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NORWAY: A SLEEPING GIANT?

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Introduction

The global green shift represents a major challenge for every nation — and only more so for petroleum-dominated economies. The value of petroleum-related assets, technologies and capabilities will diminish in the years to come — threatening jobs, export revenues and industrial innovation. Norway is the world's third largest exporter of gas, with total exports of petroleum reaching a value of NOK 424 billion (Norsk Petroleum, 2020), and 36 percent of the country's total exports in 2019 (Norsk Petroleum, 2020). In the face of the climate crisis and the global green transition, this economy needs new sources and a new direction of growth. In this brief, we argue that the

engineering and manufacturing of green technologies is an obvious candidate. If the world demands a green transition, why not produce it? We argue that with ambitious new policy actions, Norway can become a green giant driving industrial change at home and abroad. This policy brief is based on our report, *The Green Giant: New Industrial Strategy for Norway* (2021). Available at <https://www.ucl.ac.uk/bartlett/public-purpose/publications/2021/jan/green-giant-new-industrial-strategy-norway>.

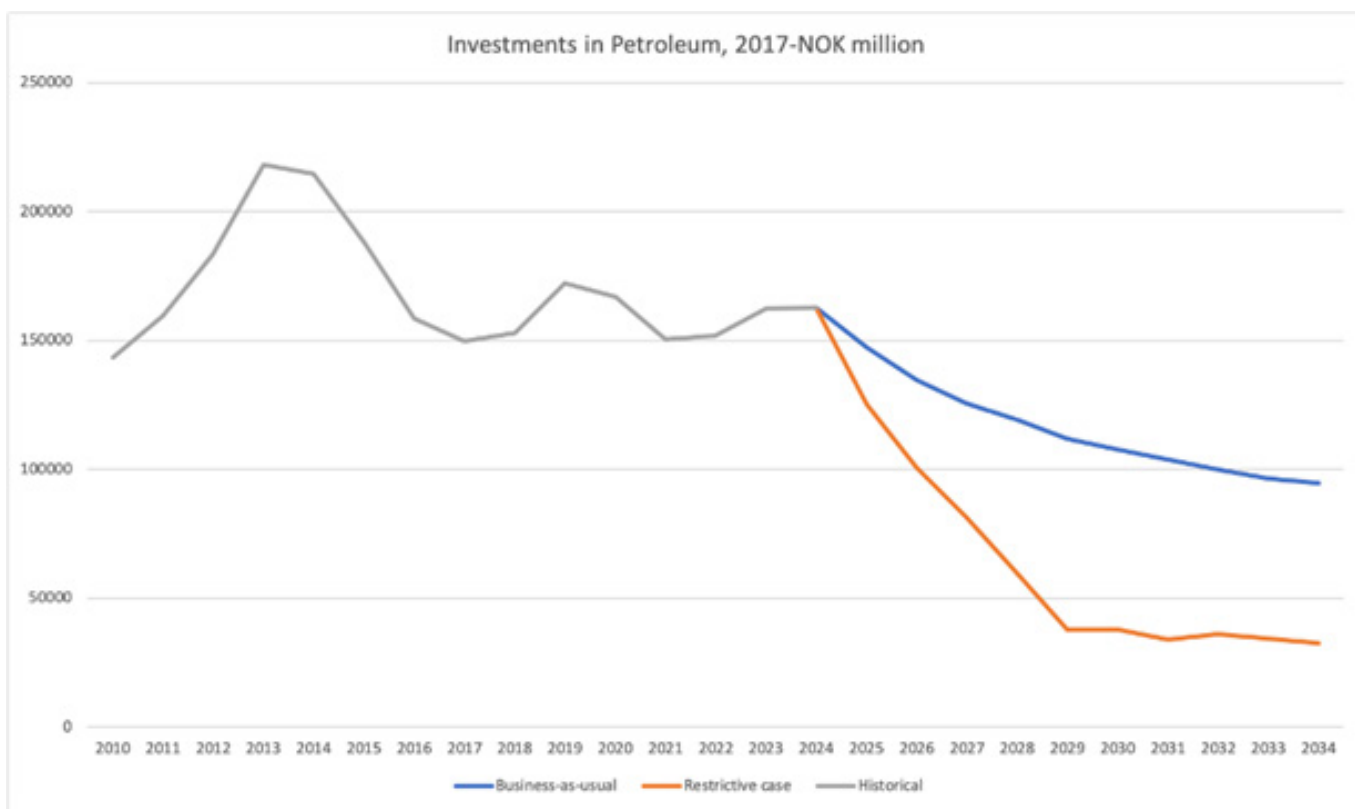
Norway's wicked challenge

With an advanced industrial base in sectors such as energy, maritime industries, offshore engineering and process industries fuelled by green hydropower, the Norwegian economy might seem ready for a green industrial transition. But Norway faces a wicked policy paradox. On the one hand, reduced demand for petroleum, as a result of global climate policies will mean that the country's main engine of growth must be replaced. On the other hand, several of Norway's foremost technological advantages are developed by the petroleum industry. The carbon lock-in of the Norwegian economy is exacerbated by path-dependent technological development and a tendency towards Dutch disease. Petroleum investments dwarf investments in other industries, attracting advanced skills to the sector. The innovation system is tied to incumbent industries, with little room for transformative innovations. The extraordinary profitability and export revenues of the oil and gas sector have inflated the prices and wage growth in the rest of the economy, in turn

creating challenges for other Norwegian exporters. Norway has been one of the biggest losers of international market shares in the OECD since the late 1990s and the non-oil trade deficit has been growing consistently over the last decade (Fjose et al., 2020). Manufacturing's share of the economy is only half of what it is in the other Nordic countries (OECD, 2020). As for ambitious strategies and investments towards the green industrial transition, Norway is trailing other nations with more proactive approaches.

And the road ahead looks rocky. Investments in the nation's most important export industry are set to dwindle rapidly over the next decade. Over the previous decade, annual investments in the petroleum sector amounted to more than NOK 170 billion (about USD 17 billion) on average. Even without more restrictive petroleum policies, this level is estimated to fall by NOK 60 billion for the years 2025–2034, according to a recent report by Statistics Norway. In a scenario with restrictive extraction policies, the annual investment level in this sector could fall to NOK 40 billion in 2029 (Figure 1).

Figure 1: Investment in petroleum in 2017 NOK (million)



Source: Finn Roar Aune, Ådne Cappelen and Ståle Mæland. (2020). Konsekvenser av redusert petroleumsvirksomhet - Makroøkonomiske effekter av politiske tiltak for å redusere norsk produksjon av olje og gass. Statistics Norway.

In a second scenario, the decline in petroleum investments equals more than 50 percent of total annual industrial investments in the economy as a whole. The dramatic scenario illustrated in the figure above is double-edged. On the one hand, many jobs and prospects for industrial innovation may be lost. On the other hand, the engineers and workers involved in constructing offshore platforms for petroleum today could be constructing offshore wind power plants tomorrow. The figure above therefore implies that the capacity to absorb tens of billions of NOK in annual investments in green industrial development will be freed up in the real economy, at a time when international markets for green industrial technology are set to grow at a record pace.

As Semieniuk and Mazzucato have shown, various predictions “emphasise the need for investments to double or even triple over the next 15 to 25 years” in order to enable a green transformation of the global economy (Semieniuk and Mazzucato, 2018). The increase implies compound annual growth rates that are several percentage points higher than recent historical rates. In order to produce 100 percent of electricity from renewables, the global economy needs investments in the amount of 5.5 trillion USD; low-income and lower middle-income countries alone need investments in the range of 784 billion USD. Simply put, current green investment trends are insufficient. At the same time the global demand for green technologies offers opportunities for industrial development. Combining increased investment in the green shift with domestic industrial development provides a chance for a new path for the Norwegian economy.

Norway's unique window of opportunity

Norway has significant capabilities at its disposal for action on this double challenge to the economy and the climate. Enormous financial resources held in the world's largest sovereign wealth fund, the Government Pension Fund Global, have been created out of the petroleum of the continental shelf. Yet today the fund plays almost no role in either domestic or global green transitions. On the contrary, a recent report has shown that 12 of the most devastating fossil fuel projects that are currently being planned or under development would use up three-quarters of the total remaining carbon budget if we are to have a 66 percent probability of limiting global warming to 1.5° Celsius. One of the most important funders of these projects is the Government Pension Fund Global (Urgewald, 2020). The fund can serve as an insurance for the current and future wellbeing of Norwegians only if it is invested into funding productive assets of the future, not of the past.

The lessons of Norway's historic approach to industrial development may prove valuable. Norway has demonstrated its adaptive abilities in the face of changing economic context(s). At defining points in history, the Norwegian state has taken on an entrepreneurial role and set new directions of growth, through the development of hydropower 100 years ago and a petroleum industry 50 years ago. At both of these turning points the state fostered inclusive growth by watershed decisions such as placing conditionalities on investors regarding resource ownership and local industrial development; attaining technological sovereignty by investing in science and innovation; supplying industries with patient capital through publicly owned credit institutions; and utilising the policy tools of state ownership to confront the grand challenges of that day and age.

Today, the green transition could be Norway's third industrial turning point, defining the country's prospects for inclusive growth and sustainable prosperity for decades to come. A turn from the export of fossil fuels to the export of green technologies would be a sea change in Norway's role in the global climate effort. Putting its industrial capacity and financial strength to use in the green transition could turn the country from a 'climate villain' to a green giant.

Markets for Norway's future green industries

A number of sectors have been identified as potential high-growth green sectors by the Confederation of Norwegian Enterprise (CNE). These are offshore wind, hydrogen (which is related to carbon capture and storage), emission-free shipping and batteries (Valstad et al., 2020). In addition, a number of other sectors have the potential for a shift towards green production processes and technologies.

In 2017, Sintef estimated that Norwegian offshore wind (floating and bottom-fixed) has an export potential of NOK 50 billion and 24,000 jobs by 2030, and the double of that by 2050 (Støa et al., 2019). McKinsey estimates that the Norwegian market share for hydrogen could reach €1 billion by 2030 and between €4 and €20 billion by 2050 (Valstad et al., 2020). A number of CEOs in the firms currently developing hydrogen technology estimate that, with the right policies in place, more than 10,000 jobs could be created in the sector (Rynning-Tønnesen et al., 2020).

Sintef estimates that carbon capture “will strengthen the competitiveness” of 80-90,000 jobs in Norway and can create up to 70,000 new jobs by 2050, including blue hydrogen production and ripple effects (Størset et al.,

2018). These numbers are highly uncertain, especially as it is yet unclear whether there will be much of a market for blue hydrogen in the EU.

McKinsey estimates that the Norwegian market for low-emission and emission-free maritime industry can reach €5 billion by 2030 and between €17 and €53 billion in 2050. Mostly, this will not be new jobs, but preserving the existing ship-building industry (Valstad et al., 2020).

According to McKinsey, Norway can capture a market share within battery production of €9 billion by 2030 and €13–36 billion by 2050 (Valstad et al., 2020). Sintef estimates that battery production in Norway is currently valued at NOK 800 million but can reach NOK 10 billion and support 7000 jobs by 2030, and NOK 50 billion and 15,000 jobs by 2050 (Almås et al., 2019).

Green transition requires a new green industrial strategy

Directing investment into green industrial development rather than petroleum will not be profitable in a static short-term perspective. Ground rent gives rise to a very high value-added per employee in the petroleum sector, making non-strategic sunset industries highly profitable. Therefore, green industrial development is not about maximising value-added in the short term. Instead, a green industrial strategy is about developing technology and innovation that can help solve the climate crisis while capturing shares in markets that will expand as the global green transition progresses. By accelerating net-zero technologies along their learning curves, Norway can utilise first-mover advantages within such key sectors and develop necessary technologies for the global green shift.

However, markets will not find a green direction on their own. There is not yet a ready-made route that will make multi-directional, experimental, green innovation profitable. Business does not invest unless it sees an opportunity for growth, so turning mitigation into opportunities for investment and innovation is key. Governments cannot micromanage this process, as that would stifle innovation, but they can set a clear direction, make the initial high-risk bold investments which crowd in private actors later on, and reward those who are willing to invest and innovate. Through proactive policymaking that encourages innovation and learning, creates and expands markets, and ensures long term predictability, costs of green technologies can be reduced (Jennings et al., 2020; Mathews and Reinert, 2014). Dynamic policy that over time pushes down costs in strategic green industries therefore lies at the heart of green industrial development.

Rather than waiting for the world to stop purchasing petroleum, Norway needs a new industrial strategy — the Green Giant strategy — that is a proactive strategy

for spurring on the green industrial revolution of the 21st century that utilises the resources — technical and financial — of existing petroleum industries and, simultaneously, phases out petroleum extraction. We therefore recommend a more restrictive petroleum policy, guiding markets towards a steeper decline in oil and gas investments. Necessary investments in green industrial development could therefore be over NOK 100 billion per a year, on average, over the coming decade.

The finance and financial structure of an economy are not neutral; the type of finance received affects the types of investments made and the type of economic activity pursued (Mazzucato and Penna, 2016). Various public agencies provide funding along the Norwegian green innovation chain. Innovation Norway, the Research Council, Investinor, Enova, Norfund, GIEK and Export Credit Norway are among the institutions that provide funding in various segments of the innovation chain. The Environmental Technology Scheme (Miljøteknologiordningen) is a green technology programme targeted at firms that 'help solve environmental problems' and Nysnø Climate Investments is a new state-owned investment company with the mission of reducing emissions through profitable investments in partnership with the private sector. However, there is a lack of coordination between these public institutions supporting green industries. Excessive fragmentation of institutional and financial support measures is a serious impediment to successful implementation of a mission-oriented approach to innovation and green growth.

Expectations of the green industrial shift are high and there has been a wave of private investment in the green transition in the last year. Since the end of 2019, 'green' firms have doubled their value on the Oslo Stock Exchange. The value of green shares has increased by 84 percent in the same period and several green firms have been, or expect to soon be, listed on the Stock Exchange (Oslo Børs, 2020). Some commentators argue that Norway is experiencing a green bubble similar to the dotcom bubble at the turn of the century (Nilsen, 2020).

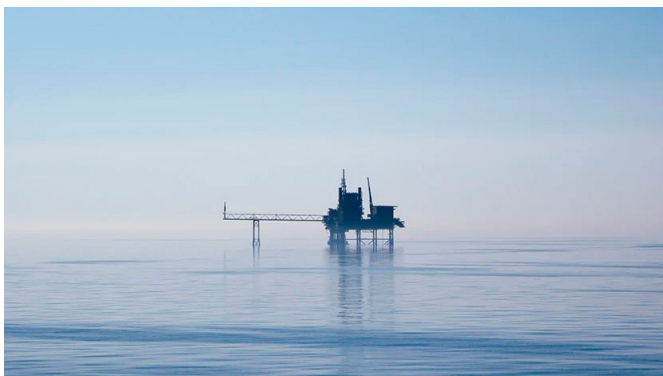
It is not clear whether the shift in private investment towards renewables is a sign of a lasting and durable shift towards green energy development, or rather a short-termist tendency produced by the pressure to distribute earnings to shareholders, which risks producing a weak commitment to durable industrial development (Mazzucato, 2013). It is possible that the current trend is a new 'green fling' (Mäkitie et al., 2019), a brief engagement within renewable energy, which lasts while the price of oil is low, but is then reversed when profitability within fossil energy recovers.

Despite a visible shift in private financial flows towards low-carbon sectors, financial innovations in the form of 'greening' financial instruments (bonds, derivatives), and institutional innovations around climate-related risk

disclosure and accepting green collaterals, market forces alone cannot bring the required shift in financing. The history of financing of successful industrialisation shows that structural transformation requires institutional setups that help direct and, most importantly, coordinate various financial policies (state investment, monetary, fiscal, regulatory) in order to support the needed sectors and economic activities in line with industrial and innovation strategies (Ryan-Collins and van Lerven, 2018).

The fundamental uncertainty of climate-related risks and scenarios also implies that no optimal forecasts are possible and therefore 'market-shaping' and a precautionary approach to regulating financial markets are necessary (Kedward, Ryan-Collins and Chenet, 2020). Norwegian policymakers should not let the financial trends produced by the COVID-19 crisis lead to complacency. A durable and long-term green industrial transition is a major challenge which requires bold and strategic policy making.

Norway's sovereign wealth fund should become a mission-oriented institution



Source: Getty Images

Norway's Oil Fund (the Government Pension Fund Global) is the largest sovereign wealth fund on the planet. The fiscal rule (handlingsregelen) established 2001 has been an important policy innovation for managing the large and volatile petroleum revenue. The fiscal rule states that the revenue from petroleum activities must be transferred into an oil fund, invested abroad (Sivramkrishna, 2019). The oil revenue is then phased into the economy as the fund is tapped at an annual rate that should average 3 percent of the fund's worth. With a 3 percent expected rate of return for the fund, it can be tapped at this rate without ever being depleted. This policy innovation has helped balance a high tempo in petroleum extraction with limited inflationary pressure, enabled a gradual phasing in of the oil revenue into the Norwegian economy, and gives the state an extra source of revenue for its budget. While the Oil Fund and the fiscal rule have enjoyed broad political support in

Norway, concerns have been raised that the system has allowed a petroleum bubble to go unnoticed (Mork, 2020).

Another concern is that elements of the fiscal rule may be outdated. This rule was made to safeguard stability, whereas what the Norwegian economy needs now is patient long-term finance for large-scale dynamic change to increase economic diversity. The fiscal rule enables large public investments in the petroleum industry to be kept outside the government budget. This system fuels the current petroleum-determined path dependence. As a petroleum-dominated economy, Norway stands on the brink of the green transition and it is necessary to rethink the institutions and regulations that served well to insulate and safeguard revenues from the fossil sectors, but are less capable of facilitating the green transformation and green growth. Structural transformation and changes in economic and technological priorities require (pro)active policies.

The Norwegian Oil Fund could be turned into an important domestic mission-oriented actor, which actively supports low-carbon economic policies, and a powerful global driver of green growth. To finance large public investments in the green industrial transition, and rather than further capitalising the Oil Fund, the cash flow could be directed towards capitalisation of **a new public Green Investment Bank**. The current fiscal rule — developed with the purpose of shielding the public finances from the volatilities of the petroleum revenue — should not be a blockage for the policy development needed to deal with the economic challenges of today. To cover the investment need, a number of financing routes could be considered so that public investments are adapted to the needs of the economy, rather than the economy being adapted to the needs of the fiscal rule. **The fiscal rule has served the purpose of economic stability, but might need revision now that Norway's economy needs dynamic change.**

Norway's Oil Fund has increased its environmental engagement over time. A section of the fund is included under the environment-related mandates, currently in the NOK 30–120 billion range. Since 2018, there is the possibility for investment in unlisted renewable energy infrastructure (NBIM, 2018). However, Norway's Oil Fund investment in green sectors has remained low during the last decade and currently stands below 1 percent of all investments.

Besides different types of policy objectives that sovereign wealth funds fulfil, often simultaneously — short-term and *ad hoc* stabilisation or more long-term return on investments — the investment strategies can also vary in terms of internationalisation. For instance, one of Singapore's sovereign wealth funds, Temasek Holdings, is an example of the least internationalised sovereign

fund. In addition, the Government of Singapore Investment Corporation (GIC) is a fund management company that manages a diverse portfolio of foreign assets amounting to some \$100 billion USD. Temasek, a state-owned investment company operating under the Ministry of Finance, holds equity amounting to some \$200 billion USD (as of 2019). Despite a major change in leadership and a more dynamic take on internationalisation in the early 2000s, Temasek remains strongly linked to the domestic economy: 24 percent of total assets are held domestically and the Singapore dollar accounts for 57 percent of assets' currency denomination (See <https://www.temasek.com.sg/en/what-we-do/our-portfolio#geography>.)

At present, Norway's predominant industry and main source of export revenue appears unsustainable, and annual investments are set to diminish rapidly over the next decade. An unsuccessful shift away from petroleum would provide significant risks for employment, growth and the Norwegian welfare state. If saving abroad becomes an aim in itself and hinders the necessary productive investments at home, then growth, innovation, employment and the economic security of future generations may be at risk.

Mission-oriented state-owned enterprises

The Norwegian national innovation system is characterised by a significant share of public ownership. As in many western countries, the capabilities of the state to engage in business activities has been reduced over the last decades, but the state still has a strong presence in the Norwegian business environment, (OECD, 2019) owning around a third of total value at the Oslo Stock Exchange and partially owning five out of the seven largest companies in 2016 (Lie, 2016). Notably, the Norwegian state owns 67 percent of the petroleum giant Equinor (formerly Statoil), the flagship company in the Norwegian petroleum industry and by far the largest actor in the petroleum sector (PwC, 2020). Hence, the active, mission-oriented approach to state-owned enterprises (SOEs) can become one of the key tools for achieving the green transformation. Significant public ownership of key strategic industries in Norway can become an important mechanism for actualising and scaling up investment opportunities for innovation-led green industrial strategy. While increased financialisation risks lead to a short-termist tendency (Mazzucato and Perez, 2015) within key sectors, the active use of SOEs can function as a vehicle for the state's capacity for long-term planning and risk-taking in the market. They can also function as coordinating and direction-setting agents within the broader national innovation system (Tønurist and Karo, 2016).

SOEs have historically had a significant impact on innovation and industrial development in Norway (Engen, 2009). The active, innovative and entrepreneurial utilisation

of SOEs was key in the development of the petroleum sector and related industries. In the 1980s, however, there was a turn away from active state involvement in enterprise and towards trust in the efficiency of the private sector alone. State ownership stakes were sold to finance government budget expansions, which reflects a change in the view of SOEs from an entrepreneurial arm of government to a source of revenue (Lie, 2012). Statoil was eventually publicly listed and partially privatised, and recently renamed Equinor (Grønlie, 2001). The new model for state ownership now became the 'hydro model', whereby the state reduces its ownership, but retains a share large enough to block 'unwanted' decisions. Thus, state ownership was no longer based on 'positive possibilities of governance', but instead on 'negative control'. This process has implied a shift away from an entrepreneurial state, towards a passive state, that looks to fix market failures rather than shape markets.



Source: UnderConsideration | Brand New

We argue that Equinor can become a mission-oriented state-owned company. Making Equinor a fully state-owned company would enable the firm to focus on the big challenge facing the Norwegian economy today by removing the pressure on Equinor to distribute earnings among shareholders. The company can thereby be reoriented away from value extraction and towards green value creation. The extensive share buyback programmes, in a time where significant investments in the green transformation are necessary, signal the need to rethink the orientation of the firm. The current arms-length distance between government and management makes it difficult to ensure political accountability for the activities of Norway's petroleum giant. Norway's current system of governing SOEs allows such companies to be governed as a mission-oriented SOE (the so-called category 3 ownership model (Norwegian Ministry of Trade, Industry and Fisheries, 2020)) and we recommend moving the firm to this category.

Recommendations: Towards a mission-oriented green industrial strategy

We argue that through well-defined goals, or more specifically 'missions', focussed on the various aspects of

the green transformation, Norwegian policymakers have the opportunity to determine the *direction* of growth by making strategic investments, coordinating actions across many different sectors and policy domains, and nurturing new industrial landscapes that the private sector can help develop further (Mazzucato and Penna, 2016). Such a market-shaping approach is not about top-down planning by an overbearing state; it is about providing a direction for growth, increasing business expectations about future growth areas and catalysing activity that otherwise would not happen. It is not about de-risking and levelling the playing field, nor about supporting more competitive sectors over less, since the market does not always know best, but about tilting the playing field in the direction of the desired societal goals, such as the just green transition.

Norway should develop a mission-oriented green investment strategy, which may require several new policies and institutions:

The Norwegian government should establish a **Green Industrial Investment Bank**, which will channel public investments into green industries and in the process mobilise private capital. The bank will identify investment opportunities along the entire innovation/production chain that can spur green industrial development, and promote competitiveness as well as experimentation from below. The bank should have a strong regional presence and mandate, and place necessary conditionalities on investments to safeguard labour standards and environmental considerations.

The **Norwegian Bank for Sustainable International Cooperation (NBSIC)** should be established with a mandate to multiply and develop the Green Giant's portfolio of green investments abroad. NBSIC could be a fully owned subsidiary of the Green Industrial Development Bank. It will have a double mandate: invest internationally in technologies that bring down greenhouse gas emissions at the global level, and contribute to the success of Norwegian exporters who foster sustainable, green industrial jobs at the local and national level. Conditionalities will be important to ensure that economic development and international cooperation considers local labour and environmental conditions, and the distribution of risks and rewards.

We recommend a revised **fiscal rule for the green industrial transition**. To finance large public investments in the green industrial transition, and rather than further capitalising the Oil Fund, the cash flow could be directed towards capitalising the Green Investment Bank. The current fiscal rule — developed with the purpose of shielding the public finances from the volatilities of the petroleum revenue — should not be a blockage for the policy development needed to deal with the economic challenges of today. To cover the investment need, a number of financing routes could be considered so

that public investments are adapted to the needs of the economy, rather than the economy being adapted to the needs of the fiscal rule. **The fiscal rule has served the purpose of economic stability, but might need revision now that Norway's economy needs dynamic change.**

Norway should adopt a **mission-oriented policy for state-owned enterprises (SOEs)**, so that these firms may contribute towards green industrial development. The Norwegian state has successfully used SOEs to promote industrial policy and innovation in several historical phases. To enable the green transition, the state should be ready to establish new renewable energy companies as it did with Statoil in the petroleum industry. SOEs engaged in industries that are relevant for the green transition should be given new mission-oriented mandates.

Make Equinor a mission-oriented state-owned company. We recommend taking Equinor off the stock market. It should be evaluated whether it is necessary to move Norway's most important company into state ownership category 3, which stipulates that the public ownership is used for achieving key policy goals. Companies such as Petoro, Gassnova, Nye Veier and Norfund are already in this category. This would enable a reorientation of the company away from value extraction and towards green value creation.

Norway's state ownership needs to be more efficient and coordinated if it is to help navigate the difficult green industrial transition. In order to facilitate coordination between the relevant companies and resources and find cross-sectoral synergies, the government could establish a **Green Industrial State Holding Company**. The company should not be a passive financial actor, but an active player in strategic industrial coordination and development.

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