Oil & Gas Transitions

North Sea Oil and Gas:

Transition from a Regional and Global Perspective

SEI Stockholm Environment Institute
CLIMATE Strategies
AALBORG UNIVERSITY DENMARK
UiO : University of Oslo
THE UNIVERSITY OF EDINBURGH
Funded by:
KR FOUNDATION
Laudes Foundation

Stockholm Environment Institute
Linnégatan 87D 115 23 Stockholm, Sweden
Tel: +46 8 30 80 44 www.sei.org

Author contact: Gökçe Mete
gokce.mete@sei.org
Editor: Tom Gill
Graphics and layout: Mia Shu
Cover photo: piola666 © Getty Images

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes, without special permission from the copyright holder(s) provided acknowledgement of the source is made. No use of this publication may be made for resale or other commercial purpose, without the written permission of the copyright holder(s).

Copyright © May 2022 by Stockholm Environment Institute

Stockholm Environment Institute is an international non-profit research and policy organization that tackles environment and development challenges.
We connect science and decision-making to develop solutions for a sustainable future for all.
Our approach is highly collaborative: stakeholder involvement is at the heart of our efforts to build capacity, strengthen institutions, and equip partners for the long term.
Our work spans climate, water, air, and land-use issues, and integrates evidence and perspectives on governance, the economy, gender and human health.
Across our eight centres in Europe, Asia, Africa and the Americas, we engage with policy processes, development action and business practice throughout the world.

This synthesis report was written by the Stockholm Environment Institute as part of the Oil and Gas Transitions (OGT) programme, which is co-led by Climate Strategies (CS) and the Stockholm Environment Institute (SEI). OGT is an evidence-based programme which aims to generate evidence and co-produced pathways for policy action to accelerate oil and gas just transitions in the UK/Scotland, Denmark and Norway. This report provides a synthesis of three country reports from university partners within the OGT consortium, as well as an assessment of the state of just transition policies in the North Sea using a novel scorecard analysis. The synthesis report forms the foundation for the OGT programme's ongoing work on co-producing just and feasible oil and gas transitions pathways/scenarios with stakeholders. The statements herein do not directly represent the views of CS, SEI, the funders of the programme or other members of the OGT consortium.

For more information visit: www.oilandgastransitions.org

Suggested citation: Linde, L., Sanchez, F., Mete, G., & Lindberg, A. (2022). North Sea Oil and Gas Transition from a Regional and Global Perspective. SEI Report. Stockholm Environment Institute, Stockholm. DOI: https://doi.org/10.51414/sei2022.012

Acknowledgements

The production of this synthesis report is financed by the KR Foundation and Laudes Foundation. We are grateful for contributions to the report from Climate Strategies, the University of Aalborg, the University of Edinburgh, and the University of Oslo. Thank you to the SEI editors and an anonymous peer reviewer for comments on an earlier version of this report.

Contents

Executive summary **4**

1. Global trends in oil and gas transition **6**

1.1 Introduction 6

1.2 Challenges of oil and gas transitions 7

1.3 International and EU initiatives landscape 12

1.4 Companies and finance in transition 14

1.5 Role of the EU in the oil and gas transition 17

1.6 Conclusions of Section 1 19

2. Oil and Gas Transitions project: gathering and synthesizing evidence on opportunities and barriers to oil and gas transitions **20**

2.1 Introduction 20

2.2. Landscape of stakeholders 21

2.3. Evidence for policy action 24

2.4 Just transition 30

2.5 Conclusions of Section 2 42

References **44**

Annex **51**

Executive summary

The oil and gas industry must play a big part in the world's efforts to meet its climate goals because of the greenhouse gas emissions associated with production and consumption of these commodities. Recent data from the International Energy Agency urges countries to stop new oil and gas production licenses after 2021. However, governments are moving ahead with plans to produce significantly higher volumes of oil and gas in 2030. This production gap is increasing year on year, putting at risk efforts to hold global average temperature increase to well below 2°C above pre-industrial levels, let alone limiting it to 1.5°C.

Reducing and phasing out oil and gas production has been rising higher on the global agenda, although meaningful progress has been difficult to achieve. Oil and gas commodities have created decades-long dependencies throughout most of the world's economies, both for consumer and producer states.

Today the benefits of a low-carbon society are well-known. Energy transitions can enhance human well-being through reduced air pollution, increased energy access, and by creating local jobs and generating income for local communities (IRENA, 2022b). The diversification of energy mixes and economies reduces the risks posed by fossil fuel dependence and decreases import bills and therefore household energy expenditure (OECD/IEA & IRENA, 2017). Renewable energy prices have been more stable during the Covid-19 pandemic than oil and gas prices. And in several parts of the world, especially in developed countries, renewable energy investments have been delivering higher margins of return than fossil fuels (Mete et al., 2021). Despite this, inefficient subsidies, lack of international cooperation, jobs and key sectors tied to the sector, and geopolitical and political factors have all combined to create barriers and resistance to change.

Furthermore, at the same time as scientific evidence and citizen and civil-society campaigns are mounting and global initiatives and alliances to put an end to oil and gas production are on the rise, there is not yet a successful example of a just transition away from oil and gas that countries can learn from and be inspired by.

Even in Europe, which aims to become the world's first climate neutral continent by 2050, and where oil and gas producing nations have individually committed to ambitious carbon neutrality targets, oil and gas expansion plans remain in the UK and Norway, with only Denmark setting any ambition to phase out the industry. In all these three countries plans and actions are focused on reducing emissions within oil and gas operations through process efficiency improvements, electrification and in building low-carbon capability (e.g. carbon capture and storage and hydrogen production).

The three North Sea oil and gas producing nations have the necessary finance and economic diversity, technical knowledge, and ample renewable energy capacity to enable them to break the path dependency between economic development and oil and gas related industries. Yet there is considerable resistance to doing so from companies, governments and communities, largely due to concerns and uncertainties over costs and impacts. For example, while phasing out fossil fuel extraction will bring a multitude of societal benefits, not everyone will benefit equally from the transition – and those who depend on the industry for their livelihoods or for development could lose out.

Indeed, one should not assume that all of the oil and gas jobs lost could be replaced by alternative energy and low-carbon energy technology solutions. Many oil and gas jobs are also very lucrative due to high revenue margins and tougher living and working conditions in oil and gas fields. While the same cannot yet be expected from the low carbon energy value chain, it must be noted that

the low carbon and renewable energy sector can also create high value and skilled jobs. In fact, in 2020, jobs in the renewable energy sector have been the most popular energy sector jobs globally, in terms of switching employment (Statista, 2022a).

Aside from those who lose jobs, there will inevitably be others who lose out from the change due to the geographic location of new energy infrastructure and age of the workforce, among other factors. And parts of the oil and gas value installations and engineering structures cannot be transitioned at all and will need to be decommissioned. Regardless of this, education, compensation and reskilling programmes must all be part of early planning for just transitions. Supporting oil and gas companies by providing market certainty and a phase-out date could help them reorient their business models and enable countries to reach net-zero emissions from a domestic production perspective.

Therefore, strategies to phase out oil and gas must also be just and equitable. Addressing these concerns and overcoming the "ambition gap" can only happen through greater policy coherence between greenhouse gas emissions targets, increased policy support for an orderly phase out and managed reorientation, and increased policy support for just transition initiatives.

SEI and Climate Strategies are leading an evidence-based programme – Oil and Gas Transitions – together with the University of Edinburgh, the University of Oslo and Aalborg University. This project focuses on the opportunities, barriers and co-produced pathways for oil and gas just transitions in the UK, Norway and Denmark. The project's theory of change is based on the assumption that these countries can spearhead a just transition for this sector and can offer lessons to other oil and gas producing countries beyond the North Sea (Mete et al., 2021).

This report is part of the Oil and Gas Transitions project, which began in 2021. The report consists of two parts. The first focuses on narratives of oil and gas transition around the globe and provides an overview of the existing oil and gas dependencies and policies that create barriers to the transition. It also illustrates the opportunities to move away from oil and gas driven by global, regional (EU) and national level initiatives, such as increasing the number of moratoriums on production of these commodities. This first part of the report also places the special case of the North Sea producer states in a global context to emphasize why the world will be closely watching the UK, Denmark and Norway.

Over the past year, the three universities mentioned above carried out country case studies, which explored stakeholder perspectives, socio-economic considerations, the political landscape, and opportunities and barriers to a just transition from oil and gas in Denmark, Norway and the UK. The second part of this report synthesises these three case studies and compares them, along with a scorecard analysis of how their policies measure against each other in their pathways to a just transition.

We found that all three countries have gaps when it comes to policies aimed at ensuring a just transition. Scotland receives the highest score in our analysis but does not have devolved powers over oil and gas production, which means they cannot be assessed for some of the criteria. The other North Sea countries are especially lacking in policies targeting support to people, communities and regions affected by the transition. Denmark benefits significantly from decisive decarbonization targets, an end to new licenses for oil and gas production and more targeted renewable energy investments in the country's oil and gas region to transform the economy. The fact that neither the UK or Norway have targets to stop producing oil and gas makes it hard for them to properly plan for a transition and lowers their overall score.

1. Global trends in oil and gas transition

1.1 Introduction

The oil and gas industry accounts for a significant proportion of global carbon emissions. These emissions arise directly from the industry's exploration and extraction activities, distribution, trade, and indirectly as a result of consumption of oil and gas. As parties to the Paris Agreement, most oil and gas producing countries have committed to achieving its goal of limiting global average temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit it to 1.5°C. However, the Paris Agreement focuses primarily on reducing demand as the route to decarbonization (Verkuijl & Lazarus, 2020) and oil and gas is only mentioned in some countries' Nationally Determined Contributions (i.e. countries' climate mitigation plans) with reference to the use of carbon capture and storage (CCS) in the industry (UNFCCC, 2021b). To keep warming in line with the Paris Agreement, the International Energy Agency's (IEA) Net Zero Report urges that no licenses be approved for new oil and gas fields after 2021, and that by 2050 natural gas production must decline by 55% and oil production by 75% (IEA, 2021c). The IEA report also stressed that all unabated coal and oil power plants must retire by 2040. However, the world's governments still plan to produce 57% more oil and 71% more gas in 2030 than would be consistent with a trajectory aimed at limiting global warming to 1.5°C (14% and 15% respectively for a 2°C-degree consistent pathway). The gap is considerably wider by 2040 (SEI et al., 2019).

When we consider that energy accounts for around three-quarters of total greenhouse gas emissions globally (IEA, 2021b) and that oil and gas makes around 50% of emissions associated with energy consumption (Fletcher et al., 2018), it is clear that transition of the oil and gas sector must be a key part of the efforts to mitigate climate change to avoid catastrophic effects and "tremendous economic, social and environmental disruption and costs" (IEA, 2020d, p. 1). And it must start today, not only to drastically cut greenhouse gas (GHG) emissions, but also to ensure a just transition for both developed and developing countries.

Yet at the end COP26 in Glasgow in 2021 we saw countries softening their commitments to phase out fossil fuels because of opposition from major producing countries. Only phase-down of unabated coal was covered under the Glasgow Climate Pact (UNFCCC, 2021c). There was no reference to oil and gas in the final agreement of COP26 (Mete et al., 2021). The only significant achievement in Glasgow in relation on oil and gas was the agreement to phase-out inefficient fossil fuel subsidies, albeit without a firm date.

Today, there is not yet a single country that has achieved a successful just transition to a low carbon society. In Europe, North Sea oil and gas production corresponds to 20% and 27%, respectively, of oil and gas consumption. (Globally it corresponds to 3% and 4%; BP, 2021). Denmark is the only producing country in Europe that has set an end date for oil production – in 2050. The UK, Norway and Denmark can be first movers to achieve an orderly and just transition away from oil and gas.

The Oil and Gas Transitions project will, with local stakeholders, co-produce feasible pathways to achieve just that, building on three country case studies carried out by The University of Edinburgh, Aalborg University and Oslo University.

Section 1 of the report is based on a desk-based review of academic and grey literature, including key reports and publications on the industry. It also draws on key statistics and figures from publicly available datasets to supplement the literature review. In Section 1.2, we explore the factors that make transitioning away from oil and gas so challenging, with a focus on governments, companies, and the finance sector. Section 1.3 provides an overview of global and regional (EU) initiatives on oil and gas transition. Section 1.4 illustrates how oil and gas companies and the finance sector are participating in the transition. Section 1.5 focuses on potential role of the European Union in driving oil and gas transition. We provide conclusions in Section 1.6, with reflections on complexities surrounding oil and gas transitions.

Section 2 of the report presents a synthesis of the country case studies carried out by University of Edinburgh, Aalborg University and Oslo University. We use an emerging synthesis method using a systematic approach to synthesize various literature referred to in the country case studies (Schick-Makaroff et al., 2016). We then carry out a rapid review using tables and graphical displays. In Section 2.4 we adopt an enhancement model where qualitative data is used to quantify our analysis (Schick-Makaroff et al., 2016) thereby enhancing interpretation and explanation of just transition policies adopted by the three North Sea countries.

1.2 Challenges of oil and gas transitions

Although it may seem intuitive that companies or governments are in control of oil and gas production and reduction of supply, the choices and decisions available to them are strongly influenced by a range of forces at the global level. These include (but are not limited to) global demand for oil and gas, production and price volatility, and subsidies that obscure the true cost of oil and gas.

Global demand and energy mix

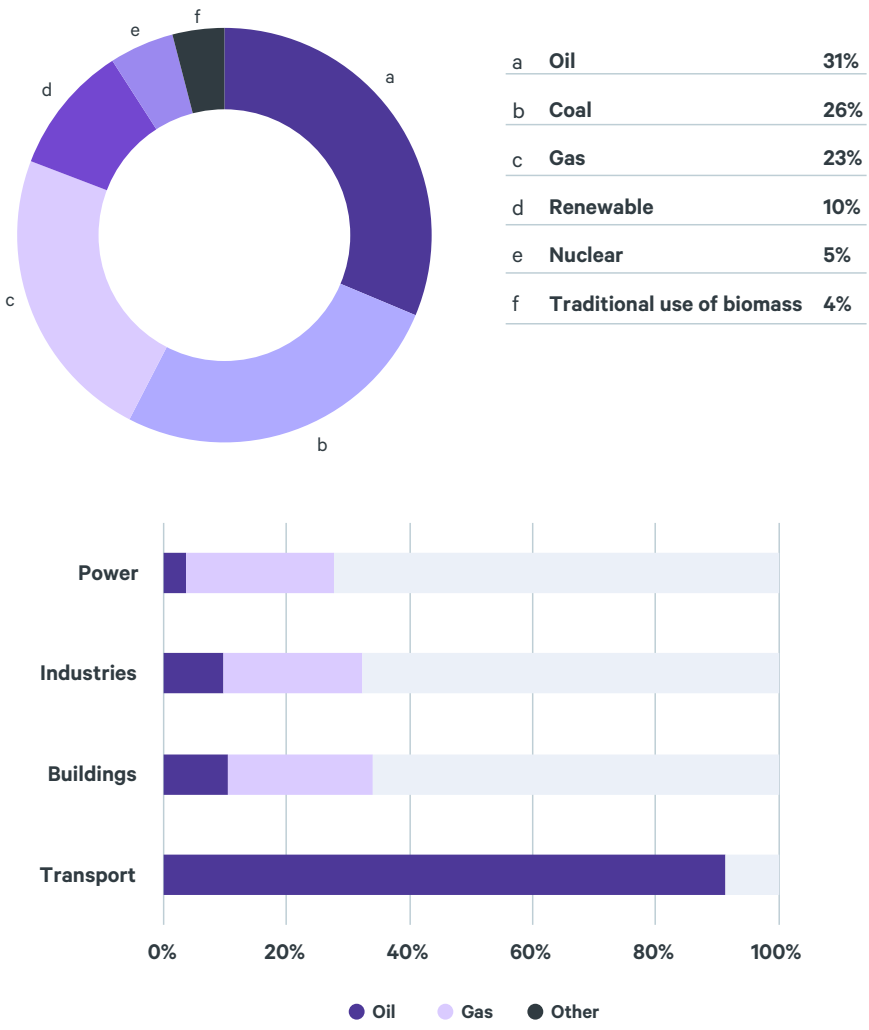
Since the turn of the 20th century, oil and gas have provided cheap, easy-to-access, transportable, high-density energy. On a global scale, the benefits generated by the consumption of these commodities have no historical precedent. The use of oil and gas has driven industry and the production of basic materials; powered, heated, and cooled buildings; and shrunk distances by fuelling planes, ships, trains, and automobiles.

The desirable properties of oil and gas partly explain why they have dominated the global energy mix for more than half a century. Together, oil and gas account for just over half of the world's primary energy consumption. As Figure 1 shows, oil and gas dominates energy input in the transport sector (91%) globally and provides around a quarter of the energy needed for industry, power, and buildings (IEA, 2020a). Given the global energy mix, the historical demand for oil and gas has established some of the world's largest companies by market capitalization, as shown in Table 1.

Table 1. Market capitalization of the ten oil and gas companies with the highest market capitalization. In billions of US dollars.(Companies Market Cap, 2021)

Company	Market capitalization (B$)	Country
Saudi Aramco	1898	Saudi Arabia
Exxon Mobil	291	US
Chevron	240	US
Shell	182	Netherlands
PetroChina	141	China
TotalEnergies	138	France
Gazprom	108	Russia
ConocoPhillips	107	US
BP	97	UK
Equinor	88	Norway

Figure 1. Total primary energy demand in 2019



Source: IEA (2020a)

This is why a successful oil and gas transition depends not only on decisions made by governments and companies, but also requires a radical transformation in the way we consume and use energy across all sectors of the economy, at an unprecedented scale, cost and speed. To enable this transition, greater international cooperation is essential for creating credible pathways to scale up renewable energy production, and to accelerate innovation, climate finance and just transition mechanisms (IEA, 2021c).

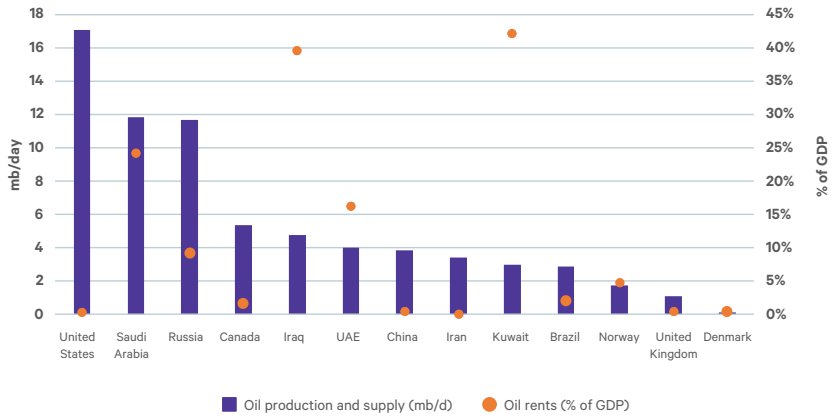
Production and price volatility

The global energy mix, combined with the availability of resources and feasibility of extraction, has concentrated production in a handful of countries and companies that reap the economic gains from these commodities. In 2019, the ten largest oil producing countries accounted for more than 70% of global oil production, and the picture is similar for natural gas production (BP, 2021). As oil and gas drive the global economy and provided large revenues stream from some producer countries, this has led to a high dependence among these countries. Yet in a world set on achieving the goals of the Paris Agreement, today's major producers will be the most exposed to the negative consequences of an unmanaged transition.

The top 10 producer countries and their dependence on oil and gas revenues can be seen in Figure 2, for oil, and Figure 3, for natural gas.

In addition to providing fiscal revenues, the industry is also a major employer, which further cements dependence on the industry for national prosperity. It is estimated that almost 6 million people globally are directly employed by the oil and gas industry, with more than ten times as many people in jobs indirectly created by the industry (ILO, 2021). This makes up roughly 2% of the global workforce (World Bank, 2021a).

Figure 2. Oil production by top 10 oil producing countries (plus Norway, the UK and Denmark) in 2019, and oil rents as share of GDP in 2019.



Source: BP, 2021; World Bank, 2021d
Note: Oil rents are the difference between the value of crude oil production at regional prices and total costs of production.

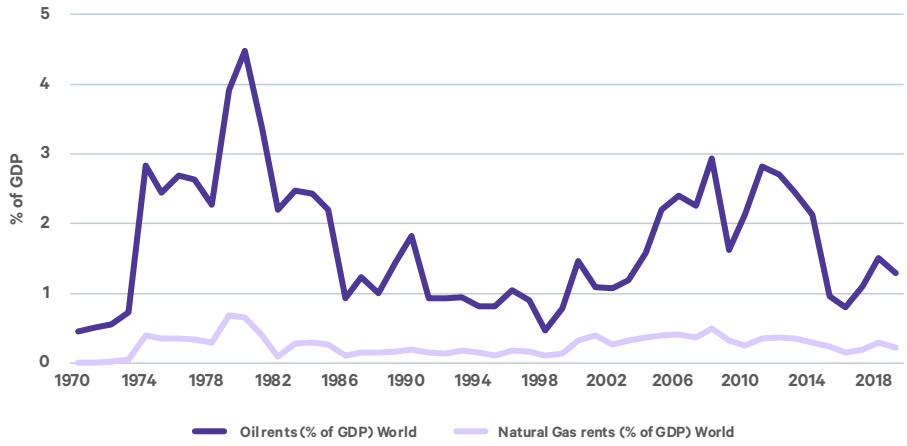
Figure 3. Natural gas production by top 10 oil producing countries (plus the UK and Denmark) in 2019 and natural gas rents as share of GDP (2019).

Source: BP, 2021; World Bank, 2021c
Note: natural gas rents are the difference between the value of natural gas production at regional prices and total costs of production.

Oil and gas are highly traded commodities – more than 90 million barrels of oil and about 11 billion cubic metres of natural gas are traded per day (BP, 2021). The differences in the cost of producing oil and gas, combined with the historically volatile prices of these commodities, creates winners and losers both between and within countries. Fiscal crises as a result of crashes in prices are not uncommon among fossil fuel exporters who depend heavily on revenues and foreign exchange earnings from oil and gas (Mete et al., 2021). Foreign revenues are also important for servicing debt, which is crucial for heavily indebted countries (SEI et al., 2020). Russia and Nigeria for instance experienced exactly that in 2020 (World Bank, 2020b, 2020c). This pattern of boom and bust is deeply entrenched in the history of oil and gas, as shown by the fluctuations of global

incomes from these commodities in Figure 4. Aside from the direct economic consequences of price volatility, there are also indirect negative effects of dependence and price volatility, which include weakening the development of institutions, hindering democracy, and enabling authoritarian regimes to stay in power (Gillies, 2020). These effects are mostly observed in producer countries with weak government institutions (Lashitew & Werker, 2020).

Figure 4. Oil rents and natural gas rents as share of GDP globally from 1970 to 2019.



Source: World Bank, 2021d, 2021c.
Note: Oil and gas rents are the difference between the value of crude oil/natural gas production at regional prices and total costs of production.

The high trade value and revenue share of oil and gas in major producing economies creates a resistance to change both within companies and among politicians, which is a key challenge to curbing production. However, the risk of inaction is potentially greater over the long-term: the IEA predicts oil and gas prices will go down significantly by the end of this decade as nations move to low carbon alternatives in the transport, industry and heat sectors, and as CO_2 prices are increasingly applied to the full value chains of fossil fuels, especially in advanced economies (IEA, 2021c). And moving away from oil and gas production does indeed have an impact on global supply: it has been estimated that given the economics of production and the sensitivity of consumers to prices, for each barrel of oil left undeveloped due to a supply restriction, net global oil consumption will be reduced by between 0.2 to 0.6 barrels (Erickson et al., 2018; Erickson & Lazarus, 2018).

Hence, the notion that demand will always be met – that is, that countries will produce more to meet demand left unfulfilled by a reduction in supply elsewhere – is thus an assumption proved to be wrong. Furthermore, the Production Gap Report notes that with less supply there would be less consumption, and this could lead to increases in oil and gas prices in the short run due to limited supply, which can help generate extra revenues to help producing nations invest in low carbon transition (SEI et al., 2021). The message from the Production Gap Report is clear: demand and supply need to go down in tandem, and this would not only bring certainty to markets but also support orderly transitions.

Subsidies hide the true cost of oil and gas

Fossil fuel subsidies, applied in the form of direct subsidies or via tax breaks, are another key challenge for oil and gas transitions, because they not only incentivize oil and gas activities, but also distract attention from the “true potential and value of renewables” (Mete et al., 2021, p.28). Fossil fuel subsidies also disproportionately benefit higher income groups, because these groups consume more fossil fuels (Mete & Heffron, 2018).

Almost every country in the world subsidizes oil and gas prices to bring down the end cost to the consumer (Mete et al., 2021). In a recent analysis, the International Monetary Fund (IMF) calculated that USD11 million worth of subsidies per minute are granted to the fossil fuel industry (Parry et al., 2021). This hides the true cost of fossil fuels. To be precise, in 2020 fossil fuel prices were a minimum of 50% below their true price in 2020, with coal being 99% below, diesel 52% and natural gas 47% below (Parry et al., 2021). IMF analysis found that the world could cut one third of its CO_2 emissions if governments can agree on a global reform to remove subsidies to fossil fuels. However, there are powerful vested interests in bringing as much oil and gas to the market as possible due to, for example, high profits for companies and stakeholders throughout the oil and gas value chain, which makes it difficult for governments to phase-out fossil fuel subsidies or indeed implement other policies for transition (SEI et al., 2020).

The G20 has been discussing removing fossil fuel subsidies for a long time, but to date, no "effective policies or sustained action" have been agreed on (Mete et al., 2021, p.28). Meanwhile, since 2020, of the total public money that G20 countries have committed to energy-producing and consuming activities, a majority is being spent on fossil fuels – 41% to be precise – compared to 37% on clean energy (IISD et al., n.d.). This is despite the obvious opportunities to pursue a green recovery after the Covid-19 pandemic. Today, the only progress in this area is the inclusion of the need to phase-out "inefficient fossil fuel subsidies" in the final text of COP26's Glasgow Climate Pact, and even this has no firm date for implementation (UNFCCC, 2021c, p.4).

Directly and indirectly, the oil and gas value chain accounts for 56% of global energy-related emissions (IEA, 2020c) as illustrated in Figure 5. The emissions are commonly divided into three "scopes", according to the carbon accounting standard the Greenhouse Gas Protocol (GHG Protocol, 2021). Direct emissions (Scope 1) are emissions that are produced directly from oil and gas operations, such as the combustion of oil and gas in engines to power rigs, leaks and flaring of methane, and emissions from transport. Indirect emissions consist of emissions from purchased energy (Scope 2) such as electricity, and emissions from the value chain through combustion of oil and gas (Scope 3). Scope 3 emissions far outweigh Scope 1 and 2 emissions. They account for more than 80% of the full life-cycle emissions for oil, and about 75% for natural gas (IEA, 2020c). Consequently, subsidies to the oil and gas sector not only hide the direct economic cost of oil and gas, but also incentivize the sector with public money to maintain its position as the main source of greenhouse gas emissions.

Figure 5. Global energy-related emissions (CO_2e) by share of scopes of oil and gas and other energy-related emissions (non-O&G energy-related emissions refer to energy-related emissions outside of oil and gas, mainly from coal, and the total figure includes all energy-related emissions globally).

Source: IEA, 2020c.

1.3 International and EU initiatives landscape

The previous section presented only a fraction of the challenges to oil and gas transitions. More detailed analysis can be found elsewhere.[1] Along with challenges there are also opportunities arising from climate ambitions set by first-mover countries and increasingly strong initiatives influencing the global agenda on the path to low carbon transformation.

First-mover countries

While at present there is not a single example of a successful and widely accepted transition to a fully low-carbon economy, examples of both past and recent energy transitions offer evidence on the advantages of being a first mover in such transitions. For instance, Denmark, Germany, and Spain have all found success by moving early on renewable energy technologies (Fouquet, 2010). And while no major oil and gas producing countries have yet made announcements on moratoriums or "sunset" provisions to end exploration and extraction activities, several smaller producers are setting deadlines to phase out oil and gas from their economies and leave their future deposits in the ground.

The biggest oil and gas producer with a phase-out date is Denmark, which in terms of global production in 2019 ranked forty-second for crude oil and fifty sixth for natural gas (US Energy Information Administration, 2021a, 2021c). Even on a regional level, this is only a fraction of production compared to its neighbours, Norway and the UK: Norway is ranked fifteenth for oil and eighth for gas, and the UK is ranked nineteenth for both oil and gas.

The moratoriums and sunset announcements that have been made (see Table 2) reveal differences in the approaches being adopted. These include differences in the timeline of action; future phase-out dates in comparison to near-term bans; and the methods of production being targeted. In addition, there are different motivations for reducing supply. For instance, in most countries listed in Table 2, phase-outs or bans were introduced to align with national climate commitments, while for Belize and Greenland, the goal of the exploration bans was to protect marine life and the environment.

Table 2. Country announcements of moratoria or sunsets to oil and gas exploration or extraction

Crude oil production global ranking in 2019[a]	Natural gas production global ranking in 2019[b]	Country	Commitment
82	n/a	Belize	Exploration ban from 2017[c]
n/a	n/a	Costa Rica	Moratorium on exploration and exploitation[d]
42	56	Denmark	Phase-out extraction by 2050[e]
70	90	France	Phase-out by 2040[f]
n/a	n/a	Greenland	Exploration ban from 2021[g]
n/a	58	Ireland	Fracking ban from 2017 and offshore from 2018[h]
73	52	New Zealand	Exploration ban from 2018[i]
90	78	Spain	Exploration ban from 2021 and phase out by 2042[j]

Sources: [a] US Energy Information Administration (2021a); [b] US Energy Information Administration (2021b); [c] WWF (2018) [d] James (2021), LINGO (n.d.), [e] Klima-, Energi- og Forsyningsministeriet (2020); [f] Ministere de la Transition Écologique (2017); [g] Government of Greenland (2021); [h] Department of the Environment, Climate and Communications (2021); [i] Morrison (2020); [j] Gerretsen (2021)

1 For further details see IEA, 2021; SEI et al., 2021.

Multilateral initiatives

Although the unilateral announcements made by the countries listed in Table 2 only represent a small proportion of global production, such actions may provide a milestone on the way to coordinated multilateral action. Indeed, under the leadership of Denmark and Costa Rica, the Beyond Oil and Gas Alliance (BOGA) was launched at COP26 (BOGA, n.d.). The alliance brings together governments committed to setting an end date for oil and gas exploration and extraction, in an effort to align with the goals of the Paris Agreement. Its first members include France, Greenland, Ireland, Quebec, Sweden and Wales, alongside associate members California, New Zealand and Portugal. Although the alliance is made up of many countries listed in Table 2, the group still lacks major producers, including the UK and Norway in the North Sea region (Mete et al., 2021)

Earlier in 2021 five countries responsible for 40% of oil and gas production, the US, Canada, Norway, Saudi Arabia and Qatar, took an initiative to establish a forum to develop pragmatic net-zero emission strategies (US Department of Energy, 2021). These include stopping methane leaks and flaring, deployment of "carbon capture and storage technologies, diversification from reliance on hydrocarbon revenues, and other measures in line with each country's national circumstances". While the alliance is the first of its kind, it falls short of an agreement on phasing out oil and gas. Lastly, initiatives such as the Global Methane Pledge announced at COP26 by the EU and US will also impact the production of oil and gas (albeit indirectly as the industry is a major source of methane) and demonstrate that bilateral action can encourage others (European Commission, 2021i).

Civil society initiatives

Aside from country-led initiatives, there are several global climate-related oil and gas initiatives that have been launched by civil society and trade union actors in recent years. This section provides a snapshot of a growing number of existing initiatives, though it is not an exhaustive list.

Within civil society, networks such as Oilwatch (Oilwatch, n.d.) and Global Gas & Oil Network (Global Oil & Gas Network, n.d.) are bringing together NGOs around the world that focus on halting the expansion of oil and gas and a managed decline of production. There are also campaigns such as the Lofoten Declaration (The Lofoten Declaration, n.d.), which calls on governments and companies to acknowledge the need for a managed decline of production, and promotes the Fossil Fuel Non-Proliferation Treaty (Fossil Fuel Treaty, n.d.), which seeks to apply the logic of nuclear non-proliferation to phasing out oil and gas.

Moreover, tools and methodologies developed by NGOs that track the pace of oil and gas transitions globally have recently gained prominence. These include the Transition Pathway Initiative (Transition Pathway Initiative, n.d.) Global Energy Monitor's Fossil Infrastructure Tracker (Global Energy Monitor, n.d.) and the Energy Policy Tracker (IISD et al., n.d.). The Science Based Targets initiative (SBTi) is also currently developing a methodology for targets for the oil and gas industry. The aim is to help companies and investors align their oil, gas and integrated energy company emissions reduction targets with the goals of the Paris Agreement, while enabling transparency and scrutiny from governments and civil society actors (Science Based Targets Initiative, n.d.).

Furthermore, there are demands from within the UK for a moratorium on all new oil and gas fields in response to approvals given to new development plans in the North Sea. In a 2022 research note, UK researchers found that the development of new oil and gas fields in the country are incompatible with the Paris Agreement's goals (Welsby et al., 2022). Researchers around the world also point to scientific evidence of the mismatch between oil and gas majors' climate pledges, decarbonization plans and investment behaviour. A recent analysis that examined BP, Chevron, ExxonMobil and Shell's corporate discourse on clean energy and their actual operations found that despite a significant increase in references to terms such as "climate", "low-carbon"

and “transition” in these companies’ annual reports, their actions and investment behaviour, translate into a rise in exploration activities rather than a reduction (Li et al., 2022)

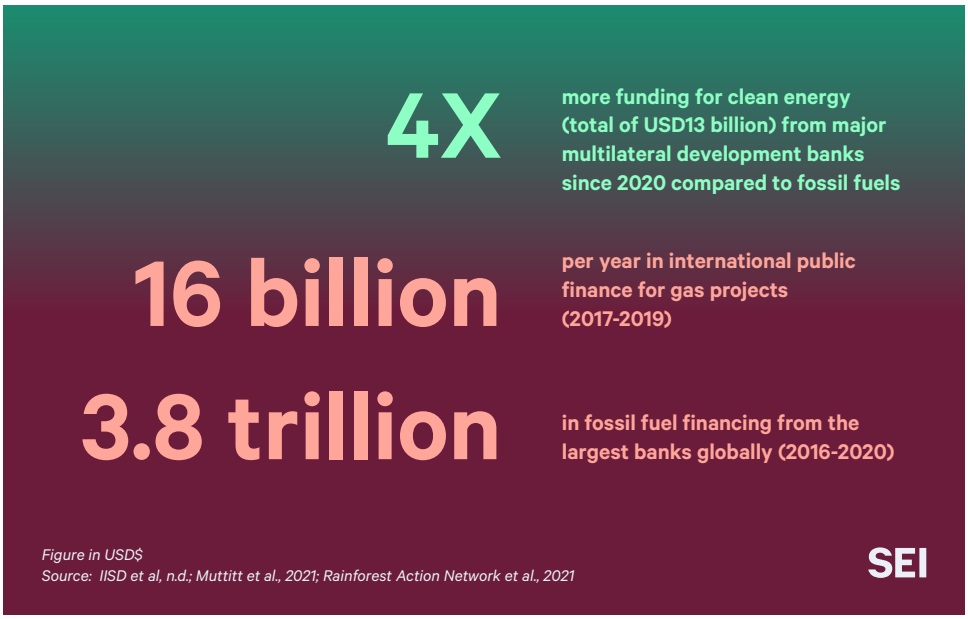
Lastly, workers’ organizations such as the Labour Network for Sustainability, the International Trade Union Confederation and the International Global Union are focusing on the socio-economic and environmental aspects of oil and gas transitions, with an emphasis on oil and gas workers needs and structural change supported by just transition principles (Atteridge & Strambo, 2020).

Civil society pressure and participation in the governance of oil and gas has a key role to play in transition. The second part of this report provides examples of how NGOs influenced key policy decisions in the oil and gas sector in the UK, Norway and Denmark.

1.4 Companies and finance in transition

A transformation of economies based on fossil fuels to low carbon economies will require a substantial amount of investment to be redirected. Hence, the transition policies of finance actors and companies will play a decisive role, in particular in accelerating or stalling transition. Meanwhile, greater climate ambition by governments will have short and long-term implications for the profitability of oil and gas assets, as public investment flows into greener alternatives and the benefit of low-carbon pathways are realized.

Already, many significant asset managers, asset owners, banks, and reinsurers of assets under management have committed to reducing their exposure to fossil fuels to align with the Paris Agreement (Institute for Energy Economics and Financial Analysis, 2021). And since the beginning of the pandemic major multilateral development banks have committed four times more funding for clean energy projects than for fossil fuels (IISD et al., n.d.). However, Covid-19 recovery packages put forward by the world’s largest economies continue to favour fossil fuels over clean energy (IISD et al., n.d.). Meanwhile, between 2016 and 2020, the world’s 60 largest banks provided almost USD3.8 trillion in fossil fuel financing (Rainforest Action Network et al., 2021). Furthermore, from 2017–19, gas projects received an average of USD16 billion in international public finance per year. This was four times as much as was earmarked for wind or solar energy across the Global South (Muttitt et al., 2021).



When we turn to companies, data illustrates that in the wake of the pandemic, oil majors and national oil companies (NOCs) cut upstream capital spending, and the recovery of global oil and gas supply in the medium term remains uncertain (IEA, 2021a, 2021c). Many oil and gas companies have already begun to revise their strategies, shifting their operating and business models, and transferring their capital into renewables, carbon capture and storage, hydrogen and bioenergy (Beck et al., 2021). Trends in the share of upstream investment suggest that majors are shifting towards transition while NOCs remain focused on traditional strategies (IEA, 2021c).

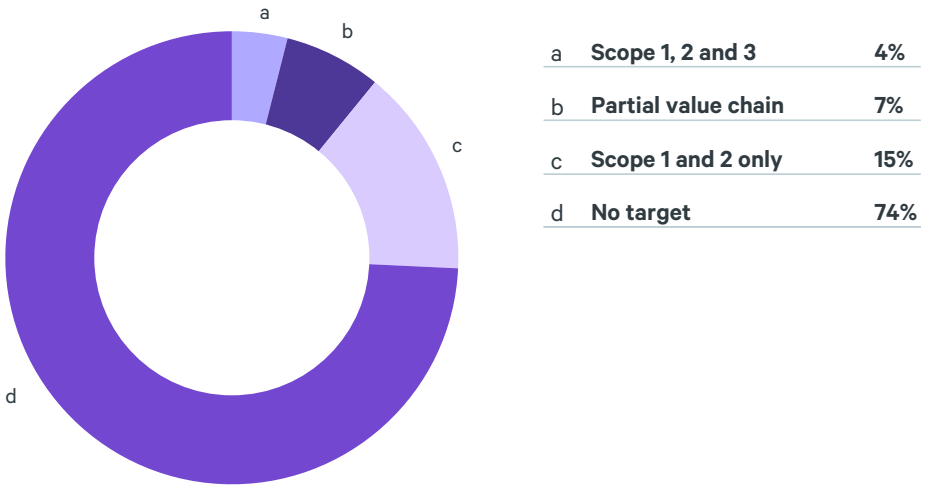
Major oil and gas companies, such as BP and Shell, have pledged a reduction in oil and gas production over time, especially in the North Sea (Royal Dutch Shell plc, 2021). The CEOs of oil and gas majors whose companies represent 30% of global production have also established the Oil & Gas Climate Initiative (OGCI, n.d.), which aims to accelerate the industry response to climate change, focusing on low carbon solutions and technologies. Recently, BP and Shell have begun to shift their business models into sustainable energy, with renewables and bioenergy at the heart of the new models. BP claims to set out a new strategy that will transform the company from an international oil company focused on producing oil and gas to an integrated energy company focusing on low carbon electricity and energy (BP, 2020a). Shell's energy transition strategy states that the company is aiming to become a net-zero emissions energy business by 2050, in line with society's progress towards the Paris Agreement's goal on climate change (Royal Dutch Shell plc, 2021). In comparison to their American competitors, European oil and gas companies have more granular targets, with absolute emission targets up to 2030, and going beyond emissions from their own operations to include end-use emissions (Coffin, 2020). In contrast to BP and Shell, America's largest oil companies ExxonMobil and Chevron Corporation claim to have little competitive advantage in the renewables sector and are planning to keep their oil and gas business model for the foreseeable future (ExxonMobil, 2021)

As some oil and gas majors have started to take small steps toward divesting, there has been a trend for large international oil and gas companies, especially European ones, to sell oil and gas operations to smaller private equity-backed producers (Holland, 2021). This is also the trend in the North Sea region, where private equity-backed producers' share of production reached 30% in 2020 in the UK, compared with 8% in 2010 (Thomas & Mathurin, 2021). Although such trends might appear to bring into question the logic of divestment from fossil fuels, since the oil and gas will be produced by the new owners of the operations, it is worth noting that independents and small-scale producers may not be able to produce oil and gas as cost-efficiently as the majors. Furthermore, majors' divestments could heighten the perception of the risk of investing in oil and gas. The increased risk of investing in the sector would result in increased credit risk and cost of capital for the sector. The combination of a less efficient production of oil and gas as well as an increased cost of capital would lead to higher prices for oil and gas, and thus to a decrease in demand (Erickson, 2020).

Given the growing economic and societal drive towards a low carbon economy, oil and gas companies must move swiftly to secure opportunities for growth while ensuring they enrich their decisions to improve their economic resilience and reputation (Beck et al., 2021). The pressures for low carbon transition away from the oil and gas industry have been gaining momentum recently with, for example, the Dutch legal ruling against Shell and the boardroom rulings against Chevron and ExxonMobil. Such developments signify a turning point in the financial and legal consequences of failing to act on climate agenda (Ambrose, 2021; Szuleck et al., 2021). Within days of the rulings, credit rating agency Moody's warned that the credit risk of major oil and gas companies had increased; a clear indication that climate risk is now being regarded as a financial risk. The events of the past years have intensified investors' interest in sustainable and resilient assets to minimize their exposure to climate risk as well as the risk of stranded assets (IRENA, 2020).

On the other hand, national oil companies are still focusing on traditional production growth targets, which will make any absolute emissions reductions difficult. To date, only three NOCs – PetroChina, Sinopec Corp and PETRONAS – have net-zero intentions, and companies such as Saudi Aramco and Gazprom have not set any emission reduction targets (Yates, 2021). And only 4% of large oil and gas companies have targets for scope 1,2 and 3 emissions, while 74% have no target at all (See Figure 6)(IEA, 2021c).

Figure 6. Distribution of emission reduction targets of oil and gas companies with announced pledges to reach net-zero emissions by 2050.



Source: IEA, 2021c.

Major international oil companies and NOCs have both announced large investments in biofuels, onshore and offshore wind power, carbon capture and storage and hydrogen. However, as of 2019, large oil and gas companies spent only 2% of their capital expenditure on new projects outside of core oil and gas supply (IEA, 2020c).

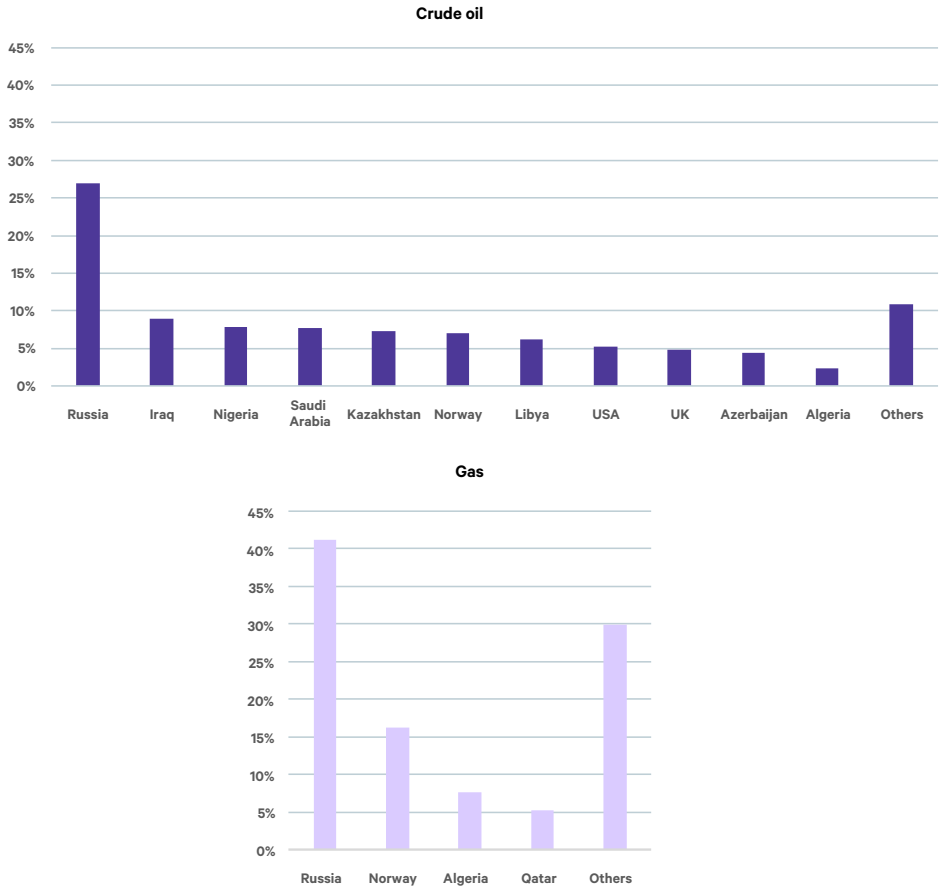
Although there is greater awareness of the financial and environmental risks of continued oil and gas production, and some investments have begun to shift, the efforts of majors and NOCs are nowhere near the ambition required to align production levels with the timeline needed to meet global climate targets.

1.5 Role of the EU in the oil and gas transition

To put the North Sea country case studies in context, we must also consider the influence of the EU, as one of the world's major consuming regions, on the production of North Sea oil and gas.

The EU is a small producer of oil and gas, and production has been declining since the turn of the century, primarily due to diminishing resources (Astorri et al., 2021). It depends heavily on imports of both oil and gas, which account for almost 67% and 27% of energy imports, respectively (Eurostat, 2019). The EU is therefore a significant driver of demand for oil globally, and for gas from neighbouring countries, with Norway and the UK being important trading partners, as shown in Figure 7 (Eurostat, 2019). EU policies are therefore crucial when it comes to the transition away from oil and gas in the North Sea.

Figure 7. EU imports of crude oil and natural gas in 2019 by country of origin.



Source: Eurostat (2019)

Importantly, the EU aims to be the first "climate neutral" continent by 2050 as part of the European Green Deal, with the target enshrined in law by the 2021 European Climate Law (European Commission, 2021a). The EU also plays a growing leadership role on global climate action, working with other countries and regions to achieve the goals of the Paris Agreement. It is a top provider of international climate finance to support developing countries in their efforts to tackle climate change and it promotes comparatively ambitious climate action in multilateral and bilateral cooperation (European Commission, 2021d).

While some countries are beginning to consider reductions in supply of oil and gas, EU policies have been focused on reducing demand, in part to address its own energy security. The EU's policies to reduce demand for oil and gas have recently been strengthened through the Fit for 55 legislative package with its increased targets for renewables, a new emission trading scheme for transportation and buildings, and stricter CO_2 standards in the transport sector (European Commission, 2021h). Furthermore, the European Commission has introduced policies on just transition (European Commission, 2021c). The Just Transition Mechanism (European Commission, 2021e) is one such measure that has been implemented. Through this mechanism, regions that depend substantially on fossil fuel industries or other carbon intensive industries get support to, for example, diversify their economies and train workers for new jobs. The Commission has also proposed a Social Climate Fund to help citizens finance investments in energy efficiency, new heating and cooling systems, and cleaner mobility (European Commission, 2021g).

While the stage is seemingly set for a climate-neutral Europe by 2050, no deadline exists for a managed transition away from oil and gas. On the contrary, upcoming policies and strategies may lead to lock-in effects, specifically from gas infrastructure. In both the latest draft of the EU taxonomy and the latest Ten-Year Network Plan (TYNDP) for gas infrastructure and its future development, natural gas is seen as a transition fuel, which makes it eligible for new investments (European Commission, 2021f; Simon & Taylor, 2022). About 72% of investments in the coming ten years are directed towards traditional gas projects in the TYNDP, which means that only 28% are directed towards energy transition projects, including CCS and CCU projects (Astorri et al., 2021). Moreover, the EU Hydrogen Strategy states that retrofitting existing fossil-based hydrogen production with carbon capture will be important during a transition phase. The retrofitting investment for half of the existing fossil plants is estimated to be EUR11 billion until 2030, which is substantial compared to EUR24–42 billion for electrolysers during the same time period (European Commission, 2020).

The potential lock-in effects of new oil and gas infrastructure could lead to waste of resources if the infrastructure must be decommissioned before its technical lifetime. This would lead to stranded assets or could prolong the phase-out of oil and gas (Taylor, 2021).

1.6 Conclusions of Section 1

Since the signing of the United Nations Framework Convention on Climate Change in 1992, global emissions from energy and industry have increased by 60% (IEA, 2021c). Phasing out oil and gas production must be the next frontier in climate mitigation. However, as this global overview has illustrated, reducing oil and gas dependency has a range of barriers which vary by region. Alongside the challenges mentioned above, these include costs and other financial aspects of the transition; political will and feasibility; resistance from key sectors and stakeholders (i.e. industries, labour unions, local communities, government); lack of information and concrete evidence; unavailability of alternative technologies and resources; and socio-economic implications, including employment and other externalities (European Environment Agency, 2017). Despite this, as illustrated in Section 1.3, there are first-mover countries showing greater ambition and leadership, but many are not major oil and gas producers, hence oil and gas transitions call for greater concerted international cooperation among producer and consumer countries (SEI et al., 2020).

If countries and companies believe that the world is moving towards aligning with the Paris Agreement, this means that oil and gas demand will decline significantly in the coming decades. A country or company with a target for phase-out will be prepared and be more able to diversify activities and use its capabilities to leverage itself into other industries, while a company or country without targets will most likely chase profit in diminishing oil and gas markets.

Putting an end date on oil and gas production provides certainty to all stakeholders. It avoids further lock-in and stranded assets, stimulates finance and innovation in low carbon technologies and, if accompanied by a just transition policy, can help build the skills needed for the next decade.

In a world aligned with 1.5°C target, the IEA forecasts a 13% decrease in the oil and gas workforce by 2030 (IEA, 2021c). On the other hand, it estimates that jobs in the energy supply sector as a whole will increase by 20% during the same time period, driven by more jobs in renewable energy (IEA, 2021c). These jobs would not necessarily be in the same regions or require similar skills as the ones lost (Atteridge & Strambo, 2020; Ghaleigh et al., 2021), therefore those countries that take the lead could benefit most from a managed and orderly transition. These opportunities include productivity and innovation improvements as a result of spillovers from low carbon technologies to other sectors, which are around 40% higher compared to higher-carbon sectors (World Bank, 2020a). Furthermore, first movers are more likely to benefit from economies of scale, because climate innovation is likely to attract a critical mass of companies and countries leading to a speedy decrease in technology costs, as new global markets emerge (Peszko et al., 2020). An example of first mover opportunities in the new value chains is the emerging green hydrogen economy. By utilizing competitive production capability of green hydrogen, many fossil fuel dependent countries that are able to generate cheap renewable electricity can reduce their export dependency, diversify their economy and become potential hubs for green industrial sites (IRENA, 2022a).

Addressing the socio-economies barriers to reducing oil and gas dependency, and overcoming the ambition gap between oil and gas production/consumption and climate change, can only happen through greater policy coherence between greenhouse gas emissions targets, increased policy support for orderly phase-out and managed reorientation, and increased policy support for just transition initiatives.

2. Oil and Gas Transitions project: gathering and synthesizing evidence on opportunities and barriers to oil and gas transitions

2.1 Introduction

The Oil and Gas Transitions project aims to help build constructive strategies for achieving just transitions within the oil and gas sector that are aligned with the Paris Agreement. We will achieve this aim by generating evidence and co-producing pathways for policy action to accelerate oil and gas transitions in the UK, Denmark and Norway.

These three countries have committed to achieving ambitious carbon neutrality targets aligned with limiting global temperature increase to 1.5°C above pre-industrial levels. Yet they are the three top oil and gas producing nations in Europe, and if they are to realize their ambitions, deep transformation of energy systems to transition out of all fossil fuels will be required. While significant progress has been achieved in phasing out coal, the world must now turn to the oil and gas sector as the next frontier. The UK and Norway still plan to expand oil and gas, despite the UK's recently announced North Sea Transition Deal (UK Government and OGUK, 2021), with only Denmark setting a date to phase out the industry. This ambition gap between net-zero promises and climate policies on the one hand, and oil and gas industrial strategies on the other, is the issue we seek to address.

Industry, government, and community resistance to transition is largely founded in concerns over social and economic impacts. Thus, strategies to phase out oil and gas must also be just and equitable. A just and orderly transition will require policy coherence between emissions targets and policies that support economic diversification, labour market plans, skills training, social security, and support for companies in reorienting their business models.

To respond to this complex research and policy challenge, the Oil and Gas Transitions project will develop a better understanding of oil and gas transition scenarios for the North Sea; establish buy-in from key stakeholders; and enable collaboration to scale up innovation and early-stage just transition efforts.

The project is led by Climate Strategies and the Stockholm Environment Institute and implemented jointly with the University of Edinburgh, the University of Oslo and Aalborg University. Since its inception in 2021, the country teams launched in-depth country studies that explored, as a scoping phase, the stakeholder, political and socio-economic landscape for an orderly and just transition in each of the countries covered in the project.

In the following sections, this report synthesises important common opportunities and challenges that were unpacked as part of the universities' research. The synthesis is complemented by a just transition analysis that uses a methodology developed by SEI and illustrated by a scorecard, which has been verified by the in-country research partners. The aim is to illustrate the data gathered in the country studies in a way that is accessible to stakeholders in civil society, academia, and the public and private sector.

In Section 2.2, we look at the complex landscape of industry stakeholders in Norway, the UK and Denmark. The complex picture underscores the need for oil and gas transition scenarios to be co-produced by all relevant stakeholders. We also show how the country case studies assessed the role of oil and gas in the economies of the three countries. In Section 2.3, we synthesize evidence on the need for policy action and intervention gathered in the case studies. Section 2.4 explains the seven principles of just transition, which provide the principal framing of the in-country case studies. We also carry out a scoring exercise to compare how just transition policies rank against each other in these case studies. The section closes with a synthesis of the opportunities and barriers to oil and gas transition in the North Sea. Section 2.5 concludes and outlines the next steps of the Oil and Gas Transitions project, which will focus on co-creating feasible oil and gas transition scenarios in Norway, the UK and Denmark.

2.2. Landscape of stakeholders

This chapter summarizes the complexity and diversity of the oil and gas industry stakeholder landscape in the North Sea to better understand the commonalities and differences across the UK, Denmark and Norway, and to emphasize the importance of involving all relevant stakeholders while producing feasible transition pathways. The information presented in the following tables is extracted from the three country case studies of the Oil and Gas Transitions Project, authored by experts from University of Edinburgh, Oslo University and Aalborg University (Ghaleigh et al., 2021; Sperling et al., 2021; Szuleck et al., 2021). This information is complemented with desktop research.

Private sector

	UK	Denmark	Norway
Actors	Some estimates suggest that there are more than 3000 companies in the UK value chain (Dun & Bradstreet, 2020). 150 companies are directly involved in oil and gas extraction (Statista, 2021b) and of those, 50 enterprises had an annual turnover of more than GBP 5 million as of 2021 (Statista, 2021c). Oil and Gas UK is the main representative body for the UK offshore oil and gas industry.	The Danish case study identified more than 70 companies involved in activities in the oil and gas value chain, from exploration and production, refining, storage, transport, distribution and logistical services to core services such as engineering. There are six oil and gas industry associations and clusters.	The case study found 37 oil and gas exploration and extraction companies active in Norway. Of those, 24 are operators and 13 are partners in production licences. While Norwegian majors make up a sizeable part of the total exploration costs, medium-size enterprises are the most active. The Norwegian service and supply industry consist of more than 1100 companies along the entire value chain. All companies that operate and have production licences in the North Sea are members of the industry association Norwegian Oil and Gas, which has 116 members.
Role in the sector	As of September 2021, Royal Dutch Shell plc (now Shell plc) was the leading oil and gas company listed on the London Stock Exchange, with a total market capitalization value of approximately GBP111.2 billion. It was followed by TotalEnergies and BP, with values of roughly GBP86.1 billion GBP and GBP63.8 billion, respectively (Statista, 2021d). There are 274 active fields in the UK, with 259 of them located in the North Sea.	Nordsøfonden is Denmark's state-owned oil and gas exploration and production company, and owns 20% of the Danish licences awarded since 2005. Nordsøfonden, TotalEnergies and Noreco are the current partners in the Danish Underground Consortium, which is responsible for about 85% and 97% of Danish oil and natural gas production, respectively. There are 11 active fields in Denmark.	Equinor is by far the largest operator, with 33.8% of total production in 2020. Foreign oil and gas production accounted for about 36% of total equity activities. Aker and Lundin Energy Norway are the second and third largest operators. There are 67 active fields in the North Sea.
(Just) transition policy	Even though the oil majors operating in the UK offshore, i.e., BP and Shell, have made the commitment to reach net zero emissions by 2050, the level of investment in renewables and bioenergy is not close to sufficient to achieve the goal of the Paris Agreement. The trade association Oil & Gas UK and oil and gas companies view themselves as a key component of the transition. The private sector is endeavouring to fill the just transition void through their own initiatives. For instance, SSE, a public energy company working to reduce gas in its portfolio has published its own Just Transition Strategy. Oil and Gas UK's Roadmap 2035, a strategy to assist the UK's net zero target, focuses on workers in the industry and aims to support 130 000 jobs "across the energy spectrum". At the same time, Oil and Gas UK's Workforce & Employment Insight 2021 states that "continued investment in oil and gas projects is key to ensuring that this skills transfer can take place.	Several oil and gas companies in Denmark are successfully shifting their business models towards a low carbon economy and are attempting to reinvent themselves as energy companies. For instance, DONG transformed its business model from a traditional oil and gas producer to a largely wind power and bioenergy producer, and changed its name to Ørsted in 2017 (Orsted, 2021). While many industry associations are not outspoken about just transitions and issues around re-employment of oil and gas workers in other sectors, the two business associations, Business Esbjerg and Business Region Esbjerg, have started to map future expectations in terms of education and workforce.	Norway's largest oil and gas company decided in May 2018 to change its name from Statoil to Equinor to reflect the shift in the strategy and business model from a traditional oil and gas producer towards an integrated energy company, producing wind and solar power (Equinor, 2020a). Equinor is expected to be a leader of change. While at the same time the crude oil production from Equinor's Johan Sverdrup field is set to grow, pushing Norway's crude oil production to an estimated increase of 18% in 2025 relative to 2020 production (Szuleck et al., 2021). Overall, private sector actors' rationale for emissions reductions has focused primarily on energy efficiency and "cleaner" activities, not decommissioning.

Civil society, NGOs, academia, research and think tanks

	UK	Denmark	Norway
Actors	There are nearly 50 active relevant NGO, academia and think thank actors.	There are nearly 20 active and relevant NGOs and research and educations centres.	There are nine prominent advocacy groups and an umbrella network of 50 organizations. There are four think tanks and research organizations and several university departments focused on relevant topics and partly financed by the oil industry.
Role in the sector	Civil society voices are particularly prevalent in the just transition discourse due to lack of coherent governmental policy. NGOs collaborate closely with the trade unions.	NGO campaigns focused on citizens' initiatives and technical input and have formed a common front on ending licencing rounds. Their citizens' proposal was supported by at least one political party, the Alternative.	Trade unions maintain a close relationship with environmental NGOs through joint initiatives such as Bridge the Future, and oil sector unions collaborate with more "technology optimistic" organizations, like Zero and Bellona.
(Just) transition policy	Friends of the Earth Scotland and the Scottish Trade Union Congress recently established the Just Transition Partnership. The Stop Cambo Oilfield campaign by 17 NGOs made this new oilfield a focal point of political debate.[k] A widely supported letter from scientists has also opposed the Cambo project, and all new oil and gas licensing and investment that is inconsistent with the latest climate science.	The Danish NGO network, called the Danish Group of 92, was influential in the adoption of the Climate Law in 2019 by submitting a "citizen's initiative" to the parliament. In 2020, another citizens' initiative demanded an end to Danish oil and gas production in the North Sea. Subsequently, the Danish Climate Council recommended an immediate stop to oil tendering for the foreseeable future. This concluded with a widespread consensus that by 2050 oil and gas exploration should cease in the Danish North Sea.	Many NGO campaigns focus on more ambitious climate and decarbonization policies. An NGO-led initiative Climate Transitions Committee has a core task to describe a policy to handle the consequences of the transition. In addition, Green Industry 21 brings together think thanks, NGOs and trade unions to find a common ground on the climate movement.

[k] *In December 2021, Shell pulled out of the Cambo Oil Field off Shetland, on the conclusion that the economic case for investment in this project being not strong at this time. While adding that they remain committed to supplying UK customers with the fuels they still rely on, including oil and gas (Harvey, 2021).*

Public sector and political landscape

	UK	Denmark	Norway
Governmental actors	Department for Business, Energy & Industrial Strategy is a ministerial department, supported by 42 agencies and public bodies. The Oil and Gas Authority (the industry regulator) adopts a tripartite governance approach between government, the regulator and the oil and gas industry. The Climate Change Committee oversees the UK's progress and regularly advises government on how to achieve this objective. The Just Transition Commission advises the Scottish Government on a zero-carbon economy that is fair for all. Skills Development Scotland is a governmental body helping people achieve career success and supporting businesses with their goals and growth.	The Danish Council on Climate Change is an independent body of experts that advises on how Denmark can most effectively and cost-effectively undertake the transition to a low-carbon economy by 2050. The Danish Energy Agency's work involves matters relating to energy supply and consumption, as well as Danish efforts to reduce carbon emissions. It also delivers critical data about activities in the Northern Sea, e.g. expiration dates of licenses. The Ministry of Climate, Energy and Utilities is responsible for national and international efforts to prevent climate change. The Environmental Protection Agency is the national authority on environmental and nature protection in Denmark.	The Ministry of Petroleum and Energy oversees the entire energy sector. The Ministry of Climate and Environment is responsible for national climate policy and international climate negotiations but does not have a direct influence on the energy sector which is challenged by civil society. The Norwegian Petroleum Directorate overseas the oil and gas sector. The national transmission operator Statnett is an increasingly important actor because of Norway's electrification plans for oil and gas installations. Norwegian Water Resources and Energy Directorate is responsible for electric power production.
Political parties	Salience of just transitions in election manifestos has increased across all political parties in the 2019–21 period.	Denmark has never had a green party, but the established parties have attempted to integrate green dimensions into their political action.	The transition away from oil and gas is politically divisive. Nearly all mainstream political parties emphasize the significance of the oil and gas industry and regard oil and gas phase-out as taboo, or visualize it in a very distant future.
(Just) transition policy	The UK government has neither a just transitions policy nor a governmental body committed to achieving its goals. Despite the lack of UK leadership, the devolved governments of Scotland and Wales are working towards establishing legal frameworks to implement their respective just transitions.	There was a relatively broad consensus among political parties during the negotiations on the North Sea Agreement to end oil and gas production in 2050, which is welcomed by local actors for being in line with the transition of the port of Esbjerg and local businesses to renewable energy, especially offshore wind.	Norway's Green Party and Red Party are the most progressive political parties, with the Green Party demanding "a planned, controlled restructuring away from petroleum activities by 2035, while at the same time safeguarding employment, and the creation of new jobs". The Red Party has put forward a plan for a "just environment policy", using the Sovereign Wealth Fund to finance the transition.

Trade and labour unions

	UK	Denmark	Norway
Actors	There are nine relevant trade unions, including regional (EU) and international bodies.	There are seven relevant labour unions.	There are eight relevant trade unions which have a stake in oil and gas policies.
Role in the sector	23.5% of the workers are unionized. Trade unions collaborate with NGOs and industry associations. For instance, OPITO is an industry owned entity with representatives from industry, government, and unions.	70% of the workforce is unionized. Some unions participated in the launch of the citizens' initiatives together with the Danish Group of 2020 on putting an end to oil and gas production.	50% of the workforce is unionized. The largest national trade union, Norwegian Confederation of Trade Unions, has close ties with the Labour Party and other centre-left parties, and has strong influence on climate and petroleum policies.
(Just) transition policy	The trade unions Prospect and UNISON, and the Trades Union Congress, are at the forefront of the just transition movement. OPITO is leading an integrated people and skills plan to feed into the government's skills plan for the sector in 2022.	Unions are in support for the transitions away from oil and gas. At the local level in Esbjerg, 3F Danks Metal participates in a task force to include as much of the existing oil and gas workforce in the transition.	In Norway, many of the oil-industry unions are supportive of the position on "continued exploration"" and oppose oil and gas phase out. Many non-oil-industry unions have so far abstained from denouncing continued exploration and other disputed oil and gas policy issues.

Role of oil and gas in the economy

	UK	Denmark	Norway
Tax revenues/ GDP share	Tax contribution from UK Continental Shelf production during 2020–21 was GBP300 million. Oil and gas contributed to circa 1.2% of GDP in 2018.	In 2019, earnings from the oil and gas sectors amounted to less than 1% of the tax revenue. The oil and gas sector contributes around 1.5% of total GDP.	The government net cash flow from petroleum activities is expected to amount to NOK154 billion in 2021 – around 9% of the total budget income. As of 2021, the oil and gas sector represent 14% of GDP and 41% of exports, respectively.
Import / export	The UK remained a net exporter of gas until 1997 and of oil until 2004 and has since been a net importer of both.	Oil exports contributed to around 2.5% of all exports in 2017, having been on a decline since 2012.	Oil and gas are the most important export commodities contributing to around half of the total value of the export.
Employment	The oil and gas sector in the UK had a total employment of 178 500 people in 2020. Around 0.5% of the total labour market employment is in the oil and gas sector.	Only 1% of total employment is in the oil and gas sectors.	Statistics Norway estimates that 140 000 people were either directly or indirectly employed in the oil and gas sector in 2019. However, a report by consultancy Menon Economics puts the total at 205 000. This constitutes 5 to 6% of national employment.

The stakeholder mapping carried out in the country studies showcases the diversity of actors involved in the oil and gas value chain. While the industry's size and role in the economy in the UK, Denmark and Norway varies, the relative number, roles and transition narratives of stakeholders share commonalities across all three countries. This is the reason why the Oil and Gas Transitions project adopts a harmonized methodology for co-creation of scenarios, which will engage with relevant stakeholders identified. The evidence gathered from country case studies emphasizes the importance of inclusiveness in developing feasible just transition scenarios. The following sub-section outlines the policy context for transitions in the North Sea region and is followed in section 2.4 by a scorecard analysis of existing transition policies of the three North Sea countries, using the seven principles of just transition.

2.3. Evidence for policy action

Governments are central players in shaping and steering complex, socio-technical transitions. Below, we set out the policy context for reducing the supply of oil and gas in Denmark, Norway, and the UK, and then present the evidence for the urgency of policymakers to act and common opportunities for action, as identified in the three case studies.

National context for policy action

The national context for reducing the domestic supply of oil and gas varies across the North Sea region, based on the extent to which countries depend on fossil fuels and the policy landscape in which production takes place, including ongoing efforts to reduce the industry's emissions. Norway has a high level of dependency, while the UK depends substantially on imports. Denmark has relatively low dependency and is pivoting towards transition.

Norway's oil and gas sector is a major source of national wealth and a pillar of its welfare state. Several key indicators suggest that Norway can be considered a petrostate. Notably, the oil and gas sector accounts for 14% of GDP, 10% of tax revenues and 41% of exports.[2] The transition away from oil and gas will require not only transforming the entire Norwegian economy, but a socio-cultural shift to create a new chapter in the Norwegian "oil fairy tale" that has brought national pride and helped build its welfare state (Szuleck et al., 2021). Thus, the notion of an end to oil and gas production has remained in the realm of political fiction, and opposition to it remains high. Nevertheless, the oil and gas industry accounts for almost a third of Norway's greenhouse gas

2 As of 2021 (Szuleck et al., 2021)

emissions, although laws that regulate these emissions mean that environmental performance is better than the global average. For instance, CO_2 emissions from flaring are 8% of the global average and 10% of those in the UK (Szuleck et al., 2021).

The UK's oil and gas reserves are in a predictable decline, and since 2004 the country has been a net importer of both commodities (Ghaleigh et al., 2021). At the same time, the country's renewables are already out-competing coal- and gas-fuelled electricity. Proponents of continued production argue that the UK's energy security depends on domestic extraction of oil and gas. Yet more than 80% of the oil produced in the UK is exported for reasons of market dynamics and process optimization, unlike gas produced in the UK, which is almost all consumed domestically.[3] Nevertheless, to ensure security of energy supply, tax revenues and jobs, since 2016 the UK's oil and gas regulator (formerly Oil & Gas Authority - OGA; now North Sea Transition Authority) has pursued a strategy of "maximum economic recovery" (MER) from its continental shelf.[4] In 2020, the OGA's strategy was revised to consider national net-zero commitments alongside MER. This has created an unresolved contradiction between the obligation to secure maximum economic value from recoverable petroleum while also contributing to net-zero emissions. More recently, as COP26 President, the UK's role as a fossil fuel producer came into the spotlight because it neither took a leadership role on ending subsidies for fossil fuels nor a decision to end future North Sea licensing rounds. On the contrary, the UK's energy minister met with oil companies to reassure them of continued production in the North Sea (Godsen, 2022).

Meanwhile Denmark – despite being almost entirely dependent on imported fossil fuels in the 1970s – is en route to becoming a world leader in renewable energy and energy efficiency. Historically, Denmark's energy policy pursued security of supply through a two-pronged approach by expanding renewable energy and efficient generation while exploiting Danish North Sea oil and gas resources (Sperling et al., 2021). The "green" element of Denmark's energy policy evolved into a strategy to achieve 100% renewable energy in electricity and heating by 2035, which in 2011 made Denmark the first country in the world with such a commitment (Sperling et al., 2021). In 2019, the development of a 70% CO_2 emission reduction target by 2030 (compared to 1990 levels), with broad support in society, further cemented the direction of change and the drive to phase out fossil fuels (Sperling et al., 2021). Naturally, this created an irreconcilable tension between the two prongs of Denmark's historical energy policy. Compared to the UK and Norway, present-day Denmark lacks a strong national or even regional "oil and gas identity". This set the conditions for the 2020 North Sea Agreement, which made Denmark the world's largest oil and gas producer to have set an end date on production by 2050 (Sperling et al., 2021).

Need for regulatory reform

The Danish decision to set an end date on production demonstrates to other producers, particularly those in the North Sea, that taking such a decision is possible. What steps enabled the Danish government to announce an end date? Examining this question can help to sketch a pathway that other large producers can emulate.

A significant first step towards the decision to phase out oil and gas production was the delay of the eighth round of tenders for the exploration of North Sea fields in October 2019. The delay was accompanied by an economic assessment of cancelling the eighth tendering round and ending oil and gas production, which concluded that there would be relatively low economic gains from continued exploration in the North Sea after 2050 (Sperling et al., 2021). Importantly, the negative political signals on future exploration and the uncertainty created by the delay in the tendering round resulted in dwindling interest from oil companies, effectively cancelling market interest in the tendering round (Sperling et al., 2021).

3 For further details see Department for Business, Energy & Industrial Strategy, 2021b, 2021a
4 Department of Energy & Climate Change & Oil and Gas Authority, 2016

Despite the differences in national contexts, the Norway and UK case studies also identify common policy levers for directly reducing the production of oil and gas. These include reforms to the licensing regimes for the exploration and extraction of oil and gas and reforms to fiscal incentives for maintaining production levels.

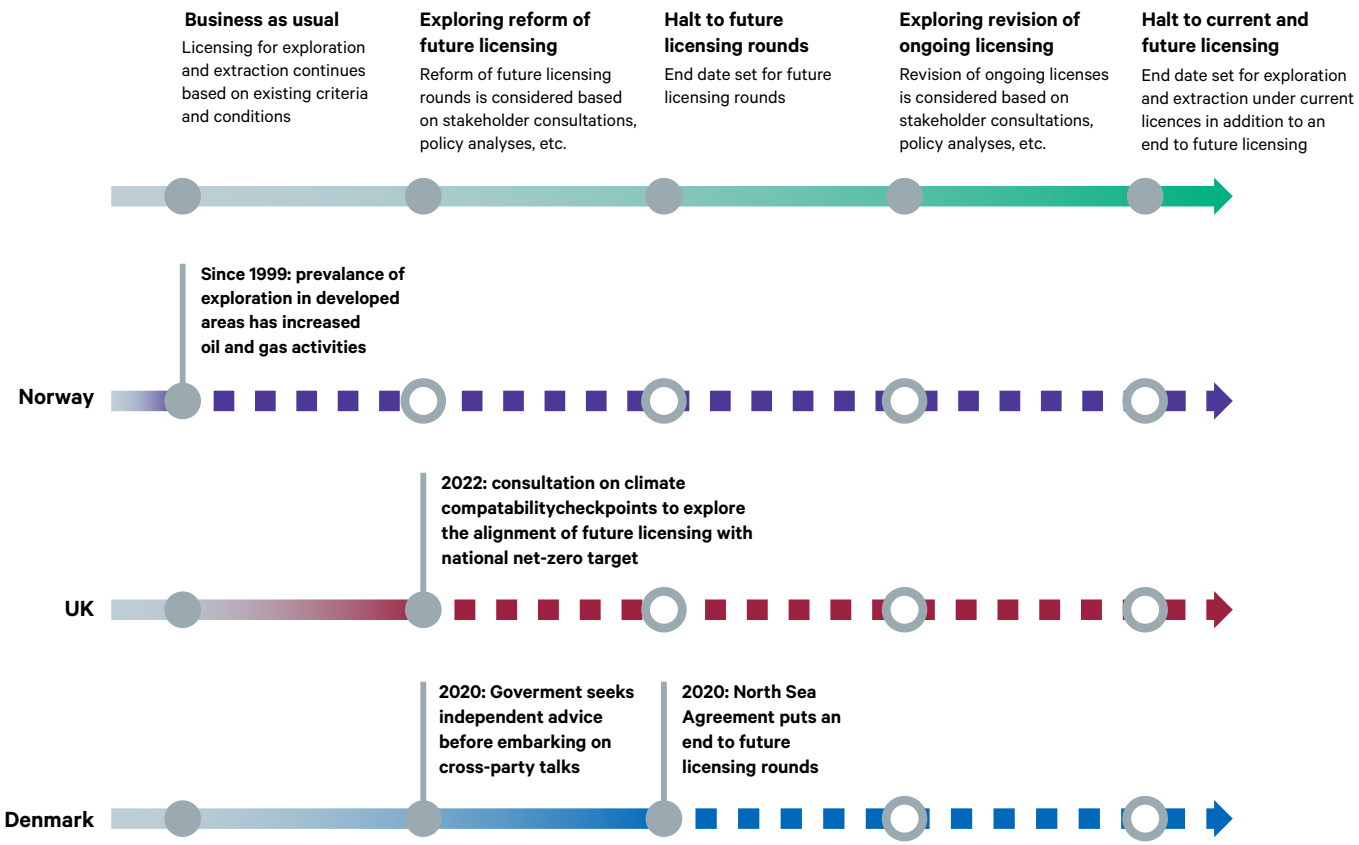
Following Denmark's approach, a logical starting point for addressing the supply of oil and gas is reform of the licensing regime that governs and regulates exploration and extraction, which is a choice that is open to governments in Norway and the UK. Broadly, the options available range from continuing to issue new licences, to restricting or halting the issue of new licences, to halting the issue of new licences and revising existing licenses. Figure 8 outlines Denmark, Norway and the UK's progress to date on licensing reform.

In Norway, support for these options varies across the political spectrum and the way forward is likely to become an especially contentious policy area following the 2021 Norwegian general election (Szuleck et al., 2021). The prevalence of "awards in predefined areas" – i.e. concessions for exploration in well-explored and developed areas – has led to an increase in oil and gas activities and thus received criticism from NGOs because of its environmental impacts. Although since 2020 it has been possible to place terms and restrictions on these types of concessions, frustration remains among environmental groups because existing licences are inflexible in terms of considering new information and opportunities to withdraw licences (Szuleck et al., 2021). As for the UK, the case for reform of the licensing regime arises from the tensions between the policy of maximum economic recovery and the 2021 North Sea Transition Deal's commitment on the oil and gas industry's contribution to the national net-zero target (UK Government and OGUK, 2021). In March 2021, the government announced the introduction of Climate Compatibility Checkpoints ahead of future licensing rounds to align exploration and extraction with national climate targets (Department for Business, Energy & Industrial Strategy, 2021c).

Although there are possibilities to reform licensing regimes in Norway and the UK, the feasibility of such reform remains a pertinent question. In 2020, an economic assessment by the Norwegian statistics agency estimated that strategies to phase out production using licensing reforms would reduce GDP by 1–1.5% in 2050 compared to the business-as-usual trajectory (Szuleck et al., 2021). On the other hand, the knock-on effects are estimated to reverberate beyond regions directly dependent on employment in the industry, to include most sectors of the economy, with implications for taxation and the provision of public welfare. Although reform of the licensing regime remains a live political debate in Norway, a report produced under the former government suggested that new licences should continue to be granted given the oil and gas reserves available (Szuleck et al., 2021). The present Labour-Centre coalition government has not indicated that it will pursue changes to the licensing policy (Szuleck et al., 2021). The potential for reform is also complicated by the conflict of interest arising from the Ministry of Petroleum and Energy being both the owner and regulator of Equinor, despite parliamentary calls to address this conflict (Szuleck et al., 2021).

At the time the UK case study was carried out, few details were available on reform to the licensing regime via the proposed climate compatibility checkpoints. The UK Government has since launched a public consultation, which hints at the potential focus of the checkpoints (Department for Business, Energy & Industrial Strategy, 2021c). Importantly, the proposed checkpoints will only apply to new licences, because existing licences are deemed to be adequately covered by existing regulation and net-zero considerations. As a result, these reforms will not tackle the existing contradictions between net-zero and the MER obligations set out in the revised OGA strategy, as highlighted by the UK case study (Ghaleigh et al., 2021), and continue to leave room for litigation. In Norway, it is also a challenge to address existing licences, because although political interventions to phase out existing operations are legally possible, they would be a matter of national controversy. It would be more tenable to intervene where licences have been awarded but operations have not begun, yet doing so might trigger legal disputes and the need for compensation (Szuleck et al.,

Figure 8. Steps towards licensing reform and progress among North Sea producers



Source: Ghaleigh et al., 2021; Sperling et al., 2021; Szuleck et al., 2021

2021). Even in Denmark, where a phase out has already been announced, the compensation that would be needed to bring forward the date of phase out has been deemed too costly, given the duration of existing licences (Sperling et al., 2021).

In terms of fiscal incentives, a Norwegian reimbursement scheme introduced in 2005 allows exploration companies to choose between getting an immediate refund of the tax value of exploration costs or carrying forward the losses, and related interests, to a year when the company has taxable income (Szuleck et al., 2021). The reimbursements paid out between 2005 and 2019 amounted to just 3.57% of the tax revenue generated by the industry. Meanwhile, the UK has one of the world's most advantageous tax regimes for oil and gas: the overall tax rate for extractive companies has fallen from 83% in 1993 to 40% in 2016 (Ghaleigh et al., 2021). In addition, in 2015–16 and 2016–17 the UK paid more to the oil and gas industry than it received in tax revenues from the industry (Ghaleigh et al., 2021).

In both Norway and the UK, fiscal incentives to spur further exploration and investment were introduced at times when activity on the continental shelf was in decline. These fiscal incentives have served their intended purpose to stimulate investments, especially among small- and medium-sized enterprises, and recent years have seen calls for reform. Norwegian NGO Bellona argues that Norway's reimbursement scheme continues to represent a risk borne by taxpayers on behalf of exploration companies since there is no guarantee that these companies will turn a net profit (Hauge, 2017). Norwegian NGOs therefore call for reform to transfer more financial risk to exploration companies (Szuleck et al., 2021). In the UK, the tax breaks afforded to the industry have already been subject to judicial review, albeit unsuccessfully.[5]

5 For a case summary see: Grantham Research Institute on Climate Change and the Environment, 2021; recent update from claimants: Paid to Pollute, 2021

Facilitating transition through dialogue

As well as demonstrating that it is possible to phase out oil and gas, the Danish case study highlights the role of dialogue and consultation among stakeholders as fundamental to overcoming resistance towards the phase out of oil and gas. The path towards Denmark's 2020 North Sea Agreement, which gained buy-in from industry and civil society during a period of right-wing government, was paved with stakeholder dialogue and can serve as a model to emulate. Firstly, the development of Denmark's Climate Law (2019) and its emission reduction targets involved public, civil society and industry participation and support (Sperling et al., 2021). Secondly, the Danish government sought independent advice from the Danish Climate Council before embarking on discussions and negotiations with political parties to reach consensus on the future of licensing rounds (Sperling et al., 2021). Lastly, the negotiations on the North Sea Agreement were also based on Denmark's tradition of consensus and inclusivity among government and non-government actors on major, long-term decisions (Sperling et al., 2021). The result was widespread buy-in among key stakeholders, who were given the opportunity to closely cooperate on reaching the final decision to phase out oil and gas.

Both the Norway and the UK case studies acknowledge that although policymakers have the power to set the direction of transition in the short- to mid-term, no single group has the leverage to steer the transition. There are already some positive signs of collaboration in Norway, with the establishment of cross-sector stakeholder platforms. For instance, Konkraft brings together trade unions and industry associations, while the Climate Transition Committee consists of civil society, climate-minded politicians, local government, and experts (Szuleck et al., 2021). Given the complexity of the transition, the Norwegian study cautions against simplistic categorizations of stakeholder groups and their views.

On the other hand, the development of the UK's 2021 North Sea Transition Deal has been criticized for its narrow reflection of stakeholder contributions. The Deal accepted wholesale the submission by the industry body OGUK, while failing to align with the UK Climate Change Committee's assessment of the emission reductions required from industry by 2030 to achieve the UK-wide net-zero commitment (Ghaleigh et al., 2021). Similar criticism has been levelled at the UK oil and gas regulator's close collaboration with industry – ahead of the public consultation – on climate compatibility checkpoints for future licencing rounds (Barnett, 2021). Lastly, despite the UK government expressing a commitment to improve inter-governmental relations, calls for an inter-governmental discussion on achieving net-zero against the backdrop of further development of oil fields went unheeded (Ghaleigh et al., 2021).

Addressing carbon leakage through international cooperation

In theory, unilateral policy action to restrict the production of fossil fuels with the aim of curbing carbon emissions may result in "carbon leakage". This term refers to the displacement of carbon emissions from jurisdictions with stringent climate policies to those with less stringent policies. However, empirical evidence suggests that climate policies such as carbon pricing do not lead to carbon leakage (Felbermayr & Peterson, 2020).

Proponents of maintaining business-as-usual levels of oil and gas production also argue that a unilateral phase out of oil and gas would, instead of leading to lower global emissions, bring about a "green paradox", whereby the announcement of a phase-out date accelerates production and any reduction in supply is fulfilled by other producers, with the outcome being a net increase in global emissions (Szuleck et al., 2021). When applied to the North Sea region, one of the main premises of the green paradox argument is that North Sea oil and gas have the lowest emissions per barrel produced compared to other oil producing regions. However, this claim is being challenged by some Gulf producers (Szuleck et al., 2021). And in any case, the main concern over carbon emissions from oil and gas is not the carbon intensity of production but rather its consumption and combustion.

Although the theories of carbon leakage and the green paradox are strongly contested in academia, the arguments still hold weight in political debate. During Norway's 2021 general election both arguments were put forward by the right-wing political parties as evidence against decarbonization goals (Szuleck et al., 2021). Similarly, those in favour of continued oil and gas production in the UK, such as the industry body OGUK, argue that a reduction in domestic production will result in increased imports from countries with lower environmental standards (Ghaleigh et al., 2021). The persistence of such arguments in political debates highlights the need to address the risk of carbon leakage and the green paradox and provide a net reduction in global emissions.

One solution is a concerted global effort by oil and gas producers to reduce supply. In Norway during the 2021 general election campaign, left-wing political parties and leading economists called for the establishment of an international forum for negotiating supply reduction among major producing countries (Szuleck et al., 2021). The Beyond Oil and Gas Alliance (BOGA), though it currently lacks major producers, is one such forum that is serving as a role model for international cooperation on reducing supply (BOGA, n.d.). As discussed in Section 1.3 of this report, the alliance brings together governments committed to setting an end date for oil and gas exploration and extraction, in an effort to align with the goals of the Paris Agreement. Although BOGA is encouraging other producers to take their lead, it is too early to tell whether it can make a compelling case for major producers to join and build momentum behind concerted supply reduction.

Policy mechanisms for a just transition

Previous transitions in North Sea countries provide sobering lessons on the political costs of unmanaged transitions. These are particularly stark in the UK, where the deprivation left by unmanaged transitions in the steel, shipbuilding and coalmining industries is still being felt (Ghaleigh et al., 2021). The Norwegian and Danish case studies also warn of the political costs of unmanaged transition. The country case studies also outline overarching policy mechanisms for enabling a just transition away from oil and gas. These range from established and dedicated just transition mechanisms in the cases of Denmark and the UK, to existing arrangements which could be tailored to deliver elements of a just transition, as is the case in Norway. These policy mechanisms are cited across the case studies as vital for addressing the negative impacts of supply reduction.

With regard to established mechanisms, both Denmark and the UK have strategies and funds available that support a just transition. Denmark's 2020 North Sea Agreement has secured stable operating conditions for the oil and gas industry until 2050, which has been welcomed by local actors (Sperling et al., 2021). In addition, the Agreement allocates DKK 90 million for the transformation of Esbjerg harbour to support offshore wind power, consolidating the Esbjerg region's transformation from the country's oil and gas hub to a renewables hub (Sperling et al., 2021). There is concern, however, that the funds allocated for the transformation of the harbour will not be enough, leaving local government to foot half of the remaining bill (Sperling et al., 2021).

In the UK, the 2021 North Sea Transition Deal outlines the building blocks for achieving net zero in the oil and gas industry by 2050, and sets aside GBP 16 billion for technologies to decarbonize the UK continental shelf, relying heavily on market solutions (Ghaleigh et al., 2021). However, it defends the continued production of domestic oil and gas using familiar arguments, including energy security, cost of abatement, and carbon leakage (UK Government and OGUK, 2021). In addition, the Deal falls short of providing support for reskilling workers, leaving it to an independent skills provider jointly owned by government, industry, and trade unions (Ghaleigh et al., 2021). Despite other relevant policies announced between 2020 and 2021, such as the Levelling Up Fund and the Lifetime Skills Guarantee, the opportunity to align them with the jobs and employment aspects of the Deal was missed. Furthermore, even though the UK's devolved

administrations are focusing on the question of a just transition, the existing constitutional settlement impedes mechanisms to provide for it. Stronger cooperation between the UK's central government and Scotland's government is urgently needed to deliver policies that are coherent across devolved and reserved competences (Ghaleigh et al., 2021). If the UK's "maximum economic recovery" policy prevails and action remains uncoordinated, the efforts described above will be insufficient and fall short of supporting workers and communities in achieving a just transition (Ghaleigh et al., 2021).

In Norway's case, a dedicated mechanism to support a just transition is not yet in place. However, Norway's Sovereign Wealth Fund ("the Oil Fund", as it's commonly referred to in Norway) has characteristics which make it suitable for supporting a just transition. Firstly, the Fund is a financial and political instrument which can be drawn on to a limited degree in times of economic downturn, such as the economic contraction forecast in the phase-out scenarios outlined in the Norwegian case study (Szuleck et al., 2021). Secondly, its objective to ensure that the wealth accrued from oil and gas extraction "benefits both current and future generations" (Szuleck et al., 2021) aligns with the need to distribute wealth fairly to those born after oil and gas production ceases. Because the Fund is overseen by the Norwegian Parliament, political momentum behind leveraging the Fund to support just transition measures is required. While there is a broader debate on the risks of an unmanaged transition driven by parties of the left and centre (Szuleck et al., 2021), the most candid proposal for leveraging the Oil Fund to finance a just transition has come from the Red Party, which called for strategic investments into industrial and green infrastructure to create new jobs (Szuleck et al., 2021). The extent to which such an approach is adopted by the centre-left coalition minority government currently in place remains to be seen.

Having explored the evidence for policy action and overarching policy mechanisms at the disposal of governments to usher in just transitions, the next chapter takes a deeper look at the status of just transitions across the three country case studies.

2.4 Just transition

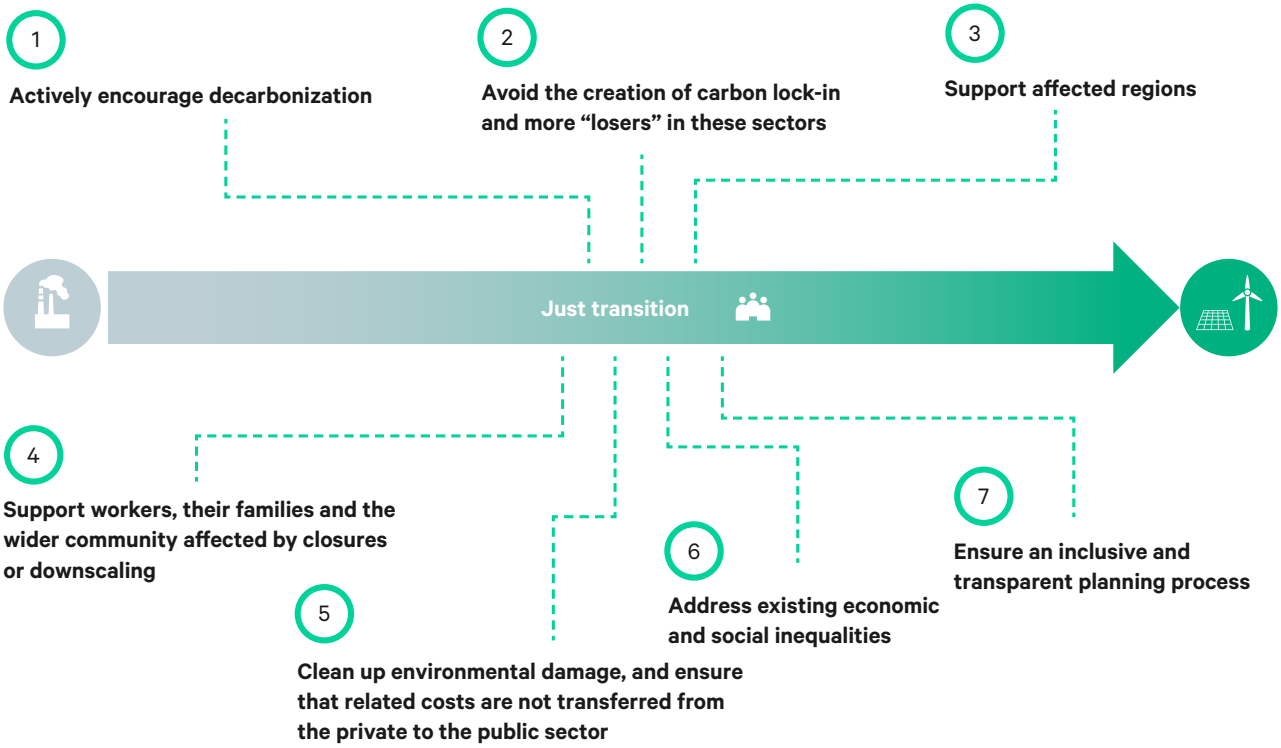
In this chapter we evaluate the three North Sea countries in terms of the seven principles of a just transition (Figure 9). The chapter aims to better understand the ongoing transformation trajectories and plans of the oil and gas sector in each country.

What is a just transition?

A just and managed transition away from oil and gas can accelerate the process of decarbonization and increase socio-economic opportunities associated with the change to a low-carbon economy. However, the opportunities and the costs of transition will not be distributed evenly among people and nations. Poorly designed implementation plans could negatively impact vulnerable groups and deepen inequalities. A managed and orderly just transition strategy should be designed inclusively and consider the concerns of a wide range of actors who are likely to be directly and indirectly impacted by the transformation. Stakeholders directly affected include oil and gas workers at platforms, while indirectly affected stakeholders could include those employed in services such as schools, retail or leisure in communities that rely on oil and gas workers' spending or taxes. Even though a just transition requires deliberate policies and plans to be put in place, this should not be an argument to delay transition. Delayed transition means accelerated climate change, which would affect vulnerable groups the most.

The concept of a just transition is not a new one. It has been enshrined within the UNFCCC framework and there is a large amount of literature on how the concept could be realized through policy design (Jenkins et al., 2016; Sovacool et al., 2016). The concept encapsulates a whole range of issues around matters of fairness and the field is constantly evolving.[6] Through a robust review of the literature, Atteridge and Strambo (2020), laid out seven principles of a just transition, which are summarized in Figure 9.

Figure 9. The seven principles of a just transition (Atteridge and Strambo, 2020)



Scorecard on a just transition

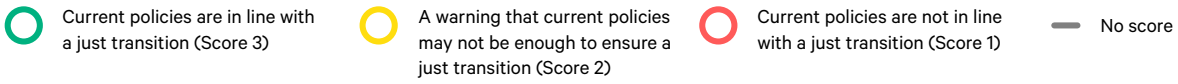
The three North Sea oil and gas producing countries have different approaches to a just transition. In this section, we evaluate their current oil and gas policies and decarbonization strategies using the seven principles of the just transition as a benchmark and a framework for evaluation. We have added a set of detailed criteria to each principle, which are explained in Annex A. Figure 10 shows a summary of the results.

The main government documents evaluated in this chapter are the UK's 2021 North Sea Transition Deal (UK Government and OGUK, 2021) and Denmark's 2020 North Sea Agreement (Nordsøaftale) (KEFM, 2020). However, other official documents, plans and policies are also evaluated to create a more complete picture, especially for Norway, which has no single document on the transition in terms of oil and gas production. In this evaluation the UK refers to the UK Government, and Scotland is included in the scorecard on the principles where it has devolved powers. Scotland is included on its own since it is an important oil and gas nation in the UK and has powers over some areas of government relevant for managing a just transition.

6 For further detail see Flynn, 2018, and Mertins-Kirkwood & Deshpande, 2019.

We have developed a traffic light system for evaluating the respective just transition policies of Denmark, Norway, the UK and Scotland, presented in a scorecard shown in Figure 10. We have evaluated individual policies separately according to each of the seven principles, but also provided overall scores for each country. Scotland is the only country that receives a green traffic light when summarizing all of the seven just transition principles. The country provides support for workers and communities and has the most ambitious greenhouse gas emissions reduction target. While Denmark, Norway and the UK all receive an amber traffic light, there is still a significant gap between Denmark, which scores the highest among the three, Norway, and the UK, which is close to receiving a red light. Denmark scores higher because of its decisive decarbonization targets, policies to end new licences for oil and gas production, and more targeted investments in the country's oil and gas region, Esbjerg. However, all countries, except Scotland, score poorly on support for regions, workers, their families, and communities, as well as on transparency in planning processes. In general, the countries scored highest in terms of decarbonization targets, while receiving low scores on specific parameters evaluating the inclusiveness of policies and plans. Below, we present our evaluation under each principle.

Figure 10 . A scorecard for evaluating government plans and policies in the UK, Scotland, Norway and Denmark against the seven principles for a just transition.



	Norway	Denmark	UK*	Scotland#
1. Actively encourage decarbonization	○	○	○	◌
2. Avoid the creation of carbon lock-in and more "losers" in these sectors	○	○	○	–
3. Support affected regions	○	○	○	○
4. Support workers, their families and the community	○	○	○	○
5. Clean up environmental damage and ensure that costs are transferred from the private to the public sector	○	○	○	–
6. Address existing economic and social inequalities	○	○	○	○
7. Ensure an inclusive and transparent planning process	○	○	○	○
In summary	○	○	○	○

**The central UK Government*
#The devolved government of Scotland (does not control policies related to principle 2 and 5, and only some of the criteria for principle 1 hence the dashed circle)

Principle 1: Actively encourage decarbonization

This principle denotes that just transition requires efforts to swiftly reduce emissions to achieve globally agreed climate goals. Below, we evaluate the climate targets and future oil and gas production plans of the three North Sea countries.

When we look at emission reductions at the national level, Scotland is the forerunner with a net-zero target by 2045 and a target to reduce emissions by 75% by 2030 (Scottish Government, 2020). Scotland is followed by Denmark, which aims to reduce emissions by 70% by 2030.[7] The UK is not far behind with a goal of at least 68% by 2030 and 78% reductions by 2035 (Climate Change Committee, 2021). Both Denmark and the UK have net-zero emission targets by 2050. On the contrary, Norway has an emission reduction target of 50% until 2030 and no net-zero target (Climate Action Tracker, 2021). On the Norwegian government platform, the intention is expressed as improving the intermediate target to 55% and a net-zero target by 2050, but this is still not the officially agreed climate target (Regjeringen, 2021). This renders Norway a low score for this principle.

Table 3. Greenhouse gas emission reduction targets for Scotland, the UK, Denmark and Norway. Base-year: 1990.

Country	2030 target	Net-zero target
Scotland	75%	2045
United Kingdom	70%	2050
Denmark	68%	2050
Norway	55%	No net-zero target

In terms of specific targets for emission reductions within oil and gas, Denmark's phase-out of oil and gas by 2050 stands out. Denmark receives the highest score for this target (criterion 1.2). However, Denmark has a low reliance on oil and gas income, and there has been discussion within the country of setting an earlier phase out date, by 2040. (Sperling et al., 2021). Norway has a target of halving the sector's emissions by 2030 (scope 3 emissions not included) through increased electrification and a doubling of the CO2 tax during this period (Finansdepartementet, 2020). There are also strict regulations on flaring, which means that flaring is only at 10% of that on the British continental shelf (Klima- og miljødepartementet, 2021). In the UK, the industry is committed to halving emissions by 2030 and reducing them by 90% by 2040, compared to a 2018 baseline (although it is unclear if scope 3 emissions are included in these targets). The aim is that it will be reached by early-stage funding from the government and investment from the industry (UK Government and OGUK, 2021). Licensing and operation of oil and gas platforms is governed by the central UK Government, which means Scotland does not have devolved powers in these matters. Thus, it does not receive a score on this criterion. In Denmark the potential for electrifying the rate of energy inputs of oil and gas operations is considered to be about 40–70% by 2030, however this is not an explicit target for the sector (Dansk Energi, 2020). In Denmark's North Sea Agreement there are funds available for an analysis of the potential to electrify oil and gas operations to be carried out during 2021, which will underpin concrete policies (KEFM, 2020).

Table 4. Score on the first principle of a just transition ("Actively encourage decarbonization").

Principle 1: Actively encourage decarbonization	UK	Scotland	Norway	Denmark
Criterion 1.1: Targets for reducing greenhouse gas emissions	3	3	1	3
Criterion 1.2: Targets for decreasing oil and gas production	2	Not applicable	1	3
Criterion 1.3: Targets for decreasing oil and gas operational emissions	3	Not applicable	3	2

Note: The criteria are weighted to better reflect their importance in terms of climate change impact: criterion 1.1 is weighted at 40%, 1.2 at 40% and 1.3 at 20%.

7 Compared to the levels in 1990 for all of the countries.

Principle 2: Avoid the creation of carbon lock-in and more "losers" in these sectors

This principle calls for ensuring that no new investments in fossil fuels are approved if they undermine the transition. New investments in fossil fuels can create carbon lock-in, delay transitions, and amplify the negative consequences of unmanaged transitions (Atteridge & Strambo, 2020). Below, we focus on policies and strategies in the UK, Norway and Denmark that risk creating carbon lock-in.

Despite the changes in the political debate in Norway and stricter climate change regulations in the UK both countries have recently issued new licensing rounds for exploration: as late as June 2021 in Norway, including concessions on the Barents Sea (Andersen, 2021), and in September 2020 in the UK, which resulted in the approval of 113 exploration licences for 65 companies (Oil and Gas Authority, 2021). The new licenses could potentially lock-in the production of oil and gas into the 2040s and 2050s. However, in the UK the climate compatibility checkpoints announced alongside the North Sea Transition Deal have the potential to decrease future licensing, but it's still unclear to what extent this policy will achieve that, as public consultation on the document is ongoing (Ghaleigh et al., 2021). The new government in Norway has also postponed the 26th ordinary licensing round, which will be announced in 2022. In Denmark, all future licensing rounds were cancelled in 2020 alongside the decision to end oil and gas exploration in the Danish North Sea by 2050 (KEFM, 2020).

As mentioned in Section 2.3, both the UK and Norway have favourable tax regimes and regulatory regimes for maximizing oil and gas investments. The UK has one of the most advantageous oil and gas tax regimes in the world and is therefore an attractive region for new investments. The tax regime, together with a policy which places an obligation on licence holders to take steps to secure the maximum value of economically recoverable petroleum – the maximising economic recovery (MER) strategy – creates favourable terms for production from both large and small fields (2 Degrees Investing, 2021). In Norway, there is a reimbursement scheme which moves some of the risk of exploration from companies to the government. The scheme allows companies exploring for oil and gas to choose between getting an immediate refund of the tax value of exploration costs or carrying forward the losses, and related interests, to a year when the company has taxable income. At the beginning of the Covid-19 pandemic, favourable terms to sustain oil and gas activities were also implemented through changes in the tax regulation (Lorentzen, 2020, p. 24).

Licensing and operation of oil and gas platforms is governed by the UK Government, which means Scotland does not have devolved powers in these matters. Thus, Scotland does not receive any score here.

Table 5. Score on the second principle of a just transition ("Avoid the creation of carbon lock-in and more losers in these sectors").

Principle 2: Avoid the creation of carbon lock-in and more "losers" in these sectors	UK	Scotland	Norway	Denmark
Criterion 2.1: Actively decreasing licensing of new oil and gas fields	3	Not applicable	1	3
Criterion 2.2: Actively discouraging investments in oil and gas through legislation and tax regimes	2	Not applicable	1	3
Criterion 1.3: Targets for decreasing oil and gas operational emissions	3	Not applicable	3	2

Note: The criteria are weighted to better reflect their importance in terms of climate change impact: criterion 2.1 is weighted at 40%, 2.2 at 40% and 2.3 at 20%.

Principle 3: Support affected regions

This principle calls for support for the transition of regions heavily invested in fossil fuels today, to help secure future economic vitality and stability. In this section, we evaluate the government support the oil and gas regions are receiving to facilitate a just transition.

In Denmark, the main oil and gas region is Esbjerg, and is the region most affected by the decision to put an end to oil production in 2050. There are government funds allocated to support the transformation of the Esbjerg Harbour into an offshore wind power hub by 2025, and even more support for R&D for CCS/CCU in abandoned oil and gas fields in the area in 2021 and 2022 (KEFM, 2020). However, it is not possible to say if the investments are sufficient to ensure a just transition of the entire economy of Esbjerg away from oil and gas, because there is no analysis of how these investments will affect the regional economy.

In UK, on the other hand, there is more than one oil and gas region, with major differences between them. For example, in the north-east of England, which has a high concentration of oil and gas workers, there are a multitude of industries other than oil and gas (e.g. heavy industries) and a growth in renewables, while Aberdeen, for example, has a less diverse regional economy and is therefore more vulnerable to negative impacts from the transition. In terms of investments, the UK government has announced a number of plans and programmes to boost renewable energy, CCS, and hydrogen production. However, some of these projects are in regions that are today heavily invested in oil and gas, while it is unclear what investments other affected regions will receive. This means there is a need for further localized planning and regional investment (Ghaleigh et al., 2021).

In 2020, the Scottish Government announced that it would support companies to invest and diversify away from oil and gas to CCS, hydrogen and renewables through the Energy Transition Fund (Scottish Government, 2021b). Projects located in regions with a high dependence on oil and gas (e.g. north-east Scotland) are among those that will be supported. Scotland has also created a Scottish Just Transition Commission, advising a ministerial-level arm of the government that reports annually to the Scottish Parliament. In this context there is potential for communities and local government to bid for tens of millions of pounds of Scottish government support (Scottish Government, 2021c).

In Norway, the lack of a vision and ambition for the transition from oil and gas leads to a lack of regional vision for social and economic development. Even though there are investments in wind power, CCS and hydrogen, there are no plans for how to support affected regions. This could be about to change, however, as the new government has recently stated that a commission for a just transition will be created (Regjeringen, 2021).

Table 6. Score on the third principle of a just transition ("Support affected regions").

Principle 3: Support affected regions	UK	Scotland	Norway	Denmark
Criterion 3.1: Investments in regional economies away from oil and gas	1	3	1	2

Principle 4: Support workers, their families and the wider community affected by closures or downscaling

This principle is at the core of a just transition and requires policies to provide assistance to those working directly or indirectly in the oil and gas industry to find new jobs or offer opportunities through reskilling, education and unemployment benefits.

The number of oil and gas workers is declining in all three countries, and workers are already feeling vulnerable because of market fluctuations. Each country is pursuing different means to support workers in this transition. The existing unemployment benefits and support with job search in the North Sea countries will most likely be able to reduce some impacts on vulnerable groups. However, the scale of a just transition requires more targeted policies, especially in Norway and UK, which have a higher socio-economic dependence on oil and gas than Denmark.

Apart from the general social safety net in Denmark, there are no specific plans on how to reskill, upskill, and fill educational gaps for oil and gas workers. Furthermore, the need to provide jobs of a similar level in terms of salary, benefits and working conditions does not feature in Denmark's policies. This is to a large extent also true for Norway. However, in Norway future needs for skills to support the "green transition" is one of three focus areas within an oil and gas upskilling programme funded by the government (Kompetanse Norge, 2020) – the fund, however, is quite limited. Denmark is not as reliant on oil and gas as Norway, and has a more diversified economy, which means that the need for targeted support from government is lower. Its North Sea Agreement specifically mentions the Esbjerg area and focuses on keeping oil and gas workers employed in large-scale projects, such as supporting CCS/CCU. The Agreement also refers to a "just transition for people in exposed business sectors", albeit without specific plans on how to avoid leaving workers behind (KEFM, 2020). Such plans, though, might be in the pipeline, and in the Oil and Gas Transitions project we will endeavour to assess new policies within the timeline of the project. We will also provide policy recommendations on designing implementation plans so that they are inclusive. In Section 2.5 we further explain our approach to achieving this objective.

The UK is focusing on the needs of industry in terms of future workforce and competences, and little attention is being paid to support needed by workers, families and communities. This could in part be because the industry itself has a more prominent role in the transition of the workforce. An industry owned entity (OPITO), which includes representatives from industry, government, and unions, is set to handle the skills policies. This will result in an Integrated People and Skills Plan, which will be part of the government's skills plan for the sector in 2022 (UK Government and OGUK, 2021). So far, the North Sea Transition Deal does not set out commitments for oil and gas companies to support their workers in terms of retraining, reskilling, or other compensation or support schemes, and does not give sufficient attention to the quality of new roles, including in terms of salary, benefits and working conditions (Ghaleigh et al., 2021).

Scotland, on the other hand, is the forerunner in terms of supporting oil and gas workers compared to the rest of the UK and Denmark and Norway. The country operates the National Transition Training Fund, showcasing opportunities for collaboration or knowledge exchange, particularly given the diffuse nature of the oil and gas workforce (Scottish Government, 2021b). However, the fund is still small scale and does not only focus on the oil and gas sector (Scottish Government, 2021e). Scotland has also built just transition principles directly into its Climate Change Act (Scottish Government, 2021b). The Scottish Climate Change Plan has to demonstrate how the policies in the plan are expected to affect certain sectors of employment and the economy and propose policies for supporting the affected workforce and communities. The first annual monitoring report of the Climate Change Plan was published in 2021, and all chapters start with reference to a just transition, however, at this point, it merely states that the indicators to evaluate the impact on the workforce, employers and communities will be developed later on (Scottish Government, 2021a). The need for new jobs to be of a similar quality and associated issues are also explained in depth in the recent report by the Scottish Just Transition Commission, which provides guidance to the Scottish Government (Scottish Government, 2021c).

Table 7. Score on the fourth principle of a just transition ("Support workers, their families and the wider community affected by closures or downscaling").

Principle 4: Support workers, their families and the wider community affected by closures or downscaling	UK	Scotland	Norway	Denmark
Criterion 4.1: Plans for upskilling, reskilling and education gaps at regional level	1	2	2	2
Criterion 4.2: Quality of new jobs	1	3	1	2
Criterion 4.3: Support for job search and social safety net	2	2	2	2

Principle 5: Clean up environmental damage and ensure that related costs are not transferred from the private to the public sector

This principle is particularly important for the oil and gas sector as there are numerous examples of accidents in the industry causing massive environmental damage. It is therefore crucial that decommissioning plans and funds for cleaning up environmental damage are in place to ensure a just transition from oil and gas, to avoid these burdens being shifted to the public sector.

In Denmark, platform operators are only granted a licence when they can demonstrate specific plans for decommissioning that ensure funds available to carry it out (Retsinformation, 2019). There are similar regulations in Norway: plans for development and operations must be in place before receiving a license, and information is required on how decommissioning will be carried out and who will be responsible for it, and it must be clear who is financially responsible for decommissioning in the event that a license is transferred, which includes former license owners having a secondary liability in case of the current owner defaulting on its decommissioning obligation (Lovdata, 1996). The UK also has similar decommissioning liability regulations in place (Stockley, 2020).

Other kinds of environmental damage (e.g. oil spills during operations) are not included in this evaluation.

Table 8. Score on the fifth principle of a just transition ("Clean up environmental damage and ensure that related costs are not transferred from the private to the public sector").

Principle 5: Clean up environmental damage and ensure that related costs are not transferred from the private to the public sector	UK	Scotland	Norway	Denmark
Criterion 5.1: Specific policies for ensuring polluters pays principle when decommissioning oil and gas infrastructure	3	Not applicable	3	3

Principle 6: Address existing economic and social inequalities

This principle refers to the need to include a social equity perspective in policies related to the transition. In order to ensure a just transition, social equity must be at the heart of policy design and made an explicit goal in creating and evaluating support mechanisms (Atteridge & Strambo, 2020).

Norway, Denmark, Scotland, and the UK are to varying degrees addressing existing economic and social inequalities on a general level through taxes, unemployment benefits, labour laws and free higher education. These are especially strong in Norway and Denmark. However, government support to diversify regional economies towards renewable energy, CCS and hydrogen production have not extensively considered existing economic and social inequalities. This is not addressed at all in the North Sea Deal in Denmark. In the UK North Sea Transition Deal the industry acknowledges the problem of a lack of diversity and in 2021 began an analysis to better understand the workforce's current composition in terms of gender, ethnicity, age, disability, and sexuality. This will result in a list of recommendations to help improve diversity, and throughout the decade there will be follow-ups on progress (UK Government and OGUK, 2021). However, there are no specific measures on how to address the inequalities. In Scotland, while the Just Transition Commission acknowledges the need to address existing inequalities, including gender and racial inequalities (Scottish Government, 2021c), these are not yet included as indicators for the Scottish Climate Change Plan.

When it comes to gender, there is a huge gap in the oil and gas industry. In Norway around 80% of the oil and gas workforce are men; in the UK, around 75%. Furthermore, there is no trend toward and increased share of women in the sector (Szuleck et al., 2021). This disparity is even more significant when it comes to offshore workers: in the UK, 96% of offshore workers are male (Oil and Gas UK, 2021). There is consequently a risk that policies and plans in support of oil and gas workers transfer this gender gap to, for example, the renewable energy industry. Another risk is that a significant amount of government support is specifically targeted to help, mostly, men transfer from well-paid jobs into other well-paid jobs, while women working in jobs indirectly linked to the industry are left out. Issues such as these, about who will benefit from support programmes, are not covered in the government policies we assessed.

Furthermore, questions around "social dumping" have not been assessed in much depth in the country case studies but could pose a significant risk for a just transition. Inequalities in labour conditions already exist in the oil and gas industry, as companies avoid the stricter labour regimes in the North Sea countries. This is especially the case in shipping and for multipurpose vessels registered under a foreign flag, where many workers fall under international labour law. For instance, "an oil worker can be resident of England, employed by an agency in Singapore, working on the Norwegian shelf on a ship registered and taxed in Panama, remaining outside Norwegian law" (Aune et al., 2020). There is a risk that these inequalities will be transferred to new offshore industries such as maintenance of offshore wind power.

Table 9. Score on the sixth principle of a just transition ("Address existing economic and social inequalities").

Principle 6: Address existing economic and social inequalities	UK	Scotland	Norway	Denmark
Criterion 6.1: Make sure policies/plans (principle 3 and 4) are decreasing economic and social inequalities	2	2	2	2
Criterion 6.2: The success of governmental policies/plans (principle 3 and 4) are evaluated in terms of reduction of existing economic and social inequalities	1	1	1	1

Principle 7: Ensure an inclusive and transparent planning process

To ensure the transition away from oil and gas is a just one, a wide social dialogue that is transparent and inclusive needs to be initiated early on in the transition planning process. Below, we evaluate current policies and strategies of the three North Sea countries to assess whether these align with this principle.

The UK's North Sea Transition Deal was developed between the government and industry with little transparency or involvement of the broader stakeholder community or affected regions. It remains to be seen whether the climate compatibility checkpoints will be developed in a more participatory manner. The design of the checkpoints is being put to a public consultation (Department for Business, Energy & Industrial Strategy, 2021c). The consultation will include a broader group of stakeholders, but it is not clear how the input from the stakeholders will be used in the checkpoint development process.

The situation is similar in Denmark, where the North Sea Agreement was agreed by a majority of the parties in the parliament and the government, with little inclusion of other stakeholders. However, the preparatory stages of the Agreement included stakeholder dialogue, which raises Denmark's score under this principle. First, the development of Denmark's Climate Law (2019) and its emission reduction targets involved public, civil society and industry participation and support, for example in the climate partnerships between the government and industries. This was followed by the government receiving independent advice from the Danish Climate Council, before negotiating with other parties to reach consensus on the future of licensing rounds. The result was widespread buy-in among key stakeholders for a phase out of oil and gas.

The Scottish Just Transition Commission is set up specifically to advise the government on how to create a just transition in a way that is "co-designed and co-delivered by communities, businesses, unions and workers, and all society". Furthermore, the board of the Commission consists of a wide range of actors including unions, civil society and industry (Scottish Government, 2021d).

In Norway, there has been little progress in this area mainly due to the lack of a plan for transition. The Labour Party (in government since October 2021) proposes a "just transition" commission, involving industry representatives and labour unions, although the make-up of its constituency has been hotly debated, for example regarding the participation of civil society (Regjeringen, 2021). However, this has not yet translated into any official strategy.

Table 10. Score on the seventh principle of a just transition ("Ensure an inclusive and transparent planning process").

Principle 7: Ensure an inclusive and transparent planning process	UK	Scotland	Norway	Denmark
Criterion 7.1: Engagement with local communities and other relevant stakeholders is an important part of the process	1	3	1	2
Criterion 7.2: Identify and include all relevant stakeholders in a transparent manner	1	2	1	1

Opportunities and challenges for a just transition in the North Sea

In this section we have unpacked each of the seven principles of a just transition and evaluated each country against them. It is clear that all North Sea countries have gaps in policy for ensuring a just transition. While Scotland received the highest score in our analysis, it does not have devolved powers over oil and gas production, which means it cannot be assessed against some of the criteria. The other North Sea countries received an "amber" overall score, because they mainly lack targeted policies to support people, communities and regions affected by the transition.

All three countries in the region face some similar opportunities and challenges. For instance, our country case studies demonstrate the opportunity presented by the momentum that is building for a just transition among political parties and stakeholders. In the UK, the Labour Party, the Scottish National Party, the Liberal Party and the Green Party all referenced five or six of the principles for a just transition in their election manifestos in 2021, and there has been a substantial increase in manifestos referring to just transition since 2019 for most parties (Ghaleigh et al., 2021). Indeed, in Norway, political parties are increasingly mentioning just transition in their rhetoric (Szuleck et al., 2021). And this is not only among the parties supporting more radical climate policies, like the Socialist Left and the Red Party, but also the Centre Party, the Green Party, and the Christian Democratic Party refer to a just transition in their manifesto (Szuleck et al., 2021). In Denmark, the 2020 North Sea Agreement is framed within a just transition perspective (Sperling et al., 2021). While all three national governments acknowledge the importance of a just transition and propose some solutions, there is still a lack of urgency and of a strong just transition perspective in the current policies of all three governments.

Another opportunity and advantage that the North Sea countries share are their social safety nets. Especially in Norway and Denmark, the national unemployment benefits and job search support schemes offer greater support to vulnerable groups in the sector compared to countries without such benefits. Furthermore, higher education is free in Denmark and Norway, which can help some workers to fill education gaps to make necessary career changes. This is an opportunity to plan ahead for a just transition without deep structural changes in the governance of employment and education schemes, but there is still room for targeted reskilling programmes fit for the needs of diverse groups of employees.

When we look at financial ability to deliver a just transition, Norway is most likely the only country in the world that, from the first years of oil and gas production, created a fund to support the country when oil begins to run out. The Sovereign Wealth Fund (officially called the Government Pension Fund Global) is the largest sovereign wealth fund in the world, with over EUR 1.1 trillion in assets. (Norges Bank, 2021). This is an unparalleled opportunity to invest in a just transition, through investments in renewable energy technologies, diversification of the economy, infrastructure development, reskilling programmes, and just compensation schemes, among others.

In fact, all North Sea countries are already investing heavily in offshore wind power, CCS, and hydrogen. A large part of these investments is in regions where the oil and gas industry play an important role today. Many skills required for these low-carbon technologies are similar to those within the oil and gas industry, especially in terms of offshore oil and gas engineers typically having the same competences and safety training as those needed in the offshore wind power industry. This is an important opportunity for workers and regions to transition into new high-quality jobs (Sperling et al., 2021). To a large extent offshore wind power overlaps geographically with where oil and gas is produced today, especially in terms of storing CO_2 in empty oil and gas fields or electrifying existing platforms through offshore wind power. However, not all oil and gas producing regions are currently receiving such investments, which calls for more inclusive policies to avoid leaving some regions behind (Ghaleigh et al., 2021; Sperling et al., 2021; Szuleck et al., 2021). It is a challenge to create investment plans and policies that include all regions, and if it is not well managed it could lead to local opposition to transition.

The favourable tax regimes and regulatory regimes for maximizing oil and gas investments in Norway and the UK (see Section 2.3) constitute another challenge towards a just transition in these countries. The UK, for example, has one of the most advantageous oil and gas tax regimes in the world and is therefore an attractive region for new investment (2 Degrees Investing, 2021). And neither the governments of the UK or Norway have made decisions to ban new oil and gas extraction projects or new exploration licenses, which means that new oil and gas production is potentially locked in until the 2040s and 2050s. If the countries, at a later stage, would like to get out of these agreements, it could be very costly for them.

Furthermore, there is a significant gender gap within the oil and gas industry, which could be transferred to other industries in the transition if policies and plans do not directly address the issue. In Norway around 80% of the oil and gas workforce are male (Szuleck et al., 2021), and around 75% in the UK (Oil and Gas UK, 2021). Another risk is that a significant amount of government support is specifically targeted to help men transfer from well-paid jobs into other well-paid jobs, while women, for example, working in jobs indirectly linked to the oil and gas industry are left out. This calls for inclusive policies and plans in the transition, that consider diversity, regional differences and all other aspects of a just transition.

There is a need for more urgency and ambitious policy in all North Sea countries to bring about a just transition in the oil and gas sector. While there are common opportunities that can help advance such policy, there are also important challenges that need to be addressed. The seven principles of just transitions can guide the process of designing such policies. The next section presents conclusions from the synthesis study and sets out our future work on how to create a just transition in the North Sea Region.

2.5 Conclusions of Section 2

The second part of this report illustrates the complexity of the landscape of oil and gas transitions in the North Sea, alongside contradictory trends in the transformation of the energy system. The theory of change of the Oil and Gas Transitions project is based on the assumption that today many policymakers and other stakeholders understand that emissions from oil and gas activities need to decrease rapidly to achieve net-zero targets and are willing to explore pathways to achieve it. Yet as this report emphasizes, there is still an ambition gap between countries' climate targets and oil and gas policies and activities. However, the UK, Denmark and Norway share a common understanding that a just and managed transition can reduce resistance to change.

In Denmark, Norway and the UK, there is growing pressure on government and the industry to accelerate industry transitions, with mixed results across the region. Our analysis also suggests that in the UK and Norway the transitions have been less progressive and more politically divisive than in Denmark. At the same time, in each country diverse stakeholders from policy, industry, campaign groups, labour movements, and academia are strongly represented, albeit to different extents. This amplifies the importance of co-producing policies and measures for just transitions.

In the UK, the lack of coherent policies on oil and gas just transitions results in inconsistent strategies developed by labour unions and companies (Ghaleigh et al., 2021). The UK case study highlights the major concern that unless there is a national policy and framework for a just transition within the oil and gas sector, communities will inevitably be left behind.

Denmark has been successful in setting out a clear target to phase out Danish oil and gas industry in the North Sea by 2050 thanks to "the support from all key stakeholders" (Sperling et al., 2021). The support gained from government actors, the industry, and civil society can be attributed to the fact that "in Denmark, there is a greater imperative and economic advantage to be gained by transitioning earlier than the UK and Norway" (Sperling et al., 2021).

Lastly, the Norway case study highlights the challenges that arise when the oil and gas is deeply entrenched in the national identity, and the importance of cross-sectoral dialogue to develop shared visions of a sustainable future that consider the need for managed and just transition (Szuleck et al., 2021).

The scorecard analysis in Section 2.4 represents the evidence that all North Sea countries can do much more to improve their policies on just transitions, especially with a focus on supporting people, communities and regions. The scorecard illustrates that there are opportunities to advance these policies by, for example, leveraging the growing political momentum for a just transition, building on existing social safety nets and finance, and through large investments in renewable energy and low-carbon capabilities. There are also important hurdles to overcome such as current tax regimes, lack of investment in some regions and a large gender gap within the oil and gas industry.

To address these challenges, taking into account the constructive role of dialogue and consultation among stakeholders, the Oil and Gas Transitions project will develop a better understanding of oil and gas transition scenarios for the North Sea, establish buy-in from key stakeholders, and enable collaboration to scale up innovation and early-stage just transition efforts.

Towards a better understanding of oil and gas transition scenarios for the North Sea region

Our analysis emphasizes the need for oil and gas transition pathways to be designed in an inclusive manner, with a dialogue among all relevant stakeholders. Indeed, besides demonstrating the possibility of phasing out oil and gas, the Danish case study highlights the role of dialogue and consultation among stakeholders as a fundamental way to overcome resistance towards the phase out of oil and gas. Both the Norway and the UK studies acknowledge that although policymakers have the power to set the direction of transition in the short- to mid-term, no single actor has the leverage to steer the transition alone. Regardless of national contexts, any decisions on the direction and shape of oil and gas transitions requires widespread stakeholder input not limited to public policy consultations. As with any policy implementation, timing and the sequencing of successive interventions is crucial to achieving strategic policy objectives. This raises the importance of coordination within and across countries. Discussions across stakeholder groups that bring together different perspectives to create a shared vision of transition that is socially and politically feasible are essential. The measure of success of such discussions will be the extent to which they bridge the divide between stakeholder perspectives to create dialogue, rather than monologues.

Just transition policies stand a greater chance of success if they reflect perspectives of a diverse group of stakeholders. In the next phase of the Oil and Gas Transition project, we will co-produce just and feasible oil and gas transition pathways that include strategies for supported reorientation and managed phase out in each case study country. Co-production is the process of working on a research problem together. The relationships between science, policy and practice are complex and non-linear, therefore to leverage complementary perspectives, as well as to ensure the science produced in this project is useful, knowledge co-production will be a key tool (Norström et al., 2020).

In fact, the Norwegian team recently held their first scenario co-production workshop, which was met by an overwhelmingly positive response from stakeholders, and attended by members of government, civil society, academia and industry. The work of translating these dialogues into scenarios to achieve net zero and phase out by 2050 is under way, including key milestones, responsibilities, opportunities and barriers to meet the timelines.

In Denmark and the UK, research teams are currently finalizing their workshop designs and contacting key participants. Across the scenarios, we will analyse the implications for workers, communities, companies and regions and identify the just transition policy levers that could be used to mitigate negative impacts. We will also explore how the scope of net-zero commitments might be a stepping stone to phase-out.

The Oil and Gas Transitions project has brought together diverse actors to cooperate towards a common goal: forming new communities of practice engaged in a process of collective learning on their national just transition from oil and gas.

References

2 Degrees Investing. (2021). The UK's Forgotten Fossil Fuel Subsidy. 2021. https://2degrees-investing.org/resource/the-uks-forgotten-fossil-fuel-subsidy/

Ambrose, J. (2021, May 29). 'Black Wednesday' for big oil as courtrooms and boardrooms turn on industry. The Guardian. https://www.theguardian.com/environment/2021/may/29/black-wednesday-for-big-oil-as-courtrooms-and-boardrooms-turn-on-industry

Andersen, I. (2021, June 9). Lyser ut nye leteområder på norsk sokkel: 70 nye blokker i Barentshavet. https://www.tu.no/artikler/lyser-ut-nye-leteomrader-pa-norsk-sokkel-70-nye-blokker-i-barentshavet/510920

Astorri et al. (2021). Ten-Year Development Plan 2020: Infrastructure Report. ENTSOG. https://www.entsog.eu/sites/default/files/2021-07/TYNDP2020_Infrastructure_Report.pdf

Atteridge, A., & Strambo, C. (2020). Seven principles to realize a just transition to a low-carbon economy. https://cdn.sei.org/wp-content/uploads/2020/06/seven-principles-for-a-just-transition.pdf

Aune, F. R., Maeland, S., & Cappelen, Å. (2020). Konsekvenser av redusert petroleumsvirksomhet. https://www.ssb.no/nasjonalregnskap-og-konjunkturer/artikler-og-publikasjoner/_attachment/435324?_ts=17563963dc0

Barnett, A. (2021, November 29). North Sea Oil Industry 'Voted' on New 'Climate Compatibility' Drilling Policy, Minutes Show. DeSmog. https://www.desmog.com/2021/10/29/north-sea-oil-industry-voted-on-new-climate-compatibility-drilling-policy-minutes-show/

Beck, C., Kar, J., Hall, S., Olufon, D., & Bellone, D. (2021, March 10). The big choices for oil and gas in navigating the energy transition. McKinsey & Company. https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-big-choices-for-oil-and-gas-in-navigating-the-energy-transition

BOGA. (n.d.). Beyond Oil & Gas Alliance. Beyond Oil & Gas Alliance. https://beyondoilandgasalliance.com/

BP. (2020a). BP Sustainability Report. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/sustainability/group-reports/bp-sustainability-report-2020.pdf

BP. (2020b). BP Sustainability Report 2020. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/sustainability/group-reports/bp-sustainability-report-2020.pdf

BP. (2021). Statistical Review of World Energy. https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Carbon Tracker. (2021). Beyond Petrostates: The burning need to cut oil dependence in the energy transition. https://carbontracker.org/reports/petrostates-energy-transition-report/

CCS Norway. (2020). Longship CCS. 2020. https://ccsnorway.com/

Climate Action Tracker. (2021). Climate Action Tracker: Norway. https://climateactiontracker.org/countries/norway/

Climate Change Committee. (2021). Progress in Reducing Emissions: 2021 Report to Parliament. https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf

Coffin, M. (2020). Absolute Impact 2021: Why oil and gas "net zero" ambitions are not enough (p. 34). Carbon Tracker Initiatives. https://carbontracker.org/reports/absolute-impact-2021/

Companies Market Cap. (2021). Largest oil and gas companies by market cap. https://companiesmarketcap.com/oil-gas/largest-oil-and-gas-companies-by-market-cap

Dansk Energi. (2020). I mål med den grØnne omstilling 2030. https://www.danskenergi.dk/sites/danskenergi.dk/files/media/dokumenter/2020-03/I_maal_med_den_gronne_omstilling_2030_klimapartnerskab_energi_forsyningssektor.pdf

Davies, E. (2020, August 4). BP to cut oil and gas production by 40% by 2030. https://www.greenpeace.org.uk/news/bp-to-cut-oil-and-gas-production-by-40-by-2030/.

Department for Business, Energy & Industrial Strategy. (2020). Trade Union Membership, UK 1995-2019: Statistical Bulletin (Trade Union Membership Statistics). www.gov.uk/beis

Department for Business, Energy & Industrial Strategy. (2021a). Energy Trends: UK gas. https://www.gov.uk/government/statistics/gas-section-4-energy-trends

Department for Business, Energy & Industrial Strategy. (2021b). Oil statistics. https://www.gov.uk/government/collections/oil-statistics#historical-time-series-data

Department for Business, Energy & Industrial Strategy. (2021c). Designing a climate compatibility checkpoint for future oil and gas licensing in the UK Continental Shelf. https://www.gov.uk/government/consultations/designing-a-climate-compatibility-checkpoint-for-future-oil-and-gas-licensing-in-the-uk-continental-shelf

Department of Energy & Climate Change, & Oil and Gas Authority. (2016). The Maximising Economic Recovery Strategy for the UK. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/509000/MER_UK_Strategy_FINAL.pdf

Department of the Environment, Climate and Communications. (2021, February 2). Government to introduce legislation to ban new oil and natural gas exploration and extraction. https://www.gov.ie/en/press-release/ee960-government-to-introduce-legislation-to-ban-new-oil-and-natural-gas-exploration-and-extraction/

Dun & Bradstreet. (2020). Find Oil and Gas Extraction Companies in United Kingdom. https://www.dnb.com/business-directory/company-information.oil_and_gas_extraction.gb.html

Equinor. (2020a). Equinor Annual Report 2020. https://www.equinor.com/en/investors/annual-reports.html

Equinor. (2020b). Equinor Annual Report 2020. https://www.equinor.com/en/investors/annual-reports.html#downloads

Equinor. (2021). ENGIE and Equinor Join Forces in the Development of Low-Carbon Hydrogen. 2021. https://www.equinor.com/

Erickson, P. (2020, December 11). Review of Mulder et al. 2020. https://www.sei.org/publications/climate-case-shell-sei-letter-court/

Erickson, P., & Lazarus, M. (2018). Would constraining US fossil fuel production affect global CO2 emissions? A case study of US leasing policy. Climatic Change, 150(1), 29–42. https://doi.org/10.1007/s10584-018-2152-z

Erickson, P., Lazarus, M., & Piggot, G. (2018). Limiting fossil fuel production as the next big step in climate policy. Nature Climate Change, 8(12), 1037–1043. https://doi.org/10.1038/s41558-018-0337-0

European Commission. (2020). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Hydrogen Strategy for a Climate-Neutral Europe. European Commission. https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf

European Commission. (2021a). 2050 long-term strategy. European Commission. https://ec.europa.eu/clima/eu-action/climate-strategies-targets/2050-long-term-strategy_en

European Commission. (2021b). EU economy and society to meet climate ambitions [Text]. European Commission. https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541

European Commission. (2021c). Fit for 55. European Commission. https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

European Commission. (2021d). International climate finance. European Commission. https://ec.europa.eu/clima/eu-action/international-action-climate-change/international-climate-finance_sv

European Commission. (2021e). Just Transition Platform [Text]. European Commission. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism/just-transition-platform_en

European Commission. (2021f). Questions and Answers: Taxonomy Climate Delegated Act and Amendments to Delegated Acts on fiduciary duties, investment and insurance advice [Text]. European Commission. https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_1805

European Commission. (2021g). Social Climate Fund. European Commission. https://ec.europa.eu/clima/eu-action/european-green-deal/delivering-european-green-deal/social-climate-fund_en

European Commission. (2021h). European Green Deal: Commission proposes transformation of EU economy and society to meet climate ambitions. https://ec.europa.eu/commission/presscorner/detail/en/IP_21_3541

European Commission. (2021i, September 18). Joint EU-US Press Release on the Global Methane Pledge. European Commission. https://ec.europa.eu/commission/presscorner/detail/en/IP_21_4785

European Environment Agency. (2017). Perspectives on Transitions to Sustainability. European Environment Agency. https://www.eea.europa.eu/publications/perspectives-on-transitions-to-sustainability/file

Eurostat. (2019). From where do we import energy? https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-2c.html#carouselControls?lang=en

ExxonMobil. (2021). ExxonMobil 2021 Energy & Carbon Summary. https://www.exxonmobil.eu/-/media/EU-Policy/Files/2021-Energy-and-Carbon-Summary.pdf#:~:text=4%20%7C%202021%20Energy%20%26%20Carbon%20Summary%20ExxonMobil%27s,growth%2C%20economic%20conditions%2C%20policy%20developments%20and%-20technology%20advancements.

Felbermayr, G., & Peterson, S. (2020). Economic assessment of Carbon Leakage and Carbon Border Adjustment. 22.

Finansdepartementet. (2020). Avgiftssatser 2021. https://www.regjeringen.no/no/ tema/okonomi-og-budsjett/skatter-og-avgifter/avgiftssatser-2021/id2767486/

Fletcher, L., Crocker, T., Smyth, J., & Marcell, K. (2018). Beyond the cycle: Which oil and gas companies are ready for the low-carbon transition? Executive Summary. 5.

Flynn, C. (2018). Just Transition and Beyond Just Transition. https://adaptingcanadianwork.ca/wp-content/uploads/2019/03/JT-Roundtable-report-summary.pdf

Fossil Fuel Treaty. (n.d.). The Fossil Fuel Non-Proliferation Treaty. https://fossilfueltreaty.org

Fouquet, R. (2010). The slow search for solutions: Lessons from historical energy transitions by sector and service. Energy Policy, 38(11), 6586–6596. https://doi.org/10.1016/j.enpol.2010.06.029

Gerretsen, I. (2021, May 14). Spain to end fossil fuel production by 2042 under new climate law. https://www.climatechangenews.com/2021/05/14/spain-end-fossil-fuel-production-2042-new-climate-law/

Ghaleigh, N. S., Stuart Haszeldine, Kirsten Jenkins, Charlotte Bucke, Kirsty Fairhurst, Andi Sihota, & Andrew Sweeney. (2021). The Future is Built on the Past: Just Industrial and Energy Transitions in the UK and Scotland. https://oilandgastransitions.org/resources/reports/the-future-is-built-on-the-past-just-industrial-and-energy-transitions-in-the-uk-and-scotland/

GHG Protocol. (2021). The Greenhouse Gas Protocol—A Corporate Accounting and Reporting Standard. https://ghgprotocol.org/corporate-standard

Gillies, A. (2020). Corruption trends during Africa's oil boom, 2005 to 2014. The Extractive Industries and Society, 7(4), 1171–1181. https://doi.org/10.1016/j.exis.2020.06.006

Global Energy Monitor. (n.d.). Global Fossil Infrastructure Tracker. https://globalenergymonitor.org/projects/global-fossil-infrastructure-tracker/

Global Oil & Gas Network (GGON). (n.d.). Global Oil & Gas Network: About. https://ggon.org/about/

Godsen, E. (2022, January 3). Kwasi Kwarteng courted oil bosses after COP26. The Times. https://www.thetimes.co.uk/article/kwasi-kwarteng-courted-oil-bosses-after-cop26-6wkf0sdd8

Government of Greenland. (2021a, July 15). Greenland halts new oil exploration. https://naalakkersuisut.gl/en/Naalakkersuisut/News/2021/07/1507_oliestop

Government of Greenland. (2021b, July 15). Greenland halts new oil exploration. https://naalakkersuisut.gl/en/Naalakkersuisut/News/2021/07/1507_oliestop

Grantham Research Institute on Climate Change and the Environment. (2021). Loach et al v OGA ("Paid to Pollute case"). https://climate-laws.org/geographies/united-kingdom/litigation_cases/loach-et-al-v-oga-paid-to-pollute-case

Harvey, F. (2021, December 2). Shell pulls out of Cambo oilfield project. The Guardian. https://www.theguardian.com/environment/2021/dec/02/shell-pulls-out-of-cambo-oilfield-project

Hauge, F. (2017). Complaint regarding the Norwegian Petroleum Taxation Act of 1975, as amended in 2005 with regards to the up-front cash flow reimbursement scheme for all direct and indirect exploration expenses. https://network.bellona.org/content/uploads/sites/3/2017/08/2017-08-21-ESA-complaint.pdf

Holland, B. (2021, August 20). BHP deal extends 2021 global M&A trend of majors shedding oil, gas assets. S&P Global. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/082021-bhp-deal-extends-2021-global-mampa-trend-of-majors-shedding-oil-gas-assets

IDA The Danish Society of Engineers. (n.d.). Union membership in Denmark. Retrieved November 25, 2021, from https://english.ida.dk/union-membership-in-denmark

IEA. (2020a). World Energy Outlook. International Energy Agency (IEA). https://www.iea.org/reports/world-energy-outlook-2020

IEA. (2020b). The Oil and Gas Industry in Energy Transitions (Fuel Report) [World Energy Outlook special report]. International Energy Agency (IEA). https://www.iea.org/reports/the-oil-and-gas-industry-in-energy-transitions

IEA. (2020c). The Oil and Gas Industry in Energy Transitions: World Energy Outlook special report. https://www.iea.org/reports/the-oil-and-gas-industry-in-energy-transitions

IEA. (2020d, December 12). As we mark the Paris Agreement's 5th anniversary, we continue to expand our work on energy and climate. International Energy Agency (IEA). https://www.iea.org/commentaries/as-we-mark-the-paris-agreement-s-5th-anniversary-we-continue-to-expand-our-work-on-energy-and-climate

IEA. (2021a). OII 2021: Analysis and forecast to 2026. International Energy Agency (IEA). https://iea.blob.core.windows.net/assets/1fa45234-bac5-4d89-a532-768960f99d07/Oil_2021-PDF.pdf

IEA. (2021b). Global Energy Review: CO2 Emissions in 2020. International Energy Agency (IEA). https://www.iea.org/articles/global-energy-review-co2-emissions-in-2020

IEA. (2021c). Net Zero by 2050 (A Roadmap for the Global Energy Sector). International Energy Agency (IEA). https://www.iea.org/reports/net-zero-by-2050

IEA. (2021d). The IEA at COP26. International Energy Agency (IEA). https://www.iea.org/commentaries/the-iea-at-cop26

IISD, IGES, OCI, ODI, SEI, & Columbia University. (n.d.). Energy Policy Tracker. https://www.energypolicytracker.org

ILO. (2021). Oil and Gas Production [International Labour Organization (ILO)]. https://www.ilo.org/inform/online-information-resources/research-guides/economic-and-social-sectors/energy-mining/oil-gas-production/lang--en/index.htm.

Institute for Energy Economics and Financial Analysis. (2021). Finance Is Leaving Oil and Gas. IEEFA.Org. https://ieefa.org/finance-exiting-oil-and-gas/

IRENA. (2020). The Post-COVID recovery: An agenda for resilience, development and equality. International Renewable Energy Agency. https://irena.org/publications/2020/Jun/Post-COVID-Recovery

IRENA. (2022a). Geopolitics of the Energy Transformation: The Hydrogen Factor. International Renewable Energy Agency. https://www.irena.org/publications/2022/Jan/Geopolitics-of-the-Energy-Transformation-Hydrogen

IRENA. (2022b). Fostering Livelihoods with Decentralised Renewable Energy: An Ecosystems Approach. https://www.irena.org/publications/2022/Jan/Fostering-Livelihoods-with-Decentralised-Renewable-Energy

IRENA, & SELCO Foundation. (2022). Fostering Livelihoods with Decentralised Renewable Energy: An Ecosystems Approach. International Renewable Energy Agency. https://www.irena.org/publications/2022/Jan/Fostering-Livelihoods-with-Decentralised-Renewable-Energy

James, C. (2021, August 9). Costa Rica to reinforce oil drilling ban. Argus Media. https://www.argusmedia.com/en/news/2242448-costa-rica-to-reinforce-oil-drilling-ban

Jenkins, K., McCauley, D., Heffron, R., Stephan, H., & Rehner, R. (2016). Energy justice: A conceptual review. Energy Research & Social Science, 11, 174–182. https://doi.org/10.1016/j.erss.2015.10.004

Jillian Ambrose. (2021, May 29). 'Black Wednesday' for big oil as courtrooms and boardrooms turn on industry. The Guardian. https://www.theguardian.com/environment/2021/may/29/black-wednesday-for-big-oil-as-courtrooms-and-boardrooms-turn-on-industry

KEFM. (2020, December 4). Bred aftale om Nordsøens fremtid. https://kefm.dk/aktuelt/nyheder/2020/dec/bred-aftale-om-nordsoeens-fremtid

Klima-, Energi- og Forsyningsministeriet. (2020, April 12). Bred aftale om Nordsøens fremtid. https://kefm.dk/aktuelt/nyheder/2020/dec/bred-aftale-om-nordsoeens-fremtid

Klima- og miljødepartementet. (2020). Meld. St. 20. https://www.regjeringen.no/contentassets/5570db2543234b8a9834606c33caa900/no/pdfs/stm201920200020000dddpdfs.pdf

Klima- og miljødepartementet. (2021). Meld. St. 13 (2020–2021). Klimaplan for 2021–2030. https://www.regjeringen.no/contentassets/a78ecf5ad2344fa5ae4a394412ef8975/nn-no/pdfs/stm202020210013000dddpdfs.pdf

Kompetanse Norge. (2020). Bransjeprogram for olje-, gass- og leverandørindustrien. https://www.kompetansenorge.no/bransjeprogram-med-studie--og-opplaringstilbud/bransjeprogram-for-olje--gass--og-leverandorindustrien/

Krauss, C. (2021, September 20). Royal Dutch Shell Sells Permian Basin Oil Holdings for $9.5 Billion. The New York Times. https://www.nytimes.com/2021/09/20/business/energy-environment/shell-conoco-permian-sale.html

Lashitew, A. A., & Werker, E. (2020). Do natural resources help or hinder development? Resource abundance, dependence, and the role of institutions. Resource and Energy Economics, 61, 101183. https://doi.org/10.1016/j.reseneeco.2020.101183

Li, M., Trencher, G., & Asuka, J. (2022). The clean energy claims of BP, Chevron, ExxonMobil and Shell: A mismatch between discourse, actions and investments. PLOS ONE, 17(2), e0263596. https://doi.org/10.1371/journal.pone.0263596

LINGO. (n.d.). Global Fossil Fuel Exploration Moratorium. LINGO Leave It in the Ground Initiative. Retrieved April 21, 2022, from https://www.leave-it-in-the-ground.org/resources/exploration-moratorium/

Lorentzen, M. (2020, April 30). Regjeringen går med på skattepakke for oljenæringen: Kan frigi 100 milliarder kroner. E24. https://e24.no/olje-og-energi/i/GGRxrJ/regjeringen-gaar-med-paa-skattepakke-for-oljenaeringen-kan-frigi-100-milliarder-kroner

Lovdata. (1996). Lov om petroleumsvirksomhet [petroleumsloven].

Mertins-Kirkwood, H., & Deshpande, Z. (2019). Who is included in a Just Transition? https://adaptingcanadianwork.ca/who-is-included-in-a-just-transition/

Mete, G., Chavarria-Flores, A., & Blachowicz, A. (2021, November 25). Oil and Gas Transitions: Taking Stock of the COP26 and the EU's Energy Crisis. SEB The Green Bond: Your Insight into Sustainable Finance. https://mb.cision.com/Main/4324/3460454/1501461.pdf

Mete, G., & Heffron, R. (2018). The social dimension of EU energy law. In The EU Social Market Economy and the Law. Routledge.

Mikael Holter. (2020, March 30). Giant-oil-field-boost-is-bad-for-market-good-for-norway. Bloomberg. https://www.bloomberg.com/news/articles/2020-03-30/giant-oil-field-boost-is-bad-for-market-good-for-norway

Ministere de la Transition Écologique. (2017, December 19). Adoption du projet de loi mettant fin à la recherche et à l'exploitation des hydrocarbures. https://www.ecologie.gouv.fr/adoption-du-projet-loi-mettant-fin-recherche-et-lexploitation-des-hydrocarbures-france-tourne-dos

Morrison, K. (2020, October 19). New Zealand to keep oil drilling ban, renewables push. Argus Media. https://www.argusmedia.com/en/news/2151282-new-zealand-to-keep-oil-drilling-ban-renewables-push

Muttitt, G., Sharma, S., Mostafa, M., Kühne, K., Doukas, A., Gerasimchuk, I., & Roth, J. (2021). Step Off the Gas: International public finance, natural gas, and clean alternatives in the Global South (p. 103). International Institute for Sustainable Development (IISD). https://www.iisd.org/system/files/2021-06/natural-gas-finance-clean-alternatives-global-south.pdf

Norges Bank. (2021, December 20). The Fund. 2021. https://www.nbim.no/

Norström, A. V., Cvitanovic, C., Löf, M. F., West, S., Wyborn, C., Balvanera, P., Bednarek, A. T., Bennett, E. M., Biggs, R., de Bremond, A., Campbell, B. M., Canadell, J. G., Carpenter, S. R., Folke, C., Fulton, E. A., Gaffney, O., Gelcich, S., Jouffray, J.-B., Leach, M., … Österblom, H. (2020). Principles for knowledge co-production in sustainability research. Nature Sustainability, 3(3), 182–190. https://doi.org/10.1038/s41893-019-0448-2

OECD/IEA, & IRENA. (2017). Perspectives for the Energy Transition: Investment Needs for a Low-Carbon Energy System. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Mar/Perspectives_for_the_Energy_Transition_2017.pdf

OGCI. (n.d.). Oil & Gas Climate Initiative. https://www.ogci.com

Oil and Gas Authority. (2020, December 16). The OGA Strategy. 2020. https://www.ogauthority.co.uk/media/6980/annex-2-the-oga-strategy.pdf

Oil and Gas Authority. (2021). Offshore Licensing Rounds. https://www.ogauthority.co.uk/licensing-consents/licensing-rounds/offshore licensing-rounds/

Oil and Gas UK. (2021). Workforce & Employment Insight 2021 Report. https://oguk.org.uk/wp-content/uploads/woocommerce_uploads/2021/08/OGUK_Workforce-Employment-Insight-2021-z07os0.pdf

Oilwatch. (n.d.). Oilwatch: About Us. https://www.oilwatch.org/about-us/

Olje- og energidepartementet and Klima- og miljødepartementet. (2020, August 6). Regjeringens hydrogenstrategi på vei mot lavutslippssamfunnet. 2020.

Ørsted. (2021). Our green business transformation – what we did and lessons learned. https://orstedcdn.azureedge.net/-/media/www/docs/corp/com/about-us/whitepaper/our-green-business-transformation---what-we-did-and-lessons-learned

Paid to Pollute. (2021, December 9). The #PaidToPollute hearing is over! https://paidtopollute.org.uk/news/the-paid-to-pollute-hearing-is-over/

Parry, I., Black, S., & Vernon, N. (2021). Still Not Getting Energy Prices Right: A Global and Country Update of Fossil Fuel Subsidies (Working Paper No. 2021/236, p. 40). International Monetary Fund (IMF). https://www.imf.org/en/Publications/WP/Issues/2021/09/23/Still-Not-Getting-Energy-Prices-Right-A-Global-and-Country-Update-of-Fossil-Fuel-Subsidies-466004

Peszko, G., van der Mensbrugghe, D., Golub, A., Ward, J., Zenghelis, D., Marijs, C., Schopp, A., Rogers, J. A., & Midgley, A. (2020). Diversification and Cooperation in a Decarbonizing World: Climate Strategies for Fossil Fuel-Dependent Countries. World Bank. https://doi.org/10.1016/978-1-4648-1340-5

Rainforest Action Network, BankTrack, Indigenous Environmental Network, Oil Change International, Reclaim Finance, & Sierra Club. (2021). Banking on Climate Chaos: Fossil Fuel Finance Report 2021. https://www.ran.org/wp-content/uploads/2021/03/Banking-on-Climate-Chaos-2021.pdf

Regjeringen. (2019). Ny rapport om flerbruksfartøy på norsk sokkel. https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/asd/nyheter/2019/ny-rapport-om-flerbruksfartoy-pa-norsk-sokkel/id2662604/

Regjeringen. (2021). Klima og miljø: En rettferdig klimapolitikk. 2021. https://www.regjeringen.no/no/dokumenter/hurdalsplattformen/id2877252/?ch=8

Retsinformation. (2019). Bekendtgørelse af lov om anvendelse af Danmarks underground.

Royal Dutch Shell plc. (2021). Shell Energy Transition Strategy. Royal Dutch Shell plc. https://www.shell.com/promos/energy-and-innovation/shell-energy-transition-strategy

Schick-Makaroff, K., MacDonald, M., Plummer, M., Burgess, J., & Neander, W. (2016). What Synthesis Methodology Should I Use? A Review and Analysis of Approaches to Research Synthesis. AIMS Public Health, 3(1), 172–215. https://doi.org/10.3934/publichealth.2016.1.172

Science Based Targets Initiative. (n.d.). SBTi: Oil and Gas. https://sciencebasedtargets.org/sectors/oil-and-gas

Scottish Government. (2020). Reducing greenhouse gas emissions. https://www.gov.scot/policies/climate-change/reducing-emissions/

Scottish Government. (2021a). Climate Change Plan: Monitoring reports—2021 compendium. https://www.gov.scot/publications/climate-change-plan-monitoring-reports-2021-compendium/documents/

Scottish Government. (2021b). Information relating to Energy Transition fund. https://www.gov.scot/publications/foi-202100225505/

Scottish Government. (2021c). Just Transition – Greener, Fairer Scotland. https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2021/09/transition-fairer-greener-scotland/documents/transition-fairer-greener

Scottish Government. (2021d). Just Transition Commission. https://www.gov.scot/groups/just-transition-commission/

Scottish Government. (2021e). Sustainable Economic Recovery. https://www.gov.scot/news/sustainable-economic-recovery/

SEI, IISD, ODI, Climate Analytics, CICERO, & UNEP. (2019). The Production Gap 2019 Report. https://productiongap.org/wp-content/uploads/2019/11/Production-Gap-Report-2019.pdf

SEI, IISD, ODI, E3G, & UNEP. (2020). The Production Gap Report: 2020 Special Report. https://productiongap.org/wp-content/uploads/2020/12/PGR2020_FullRprt_web.pdf

SEI, IISD, ODI, E3G, & UNEP. (2021). The Production Gap Report 2021. http://productiongap.org/2021report

Simon, F., & Taylor, K. (2022, January 1). LEAK: EU drafts plan to label gas and nuclear investments as green. Www.Euractiv.Com. https://www.euractiv.com/section/energy-environment/news/leak-eu-drafts-plan-to-label-gas-and-nuclear-investments-as-green/

Sovacool, B. K., Heffron, R. J., McCauley, D., & Goldthau, A. (2016). Energy decisions reframed as justice and ethical concerns. Nature Energy, 1(5), 16024. https://doi.org/10.1038/nenergy.2016.24

Sperling, K., Madsen, P. T., Gorroño-Albizu, L., & Vad Mathiesen, B. (2021). Denmark without Oil and Gas Production: Opportunities and Challenges. https://oilandgastransitions.org/resources/reports/denmark-without-oil-and-gas-opportunities-and-challenges/

Statista. (2021a). Energy companies on LSE 2021. Statista. https://www.statista.com/statistics/889600/oil-and-gas-companies-on-lse/

Statista. (2021b). Oil & gas extraction enterprises UK 2021, by size. Statista. https://www.statista.com/statistics/320757/uk-enterprises-in-the-crude-petroleum-and-natural-gas-extraction-sector-by-employment-size-band/

Statista. (2021c). Oil & gas extraction enterprises UK 2021, by turnover. Statista. https://www.statista.com/statistics/320304/uk-enterprises-in-the-extraction-of-crude-petroleum-and-natural-gas-sector-by-turnover/

Statista. (2021d). Leading energy companies trading on London Stock Exchange (UK) as of September 2021, ranked by market capitalization. https://www.statista.com/statistics/889600/oil-and-gas-companies-on-lse/

Statista. (2022a). Preferred energy sector in case of career change within the energy industry worldwide as of 2020, by current employment sector. https://www.statista.com/statistics/1197275/employment-switch-preferred-energy-sector/

Statista. (2022b). Preferred Energy Sector in Case of Career Change within the Energy Industry Worldwide as of 2020, by Current Employment Sector. https://www.statista.com/statistics/1197275/employment-switch-preferred-energy-sector

Stephanie Kelly. (2020, April 20). Historic day for oil markets as WTI crude closes below zero for first time. Thomson Reuters. https://financialpost.com/commodities/energy/oil-drops-to-21-year-low-with-storage-filling-as-demand-shrivels

Stockley, P. (2020). Decommissioning oil and gas installations: A UK perspective. https://www.fieldfisher.com/en/insights/decommissioning-oil-and-gas-installations-a-uk-per

Szuleck, K., Chitra, A., Harald Claes, D., Houeland, C., & Jordhus Lier, D. (2021). Norwegian Oil and Gas Transition: Building bridges towards a carbon neutral future.

Taylor, K. (2021, April 9). Europe risks €87 billion in stranded fossil gas assets, report reveals. Www.Euractiv.Com. https://www.euractiv.com/section/energy-environment/news/europe-risks-e87-billion-in-stranded-fossil-gas-assets-report-reveals/

The Lofoten Declaration. (n.d.). The Lofoten Declaration. http://www.lofotendeclaration.org

Thomas, N., & Mathurin, P. (2021, April 16). The new North Sea players riding the wake of the retreating majors. Financial Times. https://www.ft.com/content/93d5f778-833c-4553-ae29-785e3aa3d4d3

Transition Pathway Initiative. (n.d.). TPI: Oil & Gas. https://www.transitionpathwayinitiative.org/sectors/oil-gas

UK Government and OGUK. (2021). North Sea Transition Deal. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972520/north-sea-transition-deal_A_FINAL.pdf

UNFCCC. (2021a). Glasgow Climate Pact. https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf

UNFCCC. (2021b). Nationally determined contributions under the Paris Agreement: Synthesis report by the secretariat. https://unfccc.int/sites/default/files/resource/cma2021_08E.pdf

UNFCCC. (2021c). Glasgow Climate Pact. https://unfccc.int/sites/default/files/resource/cma3_auv_2_cover%20decision.pdf

US Department of Energy. (2021, April 23). Joint Statement on Establishing a Net-Zero Producers Forum between the Energy Ministries of Canada, Norway, Qatar, Saudi Arabia, and the United States. Energy.Gov. https://www.energy.gov/articles/joint-statement-establishing-net-zero-producers-forum-between-energy-ministries-canada

US Energy Information Administration. (2021a). Crude Oil Including Lease Condensate. https://www.eia.gov/international/data/world/petroleum-and-other-liquids

US Energy Information Administration. (2021b). Crude oil including lease condensate production (Mb/d). https://www.eia.gov/international/data/world/petroleum-and-other-liquids/annual-refined-petroleum-products-consumption?pd=5&p=0000000000000000000000000000002&u=0&f=A&v=mapbubble&a=-&i=none&vo=value&t=C&g=0000000000-0000000000000000000000000000000000000001&l=249-ruvvvvvfvtvnvv1urvvvvfvvvvvvfvvvou20evvvvvvvvvvnvvvvs&s=1577836800000&e=1577836800000&.=&&ev=false

US Energy Information Administration. (2021c). Dry Natural Gas Production (Bcf). https://www.eia.gov/international/data/world/natural-gas/dry-natural-gas-production

US Energy Information Administration. (2021d). Dry natural gas production (bcf). https://www.eia.gov/international/data/world/natural-gas/dry-natural-gas-production?pd=3002&p=00g&u=0&f=A&v=mapbubble&a=-&i=none&vo=value&&t=C&g=0000000000000000000000000000000000000000000001&l=249-ruvvvvvfvtvnvv1vrvvvvfvvvvvvfvvvou20evvvvvvvvvvvnvvvvs0008&s=315532800000&e=1577836800000

Verkuijl, C., & Lazarus, M. (2020, September 12). The Paris Agreement Five Years On: It's time to realize a just transition away from fossil fuels [SEI]. https://www.sei.org/perspectives/paris-agreement-five-years-on-just-transition-away-from-fossil-fuels/

Wallace, C. (2020, April 20). WTI crude price goes negative for the first time in history. World Oil. https://www.worldoil.com/news/2020/4/20/wti-crude-price-goes-negative-for-the-first-time-in-history

Welsby, D., Price, J., & Pye, S. (2022). UK oil and gas policy in a 1.5C world.

World Bank. (2020a). Diversification and Cooperation in a Decarbonizing World: Climate Strategies for Fossil Fuel-Dependent Countries. https://openknowledge.worldbank.org/handle/10986/34011

World Bank. (2020b). Nigeria Development Update, June 2020: Nigeria in Times of COVID-19 - Laying Foundations for a Strong Recovery. World Bank. https://doi.org/10.1596/34046

World Bank. (2020c). Russia Economic Report, No. 43, July 2020: Recession and Growth Under the Shadow of a Pandemic. World Bank. https://doi.org/10.1596/34219

World Bank. (2021a). Employers. https://data.worldbank.org/indicator/SL.EMP.MPYR.ZS

World Bank. (2021b). Employers, total (% of total employment) (modeled ILO estimate). https://data.worldbank.org/indicator/SL.EMP.MPYR.ZS

World Bank. (2021c). Natural Gas Rents (% of GDP). https://data.worldbank.org/indicator/NY.GDP.NGAS.RT.ZS

World Bank. (2021d). Oil Rents (% of GDP). https://data.worldbank.org/indicator/NY.GDP.PETR.RT.ZS

WWF. (2018). An offshore oil ban offers new hope for Belize's Barrier Reef. https://www.worldwildlife.org/magazine/issues/summer-2018/articles/an-offshore-oil-ban-offers-new-hope-for-belize-s-barrier-reef

Yates, L. (2021, April 22). The role of NOCs on the road to net zero. https://www.woodmac.com/news/opinion/the-role-of-nocs-on-the-road-to-net-zero/

Annex

There are a set of criteria (between one and three) for each of the seven principles. It is possible to score 1 point (red), 2 points (amber) or 3 points (green) on each criterion. The average of the criteria for each principle results in the point score (traffic light colour) for each principle.

	Green (3)	Amber (2)	Red (1)
1. Actively encourage decarbonization			
Targets for reduction of GHG emissions on a national level (this criterion is weighted to 40% of the score for this principle)	At least 65% reduction in GHG emissions on a national level by 2030 compared to 1990 and a net-zero target by 2050 the latest	At least 55% reduction in GHG emissions on a national level by 2030 compared to 1990 and a net-zero target by 2050 the latest	Less than 55% reduction in GHG emissions on a national level by 2030 compared to 1990 OR no net-zero target by 2050
Targets for decreasing oil and gas production (to decrease scope 3 emissions) (this criterion is weighted to 40% of the score for this principle)	A target for a phase-out of oil and gas production by 2050 the latest and comprehensive policies on the implementation	A target for a phase-out of oil and gas production by 2050 at the latest or mid-term targets on significant production reductions by 2030	No target for a phase-out of oil and gas production by 2050 the latest and no mid-term targets on significant production reductions by 2030
Targets for decreasing oil and gas operational emissions (this criterion is weighted to 20% of the score for this principle)	Government policies/targets to reduce direct GHG emissions by at least 50% by 2030 (operational GHG emissions)	Government policies/targets or stated ambitions by the industry to reduce direct GHG emissions by 50% by 2030 (operational GHG emissions)	Less ambitious policies/targets to reduce direct GHG emissions (operational GHG emissions)
2. Avoid the creation of carbon lock-in and more “losers” in these sectors			
Decreasing licensing of new oil and gas fields	No new oil and gas licenses	A decrease of oil and gas licenses	No decrease of oil and gas licenses
Discourage increased investments in oil and gas through legislation and tax regimes	Legislation and tax regimes discourage further investments in oil and gas OR have legislation discouraging further investments	Legislation and tax regimes do not incentivize further investments in oil and gas OR have legislation encouraging further investments	Legislation and tax regimes do incentivize further investments in oil and gas OR have legislation encouraging further investments
3. Support affected regions			
Investments in regional economies away from oil and gas	Have timebound investments/plans on a scale sufficient to remedy the loss of economic activity in all regions	Have timebound investments/plans on a scale sufficient to remedy the loss of most economic activity for most regions	Have timebound investments/ plans, but not sufficient to remedy the loss of economic activity for most regions or have no such investments/plans
4. Support workers, their families and the wider community affected by closures or downscaling			
Plans for upskilling, reskilling and education gaps at regional level	Have a plan/policy on the need for upskilling, reskilling and how to fill in education gaps at regional level for replacing direct and indirect jobs in the oil and gas sector	Have a plan/policy on the need for upskilling, reskilling and how to fill in education gaps at regional level OR national level for replacing direct jobs in the oil and gas sector	Does not have a plan/policy for upskilling, reskilling and filling education gaps at a regional level or does have a plan/policy, but dit is lacking in comprehensiveness.
Quality of new jobs	The plan/policy recognizes the need for measures on how to ensure new jobs have similar or higher quality in terms of salary, benefits and working conditions.	The plan/policy recognizes the need for measures on how to create new jobs with similar or higher quality in terms of salary OR other benefits OR working conditions.	The plan/policy doesn't recognize the need for creating jobs with a similar or higher quality
Support for job search and unemployment benefits	The plan/policy includes measures to support the transition from direct and indirect jobs in oil and gas to other jobs (job search assistance) and the need for income during this transition (such as unemployment benefits, basic income)	The plan/policy includes measures to support the transition from direct jobs in oil and gas to other jobs (job search assistance) OR the need for income during this transition (such as unemployment benefits, basic income, general sufficient unemployment benefits are accepted at this level)	The plan/policy includes few OR no measures on job search and social safety net

	Green (3)	Amber (2)	Red (1)
5. Clean up environmental damage and ensure that related costs are not transferred from the private to the public sector			
Specific policies for ensuring polluters pays principle when decommissioning oil and gas infrastructure	Companies are responsible for the decommissioning of platforms and related infrastructure (there is regulation on creating a plan for decommissioning prior to receiving a permit)	Companies are responsible for the decommissioning of platforms and related infrastructure (however, there is no detailed regulation on how this will be ensured)	Companies are responsible for the decommissioning of platforms and related infrastructure (however, there is no regulation on how to ensure this) or there is no regulated responsibility for companies on decommissioning platforms and related infrastructure
6. Address existing economic and social inequalities			
Make sure policies/plans (principles 3 and 4) are decreasing economic and social inequalities address less than two existing economic and social inequalities out of age, gender, skill level	The support programmes in principles 3 and 4 acknowledge and forcefully address existing economic and social inequalities (age, gender, skill level)	The support programmes in principles 3 and 4 acknowledge and address some existing economic and social inequalities (at least two out of age, gender, skill level) OR general governmental policies address existing economic and social inequalities forcefully	The support programmes in principles 3 and 4 acknowledge and/or
The success of governmental policies/plans (principle 3 and 4) are evaluated in terms of reduction of existing economic and social inequalities	Reduction of the gender-pay gap and reduction in regional Gini index (or similar) are chosen to evaluate plans/policies	Reduction of the gender-pay gap or reduction in regional Gini index (or similar) are chosen to evaluate plans/policies	Indicators such as reduction of the gender-pay gap or reduction in regional Gini index (or similar) are not chosen to evaluate plans/policies
7. Ensure an inclusive and transparent planning process			
Actively engage with local communities and other relevant stakeholders	Engagement with local communities and other relevant stakeholders is part of the process for plans/policies on a transition and their participation in the process is clearly described	Engagement with local communities and other relevant stakeholders is part of the process for plans/policies on a transition, but their participation in the process is not clearly described	It is unclear how community engagement will take place
Including all relevant stakeholders	Identifies relevant stakeholders in a clear and comprehensive manner and includes a description of their roles in the process	Identifies stakeholders in a clear and comprehensive manner	Includes no identification of stakeholders, OR only in a limited way

Oil & Gas Transitions

North Sea Oil and Gas:

Transition from a Regional and Global Perspective

For more information visit: www.oilandgastransitions.org

SEI Stockholm Environment Institute
CLIMATE Strategies
AALBORG UNIVERSITY DENMARK
UiO : University of Oslo
THE UNIVERSITY OF EDINBURGH
Funded by:
KR FOUNDATION
Laudes Foundation