot to be gained from increasing research efforts, strengthening the links between different sectors and improving the interaction between research and innovation. If we are to achieve the ambitions of the Green Industrial Initiative, we are also dependent on the rapid commercialisation and implementation of new climate friendly and environmental technologies. Instruments for demonstration and piloting of new solutions must help to support the opportunities for commercialisation and value creation in the market.

We do not yet know some of the technology solutions we will need, and they will be based on the development of completely new knowledge. The development of knowledge at universities and university colleges and the collaboration with research institutes is therefore important for the development of Norwegian industry. Knowledge sharing between stakeholders contributes to spreading technology and competence, both nationally and across national borders.

7 The DESI index (Digital Economy and Society Index) 2021 https://digital-strategy.ec.europa.eu/en/policies/desi-norway

FACTS

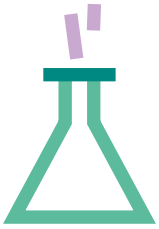
The Norwegian research institute sector

The Norwegian institute sector accounts for about one-fifth of the R&D activities carried out in Norway. The institutes contribute to the development of new technology and knowledge and to this being spread and used in business and industry. Furthermore, they own and operate research infrastructure that has great utilitarian value for industrial research. The institutes play an important role for small and medium-sized companies with a limited ability to carry out research and development work themselves, and they collaborate with universities and operate in international markets, where they help introducing new technology to Norwegian business and industry.

Historically, research institutes have made important contributions to the development of Norwegian industry, and now they are key stakeholders in the green transition. The state is building the Ocean Space Centre, the new national knowledge centre for ocean space technology that will secure Norway's position as a leading ocean nation. The centre will be run by NTNU and Sintef and will help us find the solutions that the world needs when it comes to transport, energy and food production in the sea. IFE started researching solar cells and battery technology many years ago and today has research communities with solid experience to support Norwegian companies, such as Scatec, Ocean Sun, Cenate, Morrow Batteries, Beyonder and others. NGI is engaged in technological development and transfer from oil and gas to offshore wind, and provides R&D and services to the offshore wind industry in the North Sea.

Well-functioning instruments for collaboration and cooperation, such as centre initiatives, clusters, catapults and the Green Platform Scheme, contribute to strengthening the industry's opportunities for adopting new technology, innovation and restructuring in the future.

Norwegian industry uses advanced production processes, but many industrial companies have the potential to make better use of the opportunities inherent in new technology and data. If companies succeed in using ever larger amounts of data efficiently, this can contribute to increasing the profitability and quality of production, and to developing more circular and climate-friendly solutions.[8] Computer-driven innovation and the use of the possibilities that lie in the Internet of Things, artificial intelligence and the use of other technologies, can form the basis for advanced industrial production where tailoring can be offered at low prices and with high quality. Such Industry 4.0 strategies can contribute to productivity growth and competitive advantages for companies and industries.



By focusing on research, development and efficient use of new technologies, Norwegian industrial environments will increase their opportunities to become leaders in their fields in the green transition.

8 Meld. St. 22 (2020 – 2021) Report to the Storting (white paper) Data as a resource. Data-driven economy and innovation; The expert group on private sector data sharing; The EU's data strategy (2020); The EU's Industrial Strategy (2021); The European Green Deal (2019);

Political initiatives and processes

- The Government will review the entire public policy apparatus to further sharpen efforts towards the green transition in the business sector and to support the ambition of the Green Industrial Initiative.

- The Government will ask the Norwegian policy apparatus to assess how the principles of the EU taxonomy can be used as a reference point to assess whether projects can be defined as green, and how industries that are not covered by the taxonomy should be handled.

- The Government will take initiative to assess how routines for reporting and statistics from the policy apparatus can be developed and be as comparable as possible with corresponding statistics in the EU.

- The Government will establish an easier entrance to the public policy apparatus. It should be easy to find the right scheme. As a first step, a digital solution has been launched where companies receive guidance in the public policy apparatus by contacting one public entity.

- The Government prioritises Norwegian participation in important EU programmes, such as Horizon Europe, InvestEU, the DIGITAL Europe programme, the European Defence Fund (EDF) and the EU Space Programme. This gives industry opportunities to further develop international networks, use digital infrastructure and test facilities and receive public support.

- The Government will present a long-term plan for research and higher education (LTP) for the period 2023–2032 in the autumn of 2022. The knowledge and research needs for the green transition will be a key theme in the long-term plan.

- In the work on the long-term plan, the Government is studying the possibility of using so-called missions in research and higher education policy. Mission is the term for cross-sectoral initiatives that are implemented to achieve a specific goal within a given deadline

- The Government wants Norwegian industry to be a leader in Industry 4.0 and we will therefore consider schemes to advance promising projects within automation and digitisation of industry, including the possible creation of a national Industry 4.0 programme.

- The Government will facilitate increased value creation with data by stimulating increased sharing and use of data in and across sectors, businesses and industries.

2.6 Workforce and skills

Norwegian businesses shall have access to a competent workforce. Through tripartite cooperation, continuous competence development will be facilitated, and the Government will pursue an active policy to include more people in working life

While Norway has rich natural resources, our most important resource is competent labour. Access to sufficient labour with the right skills will be an important factor in whether Norway succeeds with the green shift and the Green Industrial Initiative. This competence must be continuously maintained and developed. The opportunity for education and competence development is also important for the individual and is key to a fair and just transition to a greener economy.

Opportunities and challenges

Norwegian working life requires skills, has a high element of ICT and relatively few routine jobs in the industry and service industries.[9] Working life has been developed on the basis of the "Norwegian model" with flat structures, a high degree of trust and good social safety nets. The model gives Norwegian industrial companies an international advantage because it promotes continuous improvement, development and restructuring.

Norwegian industrial environments have cutting-edge expertise in areas such as oil and gas, renewable energy, metallurgy, and the maritime and marine sectors. We have developed many strong industrial communities through employees who are able to develop and implement new solutions, and good

9 Meld. St. 14 (2020–2021) Report to the Storting (white paper) Long-term Perspectives on the Norwegian Economy 2021

Norwegian industrial environments have cutting-edge expertise in areas such as oil and gas, renewable energy, metallurgy, and the maritime and marine sectors. The Government's Green Industrial Initiative will utilise this competence.

interaction between industry and research and educational communities. The Government's Green Industrial Initiative will be based on this competence.

The business community reports a shortage of competent labour. According to Norges Bank, companies have not had a harder time meeting their needs for labour since 2007.[10] There is reason to believe that there may continue to be a shortage of labour. The proportion of older people in the population is increasing, and recruitment of foreign workers will be limited for various reasons.[11] Lack of manpower and relevant skills can be an important bottleneck for increased activity and value creation in the industrial sector.

To realise the Green Industrial Initiative in Norway, we need competent employees from all levels of education, from skilled workers to technologists. And there is a need for access to labour that can develop and use enabling and industrial technologies such as artificial intelligence, big data analysis, robotics and the Internet of Things. Knowledge of digitisation in general, data security and data analysis is important. Industry also needs employees with insight into innovation, entrepreneurship, sustainability and with collaboration and change competence.

In 2019, almost 300,000 people who were outside employment stated that they wanted to work. More of those who drop out of education and working life must be given a chance to contribute their abilities and talents. This is important for the individual, for the companies that need labour and for society. The Government is working to increase completion rates in vocational education and training. The Government wants everyone who can and wants to work to have the opportunity to do so, and bases its work line on labour and welfare policy.

There is a need to offer relevant educational pathways at all levels across the country in order to succeed with the green transition. Through an effective and strengthened dialogue between the business community, educational institutions and the educational authorities at both national and regional level, even better access to relevant competence can be facilitated in the future. Interaction between vocational colleges, university colleges, universities and working life can contribute to the renewal of subjects and development and establishment of more relevant study programmes. Cooperation with the social partners is important in craft and vocational training, including the regional role of vocational training boards.

10 Regional Network. National report no. 4/2021. Norges Bank.

11 Meld. St. 14 (2020–2021) Report to the Storting (white paper) Long-term Perspectives on the Norwegian Economy 2021

FACTS

The triparty industry programme for competence development

The triparty industry programmes for competence development are cost-sharing undertakings where the state pays for education and training programmes at all levels of education, while the companies and the individual employee invest their time. The skills programmes offered through the industry programmes must be short and flexible, and must be able to be completed in combination with work. It is the industry itself that defines the training needs and programmes that are relevant. An industry programme for industry and construction was established in 2019, and re-established in 2022 with an expanded range. Among the relevant subject areas for the re-established programme are expertise in batteries, offshore wind, hydrogen and carbon capture and storage. In 2022, the following industries have an industry programme: the waste and recycling industry, agriculture, forestry and horticulture, industry and building sector, construction industry, food and beverage industry, electrical, automation, renewable and power industry, and maritime industry. The industry programme is managed by the Norwegian Directorate for Higher Education and Skills on behalf of the Ministry of Education and Research.

The Government is focusing on education throughout Norway. Investments in decentralised education facilitates the education and training of people where they live, based on local needs for skills. Technology and the green transition are among the subjects given priority.

Political initiatives and processes

- The Government will submit a report to the Storting which highlights the needed skills of working life in the short and long term. The overall goal of the report will be to cover society's skill requirements in the future, and ensure that citizens throughout the country have access to education.

- Education throughout the country is a priority for the Government. Investing in decentralised education facilitates the education and training of people where they live, based on local needs for skills. Technology and the green transition are among the subjects given priority.

- The Government will implement a broad competence reform for working life based on tripartite cooperation. The Government is concerned about how a broad competence reform can be implemented with special emphasis on industry's future challenges.

- The Government will continue the Skills Policy Council and will work on skills policy in collaboration with the council.

- The Government will continue schemes aimed specifically at industry's competence needs, such as the triparty industry programme for competence development (see facts above) and the Industry College, in collaboration with the parties.

- The Government will give tertiary vocational education a major role in the competence reform. The Government will give vocational colleges a greater role in teaching technical expertise, and in furthering education and development of the workforce throughout the country.

- The Government will consider how the recommendations from the funding committee for universities and university colleges should be followed up. An important priority will be to equip the sector to meet the competence needs of society in the future.

2.7 The export market

In the Hurdal Platform, the Government announced the goal of increasing Norwegian exports excluding oil and gas by at least 50 per cent by 2030. The Government's major initiative recently presented in the Norwegian export strategy "Hele Norge eksporterer" is underway – and green industry plays a key role.

Opportunities and challenges

Access to foreign markets gives Norwegian industry the opportunity to exploit economies of scale and sell its goods and services outside Norway. Many countries in the EU are among Norway's most important export markets, and the EEA agreement allows Norwegian companies to participate on equal terms with their European competitors in the internal market. In practice, this expands our domestic market from five to over 400 million people. It is also an advantage for green industrial development in Norway that many climate and environmental requirements are anchored and harmonised in common European regulations, which contributes to more equal competition conditions for European actors.

Bilateral trade agreements concluded together with EFTA with non-EU countries such as South Korea, Indonesia, Canada, Mexico and Turkey are intended to ensure Norwegian companies greater market access, competitive access to global supply chains and better predictability for exports of goods, services and investments. The trade agreements also facilitate closer economic integration with countries that can contribute to a green industrial boost.

Politiske initiativ og prosesser

- The Government will develop a strategic industrial partnership with the EU and relevant other countries (see Chapter 3.4), to achieve the goal of increased exports.
- The Government will further develop the export reform presented in the Norwegian export strategy "Hele Norge eksporterer", where the authorities, the business community and the public policy apparatus will join forces to undertake proactive export promotions abroad (see fact box).
- Through the Norwegian export strategy "Hele Norge eksporterer", the Government will ensure that the work on strategic export initiatives is more closely linked to the Government's other efforts. It is particularly important to view export promotion efforts in connection with the rest of business policy, such as the green industrial boost and the work to simplify the public policy apparatus.
- The Government will work to complete ongoing negotiations on trade agreements with Malaysia, Vietnam, India, Moldova, Thailand and Pakistan.
- The Government will prioritise new trade agreements with countries that make the greatest possible contribution to trade and value creation and that ensure basic standards, climate and environmental considerations and labour rights, and update trade agreements with Canada, Chile, Mexico and the South African Customs Union (Botswana, Eswatini, Lesotho, Namibia and South Africa).

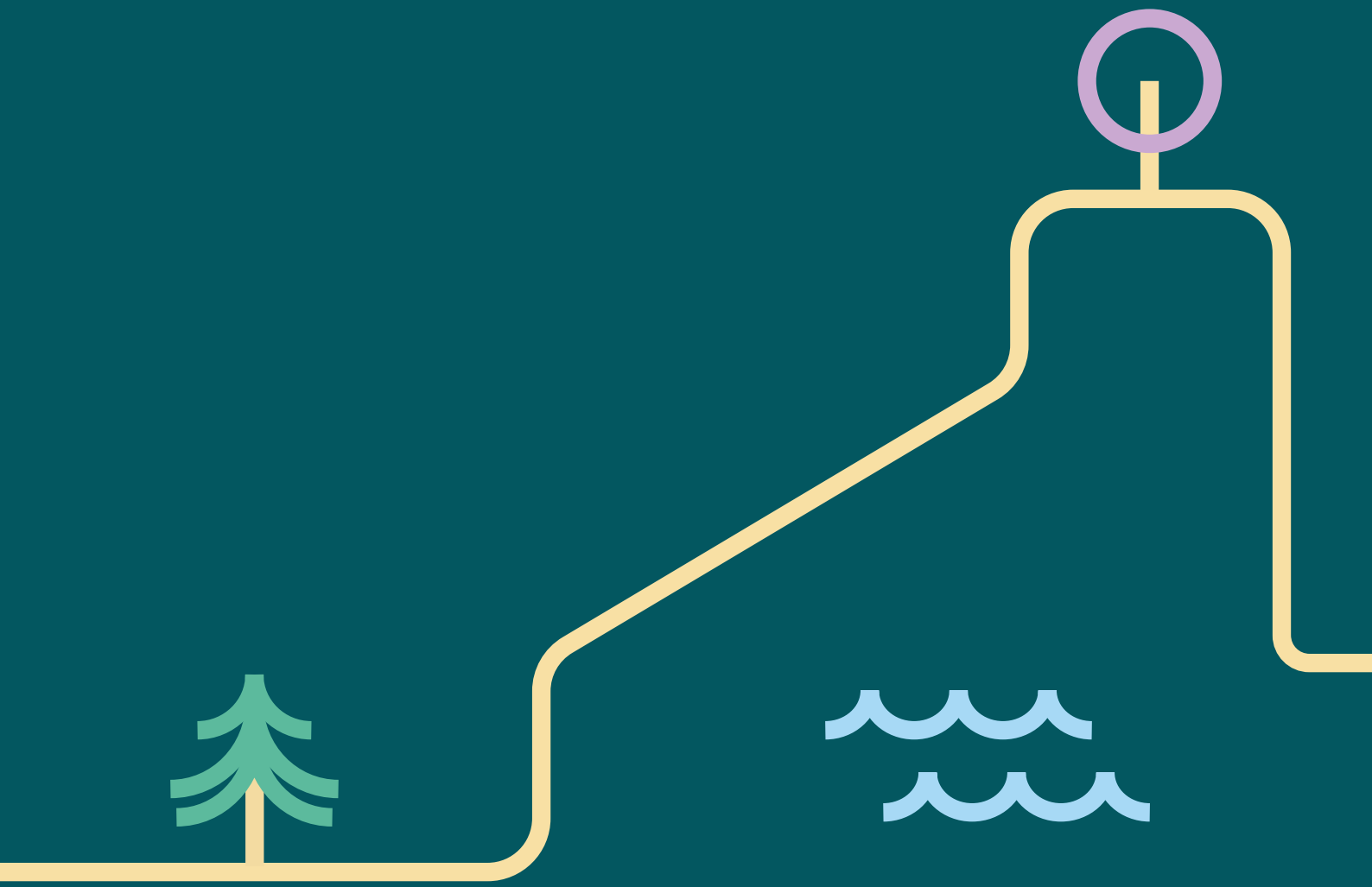
FACTS

The Norwegian export strategy

As part of the export reform, the Government has established the National Export Council with business representatives from all over the country who will provide advice and input to the Minister of Trade and Industry and formulate proposals for 5–10 major strategic export initiatives. The Government has decided that the first two strategic export initiatives will be offshore wind and "more and greener maritime exports", respectively. The Government will establish an application-based scheme in Innovation Norway where companies can apply for support to participate in trade fairs and joint business promotion activities. The Government will also take the initiative to establish a new national brand programme – "Made in Norway" – through the development of a national competence programme in Innovation Norway. The programme will develop effective tools that enable companies to consolidate international positions through the strength Norway as a brand represents. A new national labelling scheme will also be established under which Norwegian-produced goods and services will receive a recognised stamp of quality. The goal is to increase the willingness to pay for Norwegian solutions.

03

Closer interaction and strong partnerships



Introduction

We must prepare ourselves well and join forces to translate our goals and ambitions into practice. To succeed, a comprehensive and actionable policy for industry, energy, climate and the environment is needed that is efficient, results-oriented and that in aggregate contributes to our ambitions for the green transition. It requires both a well-coordinated effort at government level, and closer interaction between business and government. We will also benefit from strengthening partnerships with other countries and the EU for mutual interest and benefit.

Measures in the chapter:

- The Government will facilitate a good dialogue with the county authorities and regional actors concerning the work on the Green Industrial Initiative to ensure that developments in the area support regional opportunities and advantages.
- The Government will hold a series of thematic top management meetings chaired by the Prime Minister in order to strengthen cooperation with the business community and obtain relevant input for the work on the Green Industrial Initiative.
- The Government will establish a green industry council chaired by the Minister of Trade and Industry, where the social partners, industry actors, the environmental movement and research and development environments can discuss challenges and develop a common understanding of the role and responsibilities of different actors involved in the development of green industry.
- The Government will start work on climate partnerships by inviting the main organisations to dialogue with the purpose of entering into a letter of intent on the overall framework for climate partnerships. Both the employer and employee side will be involved.
- The Government will develop a strategic industrial partnership with the EU to position Norway as a partner in the green transition, which will bolster opportunities to create jobs throughout Norway. This can, for example, be within the production of batteries, critical raw materials and renewable energy.

3.1 Stronger coordination in the public administration

The business community shall meet a forward-looking and well-coordinated public administration that is concerned with finding good solutions and that actively facilitates the realisation of green and socio-economically profitable industrial projects.

The responsibility for framework conditions and instruments that are crucial for realising the ambitions in the green industrial boost lies with several ministries and numerous levels of public administration. National, regional and international cooperation must therefore be coordinated across sectors. It is the Government's task to ensure that various initiatives for the green shift are well connected and that the responsibility for the various initiatives is clearly positioned between ministers and ministries, agencies and public enterprises.

The Government has bolstered cooperation across ministries, and this roadmap is a first step towards greater coordination to support the further development of green industry in Norway. The roadmap provides a common understanding of the relevant problems, gives directions for the work ahead, provides an overview of ongoing and planned processes in relevant policy areas, as well as showing the connection between them. The responisble ministers meet regularly in the Group of ministers for the Green Industrial Initiative to ensure an overall and comprehensive strategy across sectors and policy areas, balance priorities between different objectives, and discuss measures. In order to operationalise the work of the Group of ministers, an inter-ministerial working group for green industrial development has also been established.

> The Green Industrial Initiative is about joining forces and making history together.

The Government will facilitate a good dialogue with the county authorities and regional actors within the work on the Green Industrial Initiative, to support regional opportunities and advantages. Cooperation has been established between the county authorities, Innovation Norway, Siva and the Research Council of Norway in all counties and there are regional partnerships for regional business development that already exist. The Government is developing regional growth agreements as tools within local and regional policy and will initiate a dialogue with two counties in 2022. These agreements could also serve as templates for a green industrial transition in other parts of the country.

Political initiatives and processes

- The Government will make sure to have a good dialogue with the county authorities and regional stakeholders concerning the work on the Green Industrial Initiative to ensure that developments in the area support regional opportunities and advantages.

FACTS

Green growth cooperation between the Norwegian policy apparatus

The transition to a society with low carbon emissions will require sweeping innovations in a short time –to boost Norwegian business and industry competitiveness in emerging markets. This requires a seamless public policy apparatus, which is well coordinated to ensure efficient use of the instruments, from research to the markets. The Research Council of Norway, Innovation Norway, Enova, Siva and Gassnova will therefore strengthen and further develop the collaboration on green growth through entering into an agreement that will contribute to the green transition and that will improve the services to customers, research and business. These entities have different roles and instruments that through good coordination better can be utilised to achieve common and overriding goals. The agreement includes collaboration on instruments, mobilisation, system development and digitisation.

3.2 Closer cooperation with industry, the social partners and knowledge environments

The Government will facilitate co-operation between all relevant social stakeholders that can contribute to accelerating the green shift.

Closer cooperation with industry, knowledge hubs and the social partners will be crucial for achieving the ambitions of the Green Industrial Initiative. The industry must lead the way through heavy investments and engagement in industrial investments in areas they believe are, or will be, commercially profitable. The knowledge environments contribute to the development of technology and knowledge that can cut emissions and increase profitability – and willingness to invest – in green value chains. The social partners are key actors in times of adjustment and major structural changes in society. New and existing arenas for strategic dialogue with industry, knowledge environments and the social partners will provide the Government with a solid basis for formulating a policy for the green industrial transition that is relevant, targeted, knowledge-based and contributes to a fair and just transition in working life.

Executive meetings on the Green industrial Initiative chaired by the Prime Minister

In order to strengthen cross-sectoral cooperation and receive relevant input to the work on the Green Industrial Initiative, the Government will regularly hold thematic executive meetings under the chairmanship of the Prime Minister. Participation will depend on the topic of the meeting in question, but will include executives from the social partners, voluntary organisations, the business community, research communities, the municipal sector and the state. The aim of these meetings is to strengthen the

Closer cooperation with and within industry, knowledge clusters and the social partners will be crucial for achieving the ambitions of the green industrial boost.

Government's base for its decision-making in key areas. Two executive meetings have already been held where the topics have been the value chain for batteries and offshore wind.

Green industry council chaired by the Minister of Trade and Industry

The Government will establish a green industry council chaired by the Minister of Trade and Industry, where the social partners, industry actors, the environmental movement and research and development environments can discuss challenges and develop a common understanding of the role and responsibilities of different stakeholders involved in the increased development of green industries. Special topics for the work will be themes discussed in this roadmap, such as the industry's access to renewable energy, expertise and public instruments. The council's task is to strengthen the knowledge base about industry-related challenges, and ensure that relevant issues are highlighted. The work and discussions in the council can provide important input, which will be included in the Government's decision basis and the overall assessments made in connection with the Green Industrial Initiative. Representation will be rotational.

5G Industry Forum

In a collaboration between the Minister of Local Government and Regional Development and the Minister of Trade and Industry, a 5G industrial forum has recently been established. The purpose of the forum is to enable industrial and business stakeholders to make use of the opportunities that lie in the fifth-generation mobile technology (5G). Smart use of 5G in various industrial processes is an important input for implementing the the Green Industrial Initiative. The forum brings together affected stakeholders from industrial companies, the e-com industry and the authorities. Semi-annual meetings are planned at the top management level (Strategic Council).

Political initiatives and processes

- The Government will hold a series of thematic top executive meetings chaired by the Prime Minister in order to strengthen cooperation with the business community and obtain relevant input to the work on the Green Industrial Initiative.

- The Government will establish a green industry council chaired by the Minister of Trade and Industry, where the social partners, industry stakeholders, the environmental movement and research and development communities can discuss challenges and develop a common understanding of the role and responsibilities of different actors involved in the development of green industry.

3.3 Climate partnership between the authorities, the social partners and industry

Through climate partnerships, we will work together to ensure that Norway reaches its climate goals, and we will start where the potential for reductions of emissions is greatest.

The Government wants to develop climate partnerships as an arena for structured dialogue between the state and business at the industry/sector level. Climate partnerships shall be designed in line with a fixed framework and based on mutually binding agreements. The overall goal will be to accelerate the green transition in the business sector.

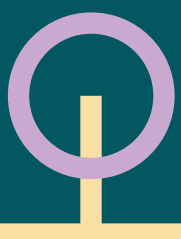
Climate partnerships will contribute to a common understanding of what is needed to achieve the climate goals, identify and anchor necessary emission reductions and the green transition in industry, including energy and resource efficiency and increased circularity. Among other things, the partnership will facilitate a systematic exchange of experience on the effect of instruments and the need for changes in the use of these, without reducing the state's overall scope for action in climate policy.

The Government will start the process of climate partnerships by inviting the main organisations in the labour sector to a dialogue on the drafting of a letter of intent on the further framework for the partnership. The Government will provide further details regarding the partnership agreements.

Political initiatives and processes

- The Government will start work on climate partnerships by inviting the main organisations to a dialogue on the drafting of a letter of intent on the overall framework for climate partnerships. Both the employer and employee side will be involved.
- The Government will enter into a dialogue on climate partnerships with the industries/sectors that are responsible for the largest harmful emissions and where the potential for rapid reductions of emissions is greatest.
- The Government will facilitate that Norwegian industry can implement the UN's Sustainability Goals in its activities.

Climate partnerships will contribute to a common understanding of what is needed to achieve the climate goals, as well as identify and anchor necessary reductions in harmful emissions and the green shift in industry, including efficient use of energy and resource, as well as increased circularity.



3.4 Strategic industrial partnership with the EU and cooperation with European countries

Norway will work closely with our international partners to increase the pace of the green transition.

EU

Norway and the EU are currently cooperating on areas such as climate, energy and industrial development. It is in our mutual interest to develop a strategic industrial partnership where we position Norway proactively as a relevant partner in the green transition. By directing our efforts towards areas where Norwegian conditions are best and where European needs are greatest, it can provide value creation, increased export opportunities and greater climate gains. The industrial partnership will strengthen the positive effects of our participation in the EEA, and complement existing cooperation with the EU, such as on the energy dialogue, the climate agreement, and programme cooperation.

This is also important for reasons of state- and public security. Several matters, including the COVID-19 pandemic, have recently revealed vulnerabilities resulting from a lack of control over value chains and few alternative suppliers from countries with which Norway cooperates on security policy. Going forward, Norwegian companies and companies in countries with which we cooperate on security policy will be important in ensuring robust supply chains of medicines, equipment and other items in the event of a crisis.

Russia's warfare in Ukraine has raised the question of Europe's dependence on energy supplies from Russia. To reduce vulnerability, the EU will need increased energy supplies from other countries and at the same time have a stronger focus on renewable energy and energy saving. Norway is an important energy supplier to Europe, so this is of great importance.

Political initiatives and processes

- The Government will develop a strategic industrial partnership with the EU to position Norway as a partner in the green transition, and which strengthens opportunities to create jobs throughout Norway. This may, for example, be in within the production of batteries, critical raw materials and renewable energy.

Bilateral cooperation

Bilateral partnerships and cooperation will be of great importance for promoting green business development in the future, especially with countries of special importance to Norway. Germany is one of Norway's most important trading partners. Norway and Germany already work closely together in a number of areas that are important for the green transition, particularly those related to energy. Norway and Germany have agreed to further develop the existing energy partnership between our two countries and establish a structured dialogue on energy and industrial restructuring. The purpose of the collaboration is to assist each other to reach climate goals, create new green value chains and jobs, and strengthen energy security and the circular economy. Regular meetings on topics related to energy and the green transition will facilitate this. It will back up already established cooperation and provide an incentive for cooperation in new areas with great potential.

Sweden is one of Norway's largest trading partners and has a business community that largely complements ours in a number of sectors. There is consensus at the political level in Norway and Sweden to facilitate existing green value chains across the Swedish-Norwegian border as well as assisting in creating new ones. The goal is to create more jobs in the export industries and contribute to increased value creation on both sides of the border.

Political initiatives and processes

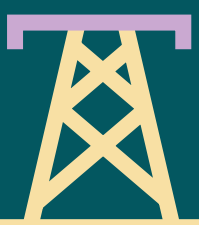
- The Government will follow up the dialogue with Germany on energy and industrial restructuring, and implement specific activities in sectors such as hydrogen, offshore wind, CCS and other green industries.

- The Government will specify the industrial cooperation with Sweden confirmed through the joint declaration between the Norwegian and Swedish governments. This will be done through a closer connection of the policy instrument actors involved in export promotion, bilateral dialogue, simplifying the possibilities for upscaling companies with easier access to Nordic markets, cooperation on technology development, development of regulatory frameworks and common standards.

- The Government will prioritise closer co-operation with the Nordic countries in relevant areas and continuously assess the other countries where similar dialogues will be appropriate, with a main emphasis on Europe.

04

Priority areas



Introduction

In its work on the Green Industrial Initiative, the Government has identified the following priority areas: offshore wind, batteries, hydrogen, CO_2 management, the process industry, the maritime industry and the forest and timber industry and other bioeconomy sectors. These are areas where future demand is expected to be large, which can provide significant opportunities for sustainable production and value creation in Norway.

Firstly, the Government's efforts consist of facilitating the development of new industrial value chains that are central to the work of developing an emissions-free energy system and society. A concrete example of this is our investments in offshore wind. Secondly, we will facilitate the establishment of large green projects in existing mainland industry, which can contribute to both large reductions in emissions and increased value creation in the future.

Selected measures in the chapter:

- The Government will facilitate large-scale development of offshore wind electricity production on the Norwegian continental shelf with the goal of allocating 30 GW by 2040.
- The Government presented a battery strategy in June 2022.
- The Government will map the market opportunities for hydrogen in Europe and study the potential for exporting hydrogen from Norway through various production and distribution solutions.
- The Government will contribute to the implementation of the Longship project as a key part of the Government's policy for CO_2 management and of Norway's contribution to developing the necessary climate technologies.
- The Government will continue its efforts to promote CO_2 management, hydrogen and electrification as important contributions to cutting emissions from Norwegian industry and achieving the temperature target in the Paris Agreement.
- The Government will focus on "more and greener maritime exports" within the framework of "All of Norway Exports". An increased green transition for the maritime industry can contribute to further growth in the industry by exporting low- and zero-emission maritime solutions.
- The Government will further develop investments in bioenergy and advanced biofuels in the transport sector.

4.1 Offshore wind

Norway will become a leading nation in the field of offshore wind, with an industry that develops and builds superior wind power solutions. The Government's ambition is to allocate areas with potential for 30 GW of offshore wind electricity production on the Norwegian continental shelf by 2040.

Market opportunities

While Norway has significant land areas, it offers sea areas that are five times larger. Combined with good wind conditions along the Norwegian coast, this provides a good starting point for producing power from offshore wind. Offshore wind has the potential to become a key source of renewable energy worldwide and in Europe, which is also illustrated by the EU's high ambitions in this area. Development of wind power on the Norwegian continental shelf will be important to meet the growing demand for renewable energy that is expected in Norway and Europe as a whole in the years ahead.

The Government's ambition to allocate areas with potential for the installation of 30 GW of offshore wind electricity production on the Norwegian shelf by 2040 will correspond to about 75 per cent of the capacity in the Norwegian electric power system today. Offshore wind in Norway also has an industrial potential, in that it can provide new market opportunities for the Norwegian supplier industry. When announcing licences for offshore wind production in Norway, Norwegian suppliers will have good opportunities to participate in the competition thanks to their proximity to the market, as well as their experience from activities on the Norwegian continental shelf. While floating offshore wind is still poorly developed, bottom-fixed offshore wind is already commercially profitable under certain conditions, and is an important source of energy in several countries.

Challenges

There are also challenges when it comes to the development of offshore wind related in part to high investment costs, long lead times and area use. Floating offshore windmills are still an immature technology in an immature market, without established supply chains. In a first phase, there will be a need for technology development, innovation and scaling, in order to reduce costs and build competence in the supply chains.

Offshore wind also competes for areas at sea that are partly used by other actors. A prerequisite for offshore wind production is to ensure that it can take place in coexistence with fisheries, shipping, other industries and with safeguarding of important environmental and societal interests.

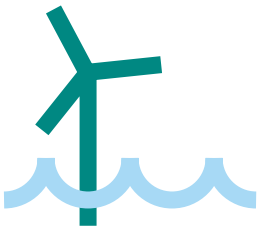
FACTS

Hywind Tampen

Hywind Tampen, which is currently being installed in the North Sea, will supply the Snorre and Gullfaks platforms with electric power and will be the world's largest floating offshore wind farm when it comes on line. The eleven wind turbines will have a total capacity of 94.6 MW and will reduce CO_2 emissions from the installations on the oil and gas fields by about 200,000 tonnes annually.

Aker Solutions was awarded one of the major contracts where they have performed the pre-engineering, procurement and construction of the foundations. Assembly of the offshore wind turbines was done at Wergeland Base in Gulen Industrial Harbour located in the Norwegian region Ytre Sogn.

Out of a total project cost of approximately NOK 5 billion, Hywind Tampen has received NOK 2.3 billion in support from the state enterprise Enova SF, responsible for the totality of the Government's climate and environmental policy.



The Government will pave the way for large-scale development of power generation from offshore wind on the Norwegian continental shelf and create an internationally competitive supplier industry.

Political initiatives and processes

Access to new areas and predictable framework conditions are important prerequisites for the establishment of an offshore wind industry in Norway. The Government facilitates the development of offshore wind by announcing licences for the use of areas for renewable power production.

- The Government will facilitate large-scale development of offshore wind on the Norwegian shelf by allocating dedicated areas for 30 GW electricity production by 2040.
- The Government will facilitate the realisation of the first 1,500 MW from the Southern North Sea II with cable connections to Norway.
- The Government will facilitate a large-scale offshore wind development that permits the use of various grid solutions. Cables with two-way power flow, radials to Europe and radials to Norway will be considered for each project call. When choosing an offshore grid solution that involves connection to the Norwegian power system, the technical design of the system must ensure national interests, including security of supply and reasonable electricity prices for households, industry and business.
- The Government will facilitate innovation and technology development. By allocating the area on Utsira Nord according to qualitative criteria, we will facilitate innovation and technology development that can contribute to future cost reductions for floating offshore wind and to develop the supplier industry.
- The Government will facilitate long-term investments in offshore wind in Norway with repeated rounds for opening up areas for offshore wind. The Government has therefore commissioned NVE, a state entity that manages Norways's water and energy resources, to identify new areas for renewable energy production at sea based on input from a directorate group.
- The Government will work to streamline the licensing process towards the completion of the first wind power projects in Norwegian ocean areas. The goal is to facilitate that the first projects can be put into operation before 2030.
- The Government will give Statnett the responsibility for the planning of offshore grids, in addition to system responsibility at sea.

Norway has significant land areas, but the sea area are is five times larger. Combined with good wind conditions out at sea and along the Norwegian coast, it provides a good starting point for production of electric power from sea wind.

4.2 Batteries

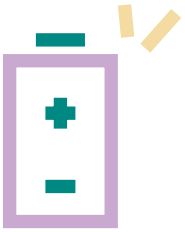
Norway will further develop a coherent and profitable battery value chain ranging from sustainable mineral extraction to recycling of batteries. Norway will be an attractive host nation for profitable activities throughout the battery value chain and attract large battery investments and giga factories.

Market opportunities

Batteries are considered a core technology for the transition to renewable energy, especially in the transport sector. Batteries are also relevant for other purposes, such as stabilisation of the power grid, energy supply and energy storage. To date, batteries have largely been manufactured in Asia. The European battery industry is currently undergoing a major mobilisation, driven by the EU's goal of strategic autonomy. The EU has a clear ambition to bring battery production closer to the European automotive industry and to have control over the battery value chain for the European market. Globally, demand for batteries has almost tripled since 2018. Nevertheless, strong growth is expected in the years ahead, and several research agencies estimate a multiplication of total global demand for battery capacity by 2030.

The value chain for batteries consists of minerals, refined active materials, battery cells, battery packs and recycling. Norway is a major exporter of several of the relevant materials used in batteries, and we also have mineral resources and good access to renewable energy at competitive prices. It provides Norway with relevant and attractive conditions for hosting a comprehensive battery value chain and producing battery cells with relatively low climate and environmental footprints seen in a global context.

Batteries are considered a core technology for the transition to renewable energy, especially in the transport sector.



Norway is well positioned to become a “leading battery nation”.

Challenges

The rapid development puts pressure on the value chains' ability to deliver in accordance with expectations of sustainability and requires the mobilisation of capital and expertise. Construction of factories for battery materials and battery cells involves investments with long time horizons and is capital-intensive. Such investments also involve technological and commercial risks as a result of rapid development of products and processes. New entrants who want to establish themselves industrially in a European battery value chain will often have to produce on the basis of technology that has already been developed, and develop their operation stepwise, to show to customers that they are capable of producing on a large scale and according to given criteria. Research and development must primarily focus on coming up with tomorrow’s battery solutions that will appear on the market in a few years’ time (improved output, service life, material combinations, safety, etc.), and these developments must often take place in parallel with production based on current technology and material solutions.

A full-scale battery factory usually has a very large capacity due to economics of scale, with continuous 24-hour production and often with a high degree of automatization. Factories producing battery materials and factories for producing battery celles will have a significant need for power, and reinforcements in the power grid might be necessary. New factories will need suitable sites with infrastructure, efficient solutions for cargo transport and highly skilled labour. Overall, this can be a challenge in terms of attracting large establishments. Development of the battery value chain will also entail a need for retraining of labour and new educational pathways, providing a collective boost for continuing and further education. The above challenges are something we share with many European countries.

The Trade and Cooperation Agreement between the EU and the United Kingdom (TCA) sets clear restrictions on the use of input materials from third countries in order for a finished product to be defined as originating in the EU or the United Kingdom, and thus be entitled to duty-free trade between the two areas. Norway is defined as a third country, which presents specific challenges in connection with the export of Norwegian-produced batteries installed in electric vehicles in trade between the EU and the UK. The Government is working with the EU and the UK to find a solution to this challenge.

Political initiatives and processes

- The Government presented “Norway's Battery Strategy” in June 2022.[12]

12 Norges batteristrategi - regjeringen.no

FACTS

Hydrovolt and battery recycling

Europe's largest recycling plant for electric car batteries was recently established in Norway, where valuable materials from electric car batteries will be recycled in a sustainable way.[13] The Hydrovolt company in Fredrikstad started operations in April 2022, and plans to expand in Europe with a long-term goal of recycling around 70,000 tonnes of battery packs by 2025 and 300,000 tonnes of battery packs by 2030. This corresponds to approximately 150,000 electric car batteries in 2025 and 500,000 in 2030.

Hydrovolt's fully automated process allows up to 95 per cent of the materials to be recovered from the batteries, including plastic, copper, aluminium and "black mass", a substance containing metals of nickel, manganese, cobalt and lithium. The black mass will be sent on to the Northvolt plant in Skellefteå in Sweden, where it will be further processed before reuse. Hydrovolt is expected to produce around 2,000 tonnes of black mass each year by 2025.

13 https://northvolt.com/articles/hydrovolt/

4.3 Hydrogen

Norway will develop a value chain for the production, distribution and use of hydrogen produced with no or low emissions, and contribute to developing the hydrogen market in Europe.

Hydrogen produced with no or low emissions is an energy carrier with significant potential to reduce greenhouse gas emissions from a number of sectors.[14] This is especially true in cases where direct electrification, batteries or other zero-emission technology are not suitable, which today primarily applies to industry and the transport sector.

Market opportunities

Norway has some prerequisites that in principle facilitate the production of hydrogen with no or low emissions. This can be done either through electrolysis based on renewable energy or by reforming natural gas with CO_2 management, which requires access to power, natural gas and space for CO_2 storage.

By increasing the use of hydrogen in various parts of the economy nationally and globally, profitable jobs can be established in connection with developing competence, technology and equipment for hydrogen use and production. Norway already has competitive and competent environments that can contribute to the development of value chains for hydrogen.

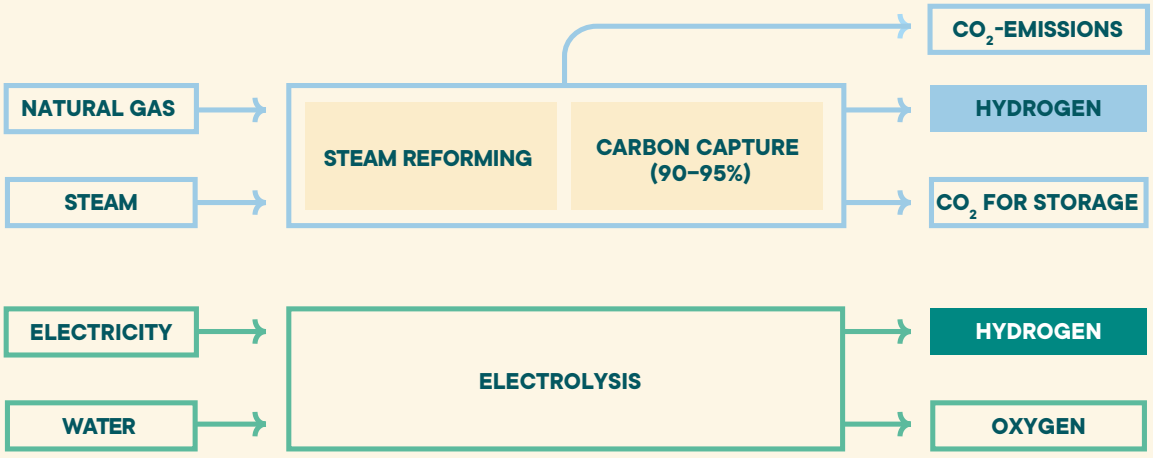
Challenges

Globally, hydrogen is only to a small degree produced with no or low emissions today, and there is great uncertainty about and possibly when a hydrogen market will reach a significant size. The sectors in which hydrogen may win ground is also uncertain. This will largely depend on technology development and cost reductions for both hydrogen and

14 *Hydrogen* includes hydrogen carriers such as ammonia, liquid organic hydrogen carriers, etc.

FACTS

Production process for hydrogen with no or low emissions



competing technologies and solutions, including which energy carriers the actors in the market will demand in the future.

Today, hydrogen is relatively costly to produce and use compared to direct use of electricity. Large amounts of energy are required to produce hydrogen, and with current technology, production entails a significant energy loss. This poses a challenge to the profitability of the technology. It is also more demanding to transport hydrogen than, for example, natural gas, and there are safety challenges associated with use.[15]

15 Ammonia is transported on a large scale today.

Hydrogen produced with no or low emissions is an energy carrier with significant potential to reduce greenhouse gas emissions from a number of sectors.

Political initiatives and processes

There are currently many projects across Norway that where the plan is to to produce, distribute and use hydrogen produced with low or no emissions. Most of these projects are in the start-up phase, and have received support from the Norwegian state through various schemes. In order to contribute to the development of a market and a comprehensive value chain for hydrogen, the state currently contributes through a number of instruments, including support for research, development and demonstration, support for the establishment of hubs and infrastructure, and through requirements in public procurement.

- The Government will contribute to building a coherent value chain for hydrogen produced with low or no emissions where production, distribution and use are developed in parallel.

- The Government will map the market opportunities for hydrogen in Europe and study the potential for exporting hydrogen from Norway through various production and distribution solutions. This will be done in part through an external study that also assesses how the state should contribute to building a coherent value chain for hydrogen produced with low or no emissions, where production, distribution and use are developed in parallel.

- The Government will contribute to the development of a market for hydrogen in Europe, in part by participating in relevant cooperation forums and programmes for hydrogen, drafting regulations for hydrogen in Europe as an EEA country, research cooperation, bilateral cooperation with relevant countries and by creating a national market for hydrogen.

- The Government will commission an external study that will help provide a better professional basis for how the state can contribute to building a coherent value chain for hydrogen. State ownership as a tool will be included in the assessment.

- The Government will have an ambition to facilitate the production of hydrogen with low or no emissions to meet national demand by 2030. The goal is to help reduce Norwegian greenhouse gas emissions.

- The Government will facilitate the establishment of socio-economically profitable production of blue hydrogen including through Gassco's architectural function, by allocating areas for CO_2 storage and processing relevant applications for developments under the Norwegian storage regulations quickly and efficiently.

FACTS

Hydrogen – Development of new electrolysis technology

Hydrogen produced with low or no emissions can replace fossil energy sources and reduce emissions, including in industry and the maritime sector, but is not yet a competitive solution in the market. The Hystar company has recently developed a completely new technology that can provide significant cost cuts for the production of green hydrogen, i.e. by electrolysis based on renewable energy. Electricity amounts to approx. 70 per cent of the production cost for green hydrogen, and Hystar's technology consumes about 10 per cent less energy than solutions. The next step is to pilot test the technology in a comparable plant, with the aim of demonstrating the technology under relevant operating conditions before commercialisation. This is being done at the Kårstø plant in collaboration with Equinor and Gassco. Enova has provided the project with pilot support to alleviate the technological risk, and accelerate the use of green hydrogen on a large scale. Founded in 2020, the Hystar company originated in the research environment at SINTEF. Hystar has also received support from the Research Council for several projects.

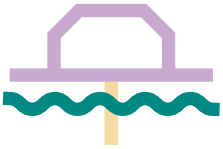
4.4 CO_2 management

Norway will continue its work on world-leading industrial solutions for the capture, storage and use of CO_2 that create profitable jobs in Norway and that cut global climate emissions in a cost-effective way.

Market opportunities

The industrial sector accounted for about 24 per cent of the total global greenhouse gas emissions in 2019, most of which came from larger point source emissions. In several industrial processes, CO_2 gas is formed naturally, for example in cement. It will be very difficult to avoid all emissions from industry, and in order to achieve net zero emissions in 2050, it will be necessary to permanently remove carbon from the atmosphere. CO_2 capture and storage (CCS) from point source emissions in industry can be a significant contribution to this.

With suitable geological storage formations on the Norwegian continental shelf, Norway can play a key role in the further development of CO_2 management as an important climate measure. CO_2 storage also enables the production of hydrogen and ammonia from natural gas with very low total emissions. This may open up for value chains with hydrogen production in Norway and for hydrogen produced by



Thanks to geological formations on the Norwegian continental shelf suitable for storage of CO2, Norway can play a key role in the further development of carbon capture and storage as an important climate measure.

landfall in Europe with CO_2 storage on the Norwegian continental shelf. Transport and storage infrastructure could potentially attract new establishments of industry to produce low-emission products, greener cement, chemicals and metals, as well as negative emissions from bio-CO_2 storage and CO_2 capture from air.

Carbon capture and storage (CCS) will thus be able to create new and preserve existing jobs while enabling emission reductions from waste incineration and from industry with no other real opportunities in a zero-emission world.

CO_2 can also be used as an input factor in production. The use of trapped CO_2 can potentially contribute to carbonaceous products being part of a circular economy, reducing emissions and at the same time creating new industrial activities. In order to have a climate effect, the CO_2 must be permanently stored in the product, which is recycled after use, or incinerated with CCS.

If a circular value chain and a market for CO_2 are established, it will be able to contribute to technology development within capture, transport, storage and use of CO_2. If captured CO_2 is used for business and industrial activities, new greener products and values can also be created that may contribute to covering costs for capturing and transporting CO_2. Here, the experiences from Longship (see page 85) can be useful for other industry actors.

Challenges

It has been widely thought that investing in CCS only postpones a necessary transition to renewable energy, recycling of materials, emission-free production processes and alternative materials and products. At the same time, reports from entities including the UN's climate panel (IPCC) and the International Energy Agency (IEA) show that it is very difficult, if not impossible, to achieve the necessary emission reductions without this technology. Scepticism about CCS is now declining in several countries, but is still present.

Norway is a leader in carbon capture and storage (CCS) in Europe and has worked for a long time to develop CCS-technology internationally. This work has broad political support. The goal is to make CCS a cost-effective measure to mitigate climate change.

CCS is still a relatively immature technology, and there are significant costs associated with technology and knowledge development, while the benefits from this will generally accrue to more than those who develop it. For the individual actor, the profitability of CCS is also largely dependent on established and widespread infrastructure and provisions for transport and storage. Capture and storage of CO_2 directly from air or from bio-based emissions could result in necessary negative emissions.

Political initiatives and processes

Norway has a leading position in CCS in Europe and has worked for a long time and with broad political support to develop CO_2 management internationally. The goal is for CO_2 management to become a cost-effective climate measure.

- The Government will continue Norway's comprehensive efforts to support the development of technology in the area and promote CO_2 management as an internationally important climate measure.
- The Government will contribute to the implementation of the Longship project, as a central part of the Government's policy for CO_2 management and of Norway's contribution to developing the necessary climate technologies.
- The Government will facilitate Northern Lights' ability to recruit Norwegian and international customers.

FACTS

The Longship project

In the autumn of 2020, the Storting decided to implement Longship in line with the white paper *Longship – Carbon capture and storage* (Meld. St. 33 (2019–2020)) and the Ministry of Petroleum and Energy's budget proposition to the Storting (Prop. 1 S (2020–2021)). Longship consists of capturing about 400,000 tonnes of CO_2 per year from Norcem's cement factory in Brevik in Porsgrunn Municipality and transport by ship to Øygarden Municipality, where the CO_2 is carried further in pipes for permanent and safe storage under the seabed, at Northern Lights JV. Longship will also include the capture of approximately 400,000 tonnes of CO_2 per year from Hafslund Oslo Celsio's waste incineration plant at Klemetsrud in Oslo, provided there is sufficient funding. In the 2022 Revised National Budget, the Government has proposed a financing solution that will facilitate the start of the construction of the capture project at Klemetsrud in Oslo in 2022.

The state's total costs in the Longship project are expected to amount to just over NOK 18 billion, including a share of the annual operating costs until 2034. In addition, the state has assumed significant risk, in part related to the interaction between capture, transport and storage in Longship.

4.5 The process industry

Norway shall have the world's cleanest and most modern and energy-efficient process industry, based on high-tech solutions and great value creation.

Market opportunities

The process industry is among other things characterised by having a high export share and is competing in international markets. Much of the production in the process industry consists of materials or semi-finished products such as aluminium ingots, silicon, ferro-alloys, plastic raw materials, cardboard, paper and cement. Many of these are key input factors in products we surround ourselves with in everyday life, and also in products such as solar cells, batteries and wind turbines.

The Norwegian process industry has streamlined its production processes for several decades, and several Norwegian companies are world leaders in their industry in terms of climate and resource efficiency, due to technology, competence, and their utilization of renewable Norwegian power. The Norwegian process industry has reduced its emissions by more than 40 per cent since 1990, while value creation has increased by about 30 per cent adjusted for inflation.[16] As climate policy is gradually tightened globally, the Norwegian process industry may gain a competitive advantage compared with foreign actors thanks to low-emission technology.

16 Statistics Norway, statistical tables 09170 (2022) and 08940 (2021)

Norwegian industry has reduced its emissions by more than 40 per cent since 1990, while value creation has increased by about 30 per cent, adjusted for inflation.

There are also opportunities to realise increased value creation through more efficient use of resources and circular business models. Circularity and material efficiency have been highlighted by the UN's climate panel as key words for achieving net zero CO_2 emissions in industry.[17] The national strategy forum for the process industry, Process21, also points to the possibility of increased specialisation and production of more complex products to move away from markets where competition mainly relates to price.[18]

Challenges

In a global context, the climate footprint of the Norwegian process industry is already low, mainly due to the widespread electrification in this industry in Norway and the large share of renewable power in the Norwegian power supply. Nevertheless, the process industry accounts for almost all of the greenhouse gas emissions from mainland Norwegian industry, corresponding to about 23 per cent of total Norwegian greenhouse gas emissions in 2020. In a low-carbon society, there will be no room for emissions from industry. Thus, it is necessary to step up efforts along the entire breadth of the process industry to achieve large cuts in emissions in the years ahead.

To achieve further reductions of the emissions form the process industry, the companies may implement new technology that changes their production processes, they may use alternative input factors and possibly implement CCS. A significant challenge for most of today's players in this industry, including the Norwegian ones, is their utilisation of fossil fuels. Companies have also invested significant capital in existing production facilities optimised for the established processes. The development of new and improved processes is also often very capital intensive, and the technology pathways from research and development to piloting and commercialisation can be long and risky.

The process industry is power-intensive, with an annual consumption of about a quarter of Norway's normal annual power production. Developments in the process industry are therefore closely linked to developments in the Norwegian power system. With the restructuring of processes and further electrification, the demand for power will increase further.

17 IPCC's Sixth Assessment Report, third part (2022): Main findings in part three of Sixth Assessment Report - Norwegian Environment Agency (miljodirektoratet.no)

18 Prosess21 (2021), hovedrapport (main report; in Norwegian only): prosess21_rapport_hovedrapport_web_oppdatert_060821.pdf

FACTS

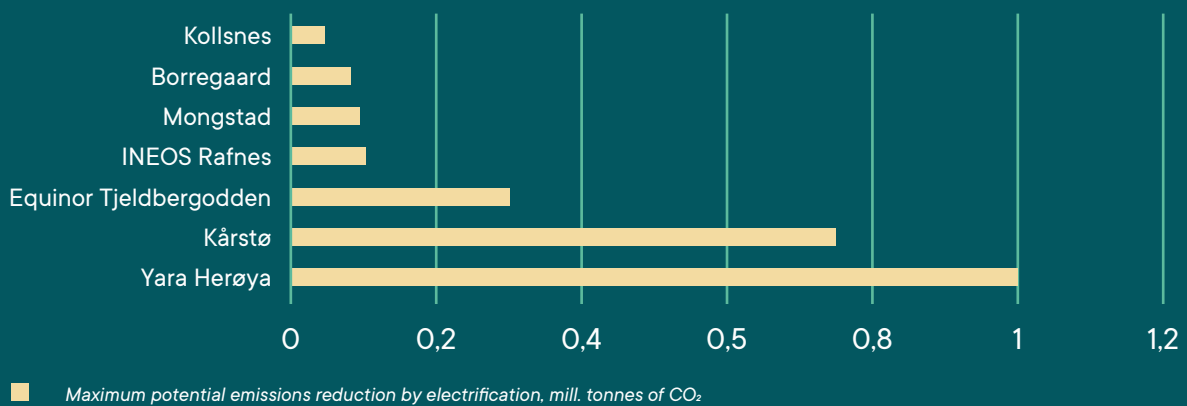
Electrification measures in mainland industry

NVE has mapped opportunities for emission reductions in mainland industry in its 2020 report on the electrification of land-based industrial plants in Norway (published in Norwegian only). As stated in the report, 30 industrial plants account for about 90 per cent of the greenhouse gas emissions from industry. At seven of these plants, it is technically possible to halve total emissions from 4.6 to 2.3 million tonnes of CO_2 per year through direct electrification, a reduction in emissions corresponding to 18 per cent of the total emissions from land-based industrial plants. Five of the seven measures may be implemented with well-known technology.

The report points out that most of the emissions cannot be reduced by direct electrification, but that more than 5.7 million tonnes CO_2 can be reduced through measures such as carbon capture, use of hydrogen, etc., in addition to the above 2.3 million tonnes CO_2 that may be reduced through direct electrification.

Various analyses and models, including a recent report from the environmental foundation Zero, operate with a higher reduction potential. This shows that technological development is progressing rapidly and that achieving the emission targets should be within reach. This will be specifically highlighted in the climate partnerships between the Norwegian Government and the industries.

Maximum potential emission reduction by electrification, mill. tonnes of CO_2



In a global context, the Norwegian process industry already has a low carbon footprint.

Ample access to power at reasonable prices will be important for the further development of this industry.

The fact that the process industry operates in international markets with significant competition contributes to high productivity, but also makes it vulnerable to carbon leakage as a result of a more ambitious climate policy in Norway than in many of the countries where several of their competitors are located.

Political initiatives and processes

- The Government will continue the CO_2 compensation scheme for the industry and work actively to safeguard Norwegian interests in connection with the EU's work to prevent carbon leakage through the Carbon Border Adjustment Mechanism (CBAM).

- The Government will continue its efforts to promote CO_2 management, hydrogen and electrification as important contributions to cutting emissions from Norwegian industry and achieving the temperature target in the Paris Agreement.

- The Government will give priority to entering into a dialogue on climate partnerships with the industries that are responsible for the largest emissions and where the potential for rapid cuts in emissions is greatest, including the process industry.

- The Government will take an active part in the discussions in the EU on how the quota-based Emissions Trading System (ETS) should be further developed in the longer term, to ensure emission reductions and profitable restructuring in Norwegian industry.

- The Government will further develop the instruments for technology development and emission reductions in industry.

- The Government will facilitate the development and use of low- and zero-emission technology that also increases the pace of the green shift in the process industry.

4.6 Maritime industry

Norway will remain an international maritime superpower, showing the way into the green shift by developing, building and utilizing zero-emission solutions and autonomous vessels.

Market opportunities

The global restructuring of the maritime industry has just begun. A report from Menon Economics shows that only 5 per cent of the world's fleet consists of low- or zero-emission vessels.[19] At the same time, IMO, the UN's maritime organisation, has set a goal to cut emissions by at least 50 per cent by 2050, and has a vision of phasing out shipping's greenhouse gas emissions as quickly as possible in this century. Norway is working to tighten the target to zero emissions from international shipping in 2050.[20]

Measured in tonnes, around 90 per cent of the total volume of goods in foreign trade is transported by sea, while ships account for about half of the domestic transport of goods. Norway is at the forefront of the transition to green shipping, and the Norwegian-owned fleet's share of low- or zero-emission ships is as much as 24 per cent.

Norwegian maritime industry actors are world leaders in the construction of low- and zero-emission vessels, and has world-leading companies in the design and construction of ships, propulsion systems, and equipment and services. Green shipping also needs green

19 Menon "Grønn Maritim 2022 – teknologi, utslipp, verdiskaping og sysselsetting" (Green Maritime 2022 – technology, emissions, value creation and employment; in Norwegian only)

20 Vil styrke klimamålene for skipsfarten - regjeringen.no (Will strengthen climate targets for shipping; in Norwegian only)

Measured in tonnes, around 90 per cent of the total volume of goods in foreign trade is transported by sea, while ships account for about half of the domestic transport of goods.

solutions on land, and many ports have already installed shore-side electricity systems and adopted new technology to reduce emissions. Succeeding in the green shift domestically may create increased export potential for Norwegian maritime solutions in terms of technology, equipment, various vessel categories and systems.

Challenges

A prerequisite for the growth of green maritime exports is that an international market for green shipping is realised. This will probably require both increased effort and more ambitious emission reduction framework at a national, European and global level. In particular, the zero-emission solutions for large ships that will operate over long distances face both technological and economic challenges, in addition to the need to expand infrastructure for the distribution of alternative fuels. The cost gap between conventional solutions and zero-emission solutions must be closed, making it profitable for the players to choose environmentally friendly solutions.

Norway has an innovative maritime industry that is at the forefront of developing new low- or zero-emission solutions. These should be commercialised to a greater extent. The large yards in particular have experienced a challenging market situation over time. The right infrastructure, competence and equipment at the Norwegian shipyards are important in order to position themselves in the market for construction of low- and zero-emission vessels.

Political initiatives and processes

The Hurdal Platform states that "a green transition package" will be presented promoting climate-friendly restructuring of shipping. The package will emphasise the measures contributing to the ambitions in the Green Industrial Initiative. In this work, the Government will consider adequate instruments for reducing greenhouse gas emissions from the maritime industry in an effective way.

- The Government will follow up the Storting's petition resolution no. 831 (2020–2021) stating that "The Storting asks the Government to return to the Storting with a national plan to make onshore charging power, hydrogen, ammonia and other green fuels available".

- The Government will follow up the Storting's petition resolution no. 841 (2020–2021) stating that "The Storting asks the Government to study the scope for action within the EEA Agreement in order to place public assignments with Norwegian shipyards. In particular, the report should look at Norwegian requirements for standards for design, equipment, working language, apprentices and health, safety and environment (HSE), as well as requirements for local presence or response time".

- The Government will give priority on achieving "more and greener maritime exports" within the framework of The Norwegian Export Strategy "Hele Norge eksporterer"". A green boost for the maritime industry may contribute to further growth in the industry by exporting maritime low- or zero-emission solutions.

- The Government will give priority to entering into a dialogue on climate partnerships with the industries that are responsible for the largest emissions and where the potential for rapid reductions in emissions is greatest, including the maritime sector.

- The Government will further develop international and Nordic co-operation that enables demonstration and testing of green solutions through the establishment of green corridors/zero-emission maritime transport corridors.

FACTS

New battery replacement solution could revolutionise coastal shipping

The Norwegian ferry fleet is well on its way to being electrified. However, our fleet of express boats remain to be electrified. The express boats are is one of the segments in shipping with the highest greenhouse gas emissions. The challenge is that the batteries needed for propulsion are heavy, which means that the electric express boats will run slower than conventional express boats running on fossil fuels. In addition, they need fast charging at the quay, which is challenging due to deficiencies in local power grids along the coast.

Together with Seam, the ferry and express boat company Norled has now developed an autonomous battery replacement system. The new solution involves the use of smaller battery packs, which are replaced at the quay. By using a limited battery capacity with less weight, the vessels' energy consumption is reduced, which makes it possible to maintain the high speed that express boats have today of between 30–35 knots. In addition, it enables charging of batteries without major expansion of the local power grid. Instead of charging high-power batteries in port, discharged batteries can be replaced with slow-charging batteries.

An autonomous robot replaces the express boats' two battery packs (2 x 1 MWh) in three minutes. The batteries are charged in the battery housing on shore until the next express boat arrives. Norled, the Norwegian companies Brødrene Aa and Slemmestad Brygge received NOK 30 million in support through the Pilot E scheme from the Research Council of Norway and Innovation Norway to develop the solution in 2021. The prototype is now under construction at Aarbakke AS (in the Norwegian region Rogaland).

4.7 The forest and timber industry and other bioeconomy sectors

Norway shall have the world's most sustainable forestry. The bioresources from sea and land will be used to make climate-friendly and profitable products, including biofuels, and contribute to the development of industrial jobs and long value chains in Norway.

Market opportunities

There is a growing demand for biomass and bio-based products that can contribute to emission reductions through carbon storage and sustainable energy and production systems. Norway has significant bioresources from land and sea, which can provide a basis for increased sustainable value creation. A prerequisite for their operations is the safeguarding of the resource bases and climate and environmental values.

The volume of logging has increased in recent years. One third of the felled volume is exported. This offers potential for increased forest-based industrial value creation in Norway through profitable processing. Wood building materials are the most important value driver in the industry. In recent years, Norwegian wood architecture and the “world-class” utilization of wood in buildings, in combination with an increased need for climate-friendly solutions, have contributed to new market opportunities for Norwegian players and increased demand for wood-based building materials. There is also increasing demand for sustainably produced biofuels, cellulose and other wood processing products.

Timber from Norwegian forests shall contribute to the greatest possible value creation through further processing and export of finished goods.

Efficient utilisation of residual raw materials can contribute to increased value creation and increased profitability in the value chain as a whole. For example, increased production of both biofuels and more advanced products can contribute to increasing the market value of residual raw materials, and thus also its degree of utilization. Norway's sound systems for resource overview and for testing new solutions in the bioindustries provide a good starting point for utilizing a larger part of the raw material. Development work is underway with the aim of producing more of the raw materials for animal feed from residual raw materials and by reusing bioresources. This may reduce the need for imports of for instance soybeans and sugar, contribute to more climate-friendly food production and increase food security in Norway and Europe. The global need for more sustainable food production means that new technology and associated services in the area are also in demand internationally.

Norway has internationally recognised competence and industrial players within advanced processing and circular utilisation of bioresources. Their production includes biochemicals, health food and pharmaceutical products from biomass. Several of the industrial players are investing in research and technology development to increase utilization of the raw material for various consumer products.

Challenges

If resources from forests, land and sea are to create value and attractive jobs to a greater extent throughout the country, it must be possible to deliver the resources to industry on competitive terms. This requires constant attention to cost-cutting measures. Challenging topography and long transport distances lead to significant costs within the forest and timber industry. An adequate infrastructure for timber transport and transport of goods in general is therefore important for the industry's competitiveness.

Competitiveness in the industrial segment of the value chain is affected by the ability to produce more efficiently and cut costs, and to exploit the potential for product development and innovation. Important factors for success are the development and upgrading of production technology, and access to capital

FACTS

Latest generation biogas plant

The biogas at Renevo AS' plant in Stord is made from manure from livestock and fish waste from fish farms in the region. The liquefied biogas produced at the plant will total 50 GWh of bio-LNG. In addition to converting waste into biogas, CO_2 will be captured as a by-product of the process. The plant alone contributes to cutting 4.4 tonnes of CO_2 a year. This is the first time such a reactor has been combined with a CO_2 capture system. CO_2 is used to make dry ice. Bioresidue is another residual product derived from biogas production that can be used as fertilizer instead of mineral fertilizer. Among other things, Renevo will supply biogas to Aker Solutions' yard at Stord to help the yard reach its goal of reducing CO_2 emissions by 50 per cent by 2030. Biogas is one of several measures to achieve this goal.

> Biological production systems are highly exposed to changes in climatic conditions and extreme weather events, and the management of bioresources must therefore be adapted to these challenges.

In order to be able to further develop Norwegian forest-based industry, NOK 500 million has been earmarked for investments in the forest and timber industry through the state-owned investment company Investinor. It has recently been decided that Investinor's funds for the forest and timber industries can be included in a joint fund with private actors.

Changes in the regulatory framework for resource management can contribute to more efficient and profitable utilisation of bioresources by making it unfavourable or illegal to allow resources to end up as waste. Criteria for public procurement are also an important tool for stimulating the development of sustainable products or markets such as the use of wood in buildings and advanced biofuels.

For parts of the marine bioeconomy, more knowledge about the resource base, new technology and new methods for sustainable harvesting will be necessary for increasing production and extraction in a profitable and sustainable manner.

Biological production systems are highly exposed to changes in climatic conditions and extreme weather events, and the management of bioresources must therefore be adapted to these challenges. In forestry, periodically lower activity and investments in forest production can also affect the industry's raw material costs and long-term access to resources.

Political initiatives and processes

Policy and established framework for sustainable forestry forms the basis for a long-term supply of raw materials to industry. Adequate trade-offs between activities and environmental considerations, between nature and climate, and between use and protection will be central to the Government's forest policy.

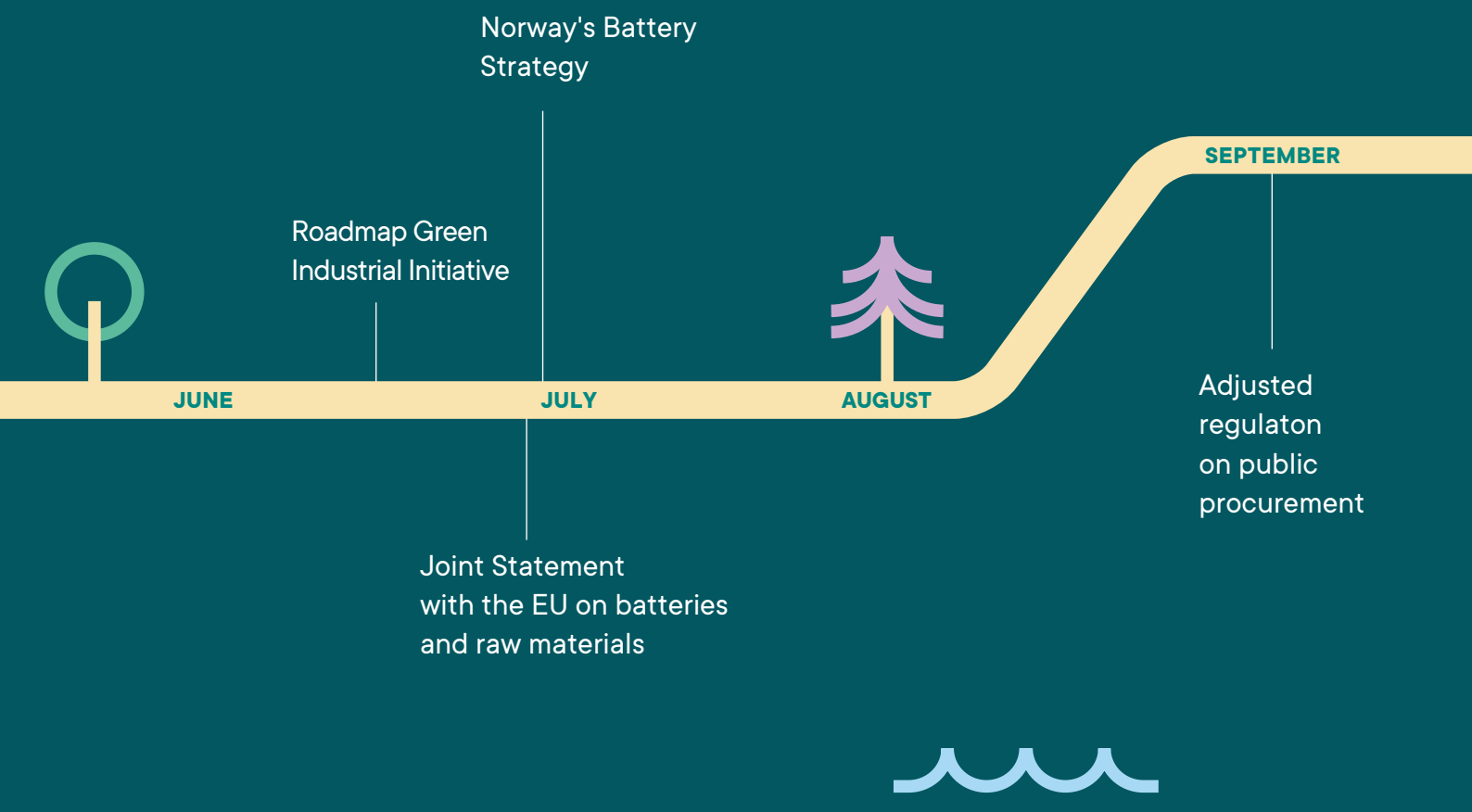
The competitiveness and market opportunities of the forest and timber industry and other bio-based industries are affected by the framework conditions in several policy areas, and coordination and cooperation across sectors is therefore important.

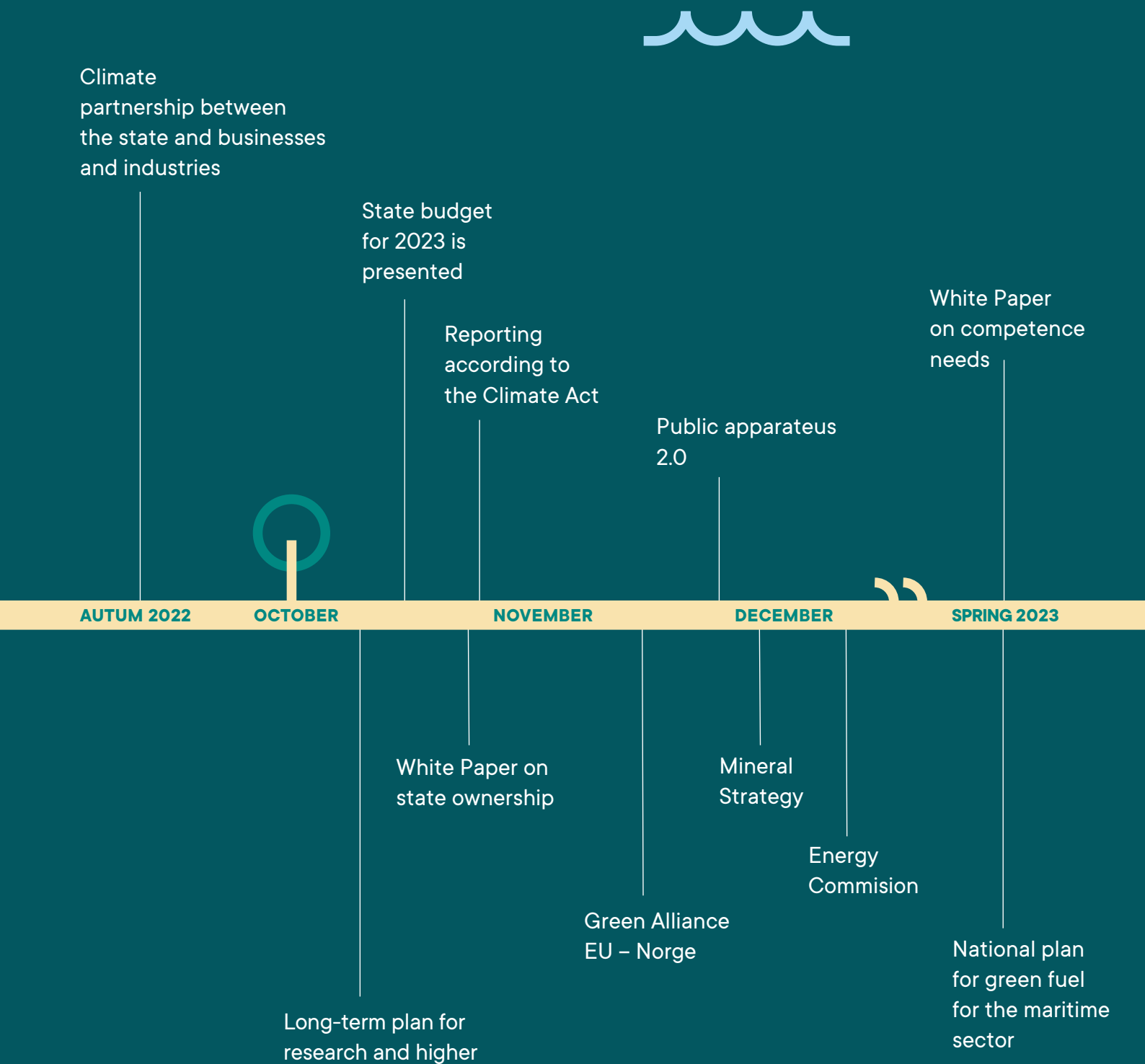
- The Government will give priority to measures that increase the profitability of forestry.
- The Government will facilitate further processing within the industrial part of the value chain by developing the resource base and improving the infrastructure in forestry.
- The Government will give priority to afforestation, young forest management and other silviculture measures.
- The Government will develop a transport strategy that contributes to more industrial processing of forests in Norway and the reduction of greenhouse gas emissions. The strategy will be developed as part of the work on the new National Transport Plan.
- The Government will further develop investments in bioenergy and advanced biofuels in the transport sector.
- The Government will ask the ministries to consider increased use of wood in Government building projects where suitable.
- The Government will continue and further develop the Dialogue Forum for the forest and timber industry between the Minister of Agriculture and Food, the industry, knowledge environments and the public policy apparatus. The aim is to exchange relevant information and facilitate discussion of key challenges for the industry.
- The Government will establish Bionova, as a tool to contribute to climate measures in agriculture. Bionova will also contribute to innovation and value creation within the bioeconomy related to agriculture, forestry and aquaculture. It is assumed that Bionova to be operational by 2023.
- The Government will stimulate knowledge-based development of regulations for circular bioeconomics, which ensures safe and efficient use of bioresources.

- The Government will facilitate good market access for circular, bio-based products.
- The Government will assess following up the recommendations from the BioDigSirk project on a digital marketplace for circular economies in the bioindustries.
- The Government will facilitate access to and increased use of residual raw materials as a basis for the development of new Norwegian industry. Its use must be safe for humans, animals and the environment.
- The Government will study a separate programme for the development of more sustainable feed and the use of carbon in feed production.
- The Government will work in a targeted manner to bring Norwegian priorities into the EU's regulatory work with regard to food and feed production, in order to give Norwegian producers sufficient latitude to increase resource utilisation within sustainable frameworks.
- The Government will facilitate research and business activities for bioproducts, including seaweed and kelp and new marine resources.

Norway's forest policy and the framework for sustainable forestry form the basis for a long-term supply of raw materials to industry.

The way forward

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State budget for 2023 is presented
Reporting according to the Climate Act
Public apparateus 2.0
White Paper on competence needs
AUTUM 2022
OCTOBER
NOVEMBER
DECEMBER
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