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Just Transitions for Oil and Gas Regions and the Role of Regional Development Policies

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Abstract: The oil and gas industry is a major economic driver in many regions and countries, providing workers with well-paid jobs and spurring investments and economic growth. The need to transition these industries in order to meet climate commitments presents a major challenge. How can the costs and risks to workers and communities of the transition be mitigated? How can stakeholders be included in decisions that impact them? How do transitions impact the broader economy of these regions and what are they transitioning to? Importantly, how can regional development policies support this process? This comparative policy review explores just transition management in three oil and gas dependent regions that have signified the need to transition away from the oil and gas sector, i.e., Taranaki (New Zealand), the northeast of Scotland, and the Jutland peninsula in southwest Denmark, drawing out key lessons and leading practices. These cases are positioned within an empirically grounded, conceptual framework of national and regional just transition policies.

Keywords: regional development; just transition; energy transition; public policy



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1. Introduction

The 6th Intergovernmental Panel on Climate Change report has been described by the United Nations Secretary General as no less than a ‘code red for humanity’ [1]. The risks of climate change are clear and urgent actions are needed to decarbonize industries, economies and societies on multiple fronts. Among these, the oil and gas sector—as a direct and major contributor to GHG emissions globally—is front and centre in terms of the transformations needed [2]. Despite this, actions have been slow, and few countries have made concrete commitments to phase out oil and gas production. There are obvious economic reasons why governments have been slow to commit; the oil and gas industries are major economic drivers and sources of employment. Nonetheless, this may be short term thinking. There is an empirically proven ‘resource curse’ phenomenon. Oil dependence has a negative impact on economic development in the long run [3]. However, the prospects and potential for energy transitions are underpinned by broader socio-technical systems including path-dependant technologies and infrastructure, regulatory systems, and political and social acceptance, among others [4]. There is a robust scholarship on transitions management that explores these dynamic processes of change and how to guide them along desirable pathways [5].

In recent years, growing emphasis has been placed on the importance of ‘just transitions’. That is, a way to recognize and manage energy and industrial transitions so that the workers, communities, and other stakeholders do not face disproportionate risks or harm. The concept emerged in the American labour movement in the 1970s and subsequently gained prominence through the work of unions and social activists [6]. Solidifying its global prominence, the 2015 Paris Agreement of the United Nations Framework Convention on Climate Change included the proviso that signatory nations would take into account “the

imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally-defined development priorities” (UNFCCC, 2015). From its labour movement origins, academic and think tank work on just transitions has proliferated in the past decade [7]. The question is how to implement these practices and scale them up, given the urgency of the climate crisis. It is a concept that is increasingly being put into action.

In oil and gas dependant regions, the concept of a just transition is particularly important. These regions are often less economically diversified, and as such, the sector has a disproportionate impact on the economy and employment. The oil and gas industries have massive fixed infrastructure and associated environmental liabilities. Their transition can entail: (i) gradual phasing out industries alongside carbon capture and storage technologies; (ii) the evolution of the industry into new, related, lower carbon energy sectors; or (iii) the wholesale shift from one industry to others, entailing economic diversification. Oil and gas transitions thus have unique place-based dynamics for which diverse strategies are needed.

Regional development—broadly conceived—entails efforts to reduce territorial disparities and support economic and social development in all types of regions. This can entail support and interventions spanning national, regional, and local levels, and coordination among them. This paper explores the transition of oil and gas regions and the role of regional development policies through case studies of three oil and gas dependent regions: Taranaki (New Zealand), the northeast of Scotland, and the Jutland peninsula in southwest Denmark. In each of these cases, the respective governments have made commitments to manage oil and gas transition in a way that is ‘just’ for stakeholders and communities. These cases are complemented by a scoping review that identifies the main policies and approaches used by regions in OECD countries that have experienced industrial transitions to date—developing a conceptual framework for how to categorize such interventions. This paper proceeds in four parts: (i) introduction; (ii) methods; (iii) a literature review focussed on the just transitions concept and place-based transitions; (iv) findings focussing on conceptual framework and comparative case studies; (v) discussion; and (vi) conclusions.

2. Methods: Comparative Case Study and Scoping Review

This study employs: (i) a comparative case methodology and (ii) a scoping review methodology. Case studies are in-depth explorations of singular phenomena, and as such, the generalizability of their findings are limited. However, for the purposes of policy learning, such cases usefully identify the practices and approaches that are employed (mechanisms and interventions) alongside the social and political conditions that either facilitate or detract from a course of policy action (e.g., policy coalitions and networks). The three countries and regions identified for comparison are all advanced economies that have made concrete commitments to phasing out their oil and gas industries. However, they have very different contexts, and as such, the purpose of our comparison is to describe the mechanisms that are used to manage transitions in a way that is ‘just’, with a particular focus on regional development policies. Each case is developed from an analysis of the academic literature, government reports and documentation, media literature, and statistical analysis alongside verification of the findings with senior public servants (one per case) in order to ensure the correct interpretation of interventions and approaches.

Separately, a scoping review has been conducted—“a form of knowledge synthesis that addresses an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in research related to a defined area or field by systematically searching, selecting and synthesizing existing knowledge” [8]. The purpose of this analysis is to identify the policy mechanisms that have been used to manage transition processes in industry, which includes energy and gas, among others. The cases for the scoping review have been identified by isolating regions in advanced economies that have undergone industrial transition. The OECD regional database was used to identify sub-regional territories where there has been a high share of employment in industry (more than a quarter out of total employment) since 1999, which subsequently declined (between 2010–2019). These sub-

regional territories ($n = 130$) correspond to 74 regions across 25 countries plus the European Union. The geography of study is territorial level 3 (TL3), which are subregions below the level of a region, state, or province across OECD countries. For a full description of this methodology including the case countries and regions, see Krawchenko and Gordon (2021) [9].

On the basis of this case identification, academic and policy literature including government websites were searched in order to develop a comprehensive understanding of the range of policies that are being used to manage industrial transitions, focusing on policies, strategies, and interventions over the years 2015–2021. Searches included a mix of policy instrument types (e.g., policy, strategy, commitment, programme, initiative, mechanism, fund) alongside sectoral or thematic descriptors (e.g., industry, workforce, climate adaptation and mitigation, energy, energy transition, fair transition, transition, employment, community, coal). As relevant policies and strategies were identified, this led to a snowball approach to identification as additional initiatives were described and linked to them. Google translate was used to search non-English and non-French documentation and studies. Literature was coded by key terms and themes were synthesized using the Mendeley reference management software (thematic tagging) and in Excel tables. Wherever possible, comparative analyses were triangulated with existing resources such as the OECD regional development policy surveys [10,11].

This study has a number of limitations. This research relied on web searches of publicly available documentation, largely from government websites. Assessed against Scott's four criteria for document quality, the content is authentic, representative, and has meaning; however the credibility of the studied literature needs to be assessed with recognition that strategies are political documents [12]. Furthermore, it is possible that some information is not up to date and that, despite our best efforts at conducting comprehensive searches, important policies, initiatives, or strategies were missed. For the case studies, verification was sought with senior public servants in the appropriate ministries.

3. Literature Review

3.1. *What Is a Just Transition?*

'Just transition' is a contested term, meaning different things to different stakeholders and rights holders. Justice can be conceived in distributional, procedural, and recognitional terms [13,14]. Understanding this is fundamental to public policy, because it defines the parameters for success. Distributional justice is concerned with how different groups benefit or experience impacts from the changes required; recognitional justice identifies interest groups and rights holders who may be implicated; and procedural justice is concerned with elements of governance, i.e., who is included and how [15]. The literature reveals three main approaches to just transitions: jobs-focused, environment-focused, and society-focused [16]. Each approach has implications for where and to whom governments have focused their policy support and investments.

The jobs-focused interpretation advocates primarily for workers and has its roots in the labour union movement which coined the term 'just transition' [17]. This is aligned with a 'differentiated responsibility' approach, where states and capital have a responsibility towards workers impacted by environmental regulations [18]. It advocates for the need to involve unions and workers in discussions around industrial transition and change to increase procedural justice, and has been operationalized by governments through support initiatives like temporary income support (e.g., bridge to retirement or reemployment), retraining or re-education initiatives, and support for communities in the form of project or diversification funding [19]. The interventions may fail to account for impacts on other groups such as marginalized populations in impacted communities.

In contrast, environment-focused interpretations emphasize enabling the shift to a low or net zero-carbon economy through green jobs in renewable energy alongside energy efficiency, adaptation projects, and other 'green' solutions [5,14]. This approach focusses on ecological justice, noting the dangers of carbon lock-in, and advocates building

alliances with workers in fossil fuel-dependent regions to help overcome resistance to climate action [17,18,20]. This ‘shared solutions’ approach involves dialogue and mutual understanding between trade unions, governments, and international organizations in the context of climate negotiations [18]. However, it can be challenging when community and worker culture and identity are deeply connected to the industry; thus, such stakeholders may be inherently resistant to the idea of low-carbon transition [17]. Furthermore, advocates for an environment-focused just transition may not consider the practicality of green solutions or the reality of green jobs, given their location and the nature of the work.

‘Society-focused’ interpretations have the broadest lens, advocating for system transformation; they are often used by social justice organizations [7,15,21,22]. This approach advocates for universal equity, recognizing that “societal transformations at any scale are shaped by, and will shape, the distribution of wealth, opportunities, and privileges afforded to different social groups” (p. 3) [15]. From this perspective, narrow attempts to find solutions for a displaced fossil fuel workforce may exclude underrepresented groups, and interventions should seek to provide opportunities for other groups facing employment barriers and strive towards gender and racial parity [23]. The philosophical ideas underpinning radical system upheaval are important and require an examination of social inequalities and discrimination (e.g., gender and racial inequality, poverty reduction, etc.). This is an encompassing agenda and can entail broad coalitions.

These three lenses on a just transition are not mutually exclusive—there is overlap among their aims and the social and union movements that support them. However, it is useful to distinguish these approaches because there are diverse goals among those who advocate for a just transition, and this impacts how the public sector and industry engage with these groups and respond to their aims. These ‘frameworks for action’ impact how transition goals are identified and how coalitions are convened.

3.2. *Transitions Management and Place-Based Dynamics*

The increasingly multi- and inter-disciplinary literature on transition management includes empirical studies and case studies of historical and ongoing sustainability transitions [24,25]. In the words of one of the seminal authors in this field, J. Meadowcroft:

“‘Transitions’ are understood as processes of structural change in major societal subsystems. They involve a shift in the dominant ‘rules of the game’, a transformation of established technologies and societal practices, movement from one dynamic equilibrium to another—typically stretching over several generations (25–50 years). ‘Management’ refers to a conscious effort to guide such transitions along desirable pathways. Transition management has roots in systems theory, evolutionary economics, and integrated assessment” (p. 324) [5].

There is no one transition, but rather, multiple types of ongoing sustainability transitions across diverse industries and sectors. Given this, managing transitions is a “reflexive, iterative and stepwise” process [26]. There are broad societal goals that need to be negotiated, and within this, various strategies to set incentives and disincentives in the system to respond to these goals. Pathways to system transformation are not static and conditions will change over time, necessitating new approaches. There may also be external shocks to system dynamics, such as Russia’s war in Ukraine, which necessitate rapid adaptation. All of this is complex for governments, industry, workers, communities, and other stakeholders to navigate and respond to.

Scale is a critical consideration when examining options for low-carbon solutions in energy transitions [20]. Much of the current academic research focusses on just transition from a high-level, global scale [27]. Yet this is an abstract scale with which to understand the nature of transitions and how they are locally managed [28]. The ‘place-based’ turn in transition management literature has been informed by geography, planning, and regional development scholars, among others [29–31]. This scholarship explores, for example, the potential for decentralized renewable energy systems and the capacity of local and regional actors to mobilize system transformation [32,33]. The regional scale is closer to workers,

community members, and local governments than that of national governments, and as such, can work on the ground with local governments, businesses, workers, and residents to support them. As has been noted, the transition of oil and gas regions has specific features that make it particularly challenging. Coal transitions have often been a key comparator industry. However, these transitions have generally not been proactively managed, have taken place over a number of years, and have entailed a proportionally smaller share of total employment than that of oil and gas sector workers [9].

Relative to coal, managing oil and gas transitions is a new challenge with features that are unique to both the industry, workers, and communities where these activities take place. The imperative from unions and social actors to manage these processes in a way that is ‘just’ is increasingly recognized by governments; as such, there is a convergence of just transitions and regional development framing in policy interventions. The remainder of this paper explores these dynamics through a comparative review of just transition policies in places that have experienced such transitions alongside case studies of three regions where oil and gas transitions are presently being pursued. It focusses on the role of governments in managing and structuring transitions responses.

4. Results: Just Transitions for Oil and Gas Regions and the Role of Regional Development Policies

4.1. Just Transition Policies: A Conceptual Framework

What kinds of strategies, policies, and interventions are governments undertaking to implement a ‘just transition’? To answer this question, data were collected on the range of policy interventions that have been used by national and regional governments to manage industrial transitions in regions that have experienced or are experiencing them. Among all intervention types, national and regional, the following thematic areas were found to be most prevalent in the examined cases (see Figure 1).

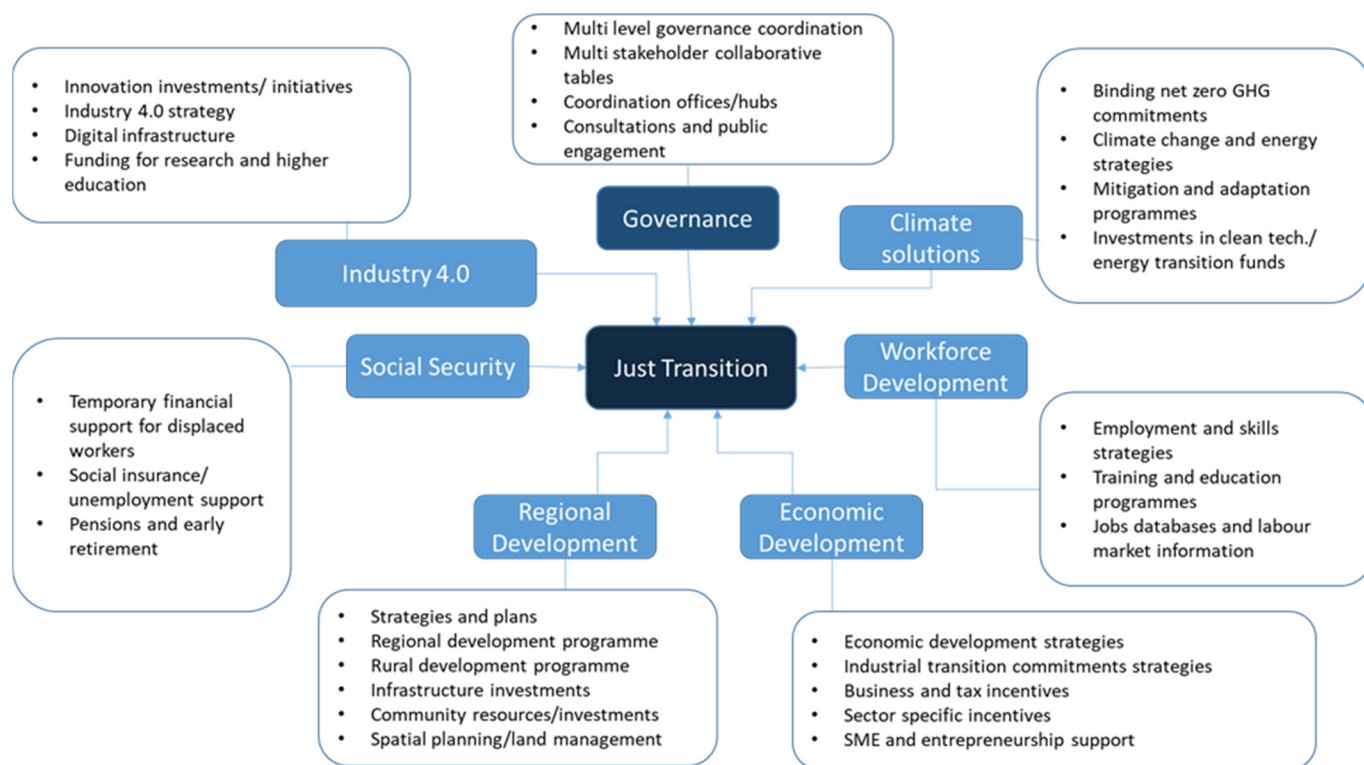


Figure 1. Just transition policies: Conceptual framework. Source: Authors’ own elaboration based on a thematic scoping review.

The jurisdictional responsibilities of regions differ across the countries examined, spanning federal, quasi-federal, and unitary systems. Many regions (particularly in unitary states) are ‘policy takers’, with their capacities and scope for action being disproportionately shaped by national governments. Even in federal countries like Canada, national subventions (i.e., health and social transfers) and policies (i.e., GHG reduction commitments) are critical for managing industrial transitions. Governance mechanisms have been highlighted in the conceptual framework in dark blue, as they are seen as a critical coordinating function across diverse sectoral areas and levels of government. Despite this, targeted, multi-level governance coordinating mechanisms are uncommon among the countries of study (present in only 4 out of 25). These include expert panel consultations and engagements, multi-stakeholder collaborative tables, and co-ordination offices.

Among intervention types, ‘climate solutions’ interventions directly address the decarbonization of energy systems and economies and are widespread. However, considerations of how to address equity were commonly absent in such policy and strategy documents. Workforce development initiatives have long been important to managing industrial transitions and are one of the most advanced intervention areas among the countries and regions studied. Social security support and interventions are complementary to this approach, but are less common. This scoping review also found a range of interventions related to economic and regional development and separately, Industry 4.0 initiatives. In the case of the latter, the connections to how such investments promote fair outcomes are not often evident in strategy and policy documents. This is a quickly changing area of government policy and action. For example, in EU states, the Fair Transition Mechanism and Fund of the 2020–2027 programme period is being mobilized for regional development, and regions and states are developing a range of strategies that have not been included in this analysis. This might broaden the types of sectoral interventions to meet just transition objectives in the future, including in agriculture. All of the above noted interventions have place-based dynamics that may connect to regional development.

This broad overview provides a conceptual framework against which to understand the government interventions in the transition case studies that follow. An important consideration is the extent to which these policies are complementary. While regional development policies are depicted in the conceptual framework as one set of policy interventions among others, they are related to, and reinforced by, a broader suite of interventions. Moreover, even broad interventions, such as the design of social support, have important place-based features that impact regional and local development. Others, such as workforce development policies, commonly rely on local institutions and the capacity to be effectively delivered, again highlighting important place-based dynamics.

4.2. Managing Just Transitions in Oil and Gas Regions

This section profiles three countries that have indicated the need for the transition of the oil and gas sector. In all countries, these transitions are ongoing. Among the three countries, Denmark has adopted the most stringent and binding net zero GHG emissions reductions commitments, and is also the first country in the world with a significant oil and gas industry to commit to the complete phase out of oil and gas by 2050 (see Table 1). Denmark’s 2020 climate law included a commitment to a “just transition.” New Zealand has signaled a phased approach to oil and gas transitions; as of April 2018, no new oil and gas exploration permits will be granted. However, existing permits will be respected, and onshore oil and gas remains important to the regional and national economy. Scotland does not have a firm commitment to oil and gas industry phase outs. However, its GHG reductions commitments have clear implications for the industry and, as will be discussed, they have set up a ‘just transitions framework’ to manage this process. In all three countries, oil and gas are concentrated in specific regions, and they are adopting diverse strategies to manage transition processes.

Table 1. Case study countries.

Country	Net Zero Commitment	Oil and Gas Transition Commitment	Impacted Oil and Gas Region
Denmark	Reduce net GHG emissions by 70% by 2030. Net zero GHG emissions by 2050 (binding in law)	Phase out oil and gas by 2050. Denmark has cancelled all future oil and gas extraction tender rounds as of 2020.	Esbjerg
New Zealand	Reduce net GHG emissions to 50% below gross 2005 levels by 2030	No further offshore oil and gas exploration permits to be granted as of April 2018	Taranaki
Scotland, UK	75% reduction in GHG emissions by 2030 (relative to base year 1990); net zero GHG emissions by 2045	No firm commitment to phase out.	Aberdeenshire

4.2.1. Esbjerg, Denmark

Denmark's greenhouse gas emissions reduction targets have gone above and beyond those adopted under European Climate Law, and in 2020, they passed binding law for climate-neutrality (Danish Climate Act) with the support of a broad political coalition. It was supported by a coalition of NGO, union, and civil society actors under the campaign "Stop looking for more oil NOW." In 2021, Denmark cancelled all future oil and gas exploration tenders and imposed an end-date for the industry of 2050 [34]. It is estimated that this policy decision will cost DKK 13 billion in foregone government revenue and impact an estimated 10,000 oil and gas jobs, as well as another 16,000 indirect jobs (around 1% of total Danish employment) [34,35].

There are important place-based features of Denmark's oil and gas transition. Denmark started producing oil and gas in 1972 and became a net exporter in 1997, with production peaking in 2004 [34,36]. Over the past 20 years, crude oil production has declined by 41% and natural gas by 57%, while renewable energy production has increased by around 300% [35]. The majority of oil and gas jobs are located in Esbjerg, on the west coast of the Jutland peninsula in southwest Denmark. This has long been known as Denmark's energy centre and, with the transition, it will remain the key energy producer but will instead focus on wind energy and other renewable energy activities. Denmark's transition is therefore being managed in place, with new economic activities in a sector that has transferable skills with oil and gas. It is clear what the region is transitioning to, and government interventions have focussed on securing major investments in sustainable energy research and innovation, transition infrastructure for export, and on creating an effective regulatory environment.

The 2020 gas phase out agreement included a DKK 90 million commitment to support the expansion of the Port of Esbjerg as a hub for large-scale offshore wind. In terms of governance, the Danish Ministry of Environment and a Ministry of Climate, Energy and Supply coordinate just transition policies and there are close working relationships with businesses and trade unions to support the transition [37]. Denmark is also closely coordinating with other countries to develop the offshore wind market, which has the potential to cover up to 12% of electricity consumption in the EU by 2030 and up to 20% by 2040 [38]. The new Viking Link power cable connection to Britain and an extension of the power grid between Holstebro and the Danish–German border further strengthens the wind power economy.

In the case of Esbjerg, a share of the existing oil and gas offshore workforce is close to retirement and will be offered early pensions; however, for the vast majority, employment in new renewable energy industries (many with transferable skills) is expected [34]. An estimated 50,000 additional jobs/year will be created to meet renewable energy needs by 2050 [39]. The municipally owned port authority, Port Esbjerg, in cooperation with the United Federation of Workers in Denmark, is introducing an "Offshore Academy" to support education and training in renewable energy and related industries. Beyond this,

Denmark's robust social welfare state helps to smooth the transition, and the "flexicurity" model makes it easy to hire and fire workers while safeguarding their financial security by providing a robust system of social and employment support. An active labour market and education policies ensure that individuals have the skills they need to transition to new employment.

4.2.2. New Zealand, Taranaki

The decision by the Government of New Zealand to stop issuing new permits for offshore oil and gas in 2018 affects around a third of the country's total active exploration permits (71%, or 22 out of a total of 31 oil and gas permits). Existing offshore oil and gas exploration permits that have already been approved may operate until 2030, and existing producing offshore fields could operate up to 2050 [40]. The oil and gas transition in New Zealand is therefore phased; there is no wholesale shift in the industry and there is time to plan for the transition ahead. The Taranaki region, commonly referred to as the 'Texas of New Zealand', will be most impacted by this shift. While the oil and gas sector directly employs only 750 people in the region (just over 1% of total employment), the sector contributes an estimated 30% of regional gross domestic product and is a big reason why the region has the highest GDP per capita in the country (GDP) [41,42]. In total, around 4700 people are directly employed by the oil and gas sector in New Zealand, and it provides around \$170 m in royalties to the government each year [43].

New Zealand has adopted a whole-of-government approach to climate change programmes, and 'just transition' concepts are being incorporated into domestic legislation and policy [44]. In 2018, the Government of New Zealand established a Just Transitions Unit (JTU) within the Ministry of Business, Innovation, and Employment to support the transition process in the Taranaki Region. It forms a centre of expertise in government for managing transitions and forming partnerships. Together with the local economic development agency, Venture Taranaki, the unit convened a wide-ranging dialogue on how the region could manage the just transition to a low-carbon economy. Twenty-nine workshops were held on 12 transition topics, surveys and community outreach, a creative challenge, and youth engagement. Twenty volunteers led the process, and the final report—the *Taranaki Roadmap 2050*—was co-created with communities, *iwi* (Māori nation/peoples), local and central government, businesses, educators, unions, and workers [45]. The plan identifies 12 transition pathways to diversity and strengthening the local/regional economy. Some pathways relate to sectors (e.g., tourism), some are enablers (e.g., the regulatory environment), and some are both (e.g., energy, infrastructure and transport).

Each 'pathway' has an associated action plan that identifies a coordination network and projects for implementation alongside budgetary requests to the national government, with the expectation that private sector funding will also be raised. Upon announcing the end of offshore oil and gas permits, the government of New Zealand announced a \$3 billion Provincial Growth Fund to support economic diversification and transition [43]. This fund supports the development of the Taranaki Roadmap, and there are other government funds that can be leveraged across the sectoral priorities as well. The Just Transitions Partnerships team helps to coordinate with other government ministries to identify funding opportunities and fill in gaps where there are no other alternatives. They work on a case-by-case basis as needed to coordinate across the public service.

While the just transition response to the oil and gas phase out in Taranaki has focused on economic diversification and regional development, there are individualized forms of support for workers such as active labour market policies, and in particular, retraining programmes. Some support is funded through demand-led government services such as the tertiary education system, which are funded through the Tertiary Education Commission (TEC), and active labour market programmes, funded through the Ministry of Social Development. Employee-oriented support is among the most common focus of just transition policies in advanced economies [9]. However, in the Taranaki region, there have not been any substantial employment losses in the sector to date. How this aspect of the

transition will be managed and supported remains to be seen. The government, national business association (Business NZ), and the New Zealand Council of Trade Unions (CTU) are jointly designing a Social Unemployment Insurance scheme that would allow workers to retain about 80% of their income for a period after they lose their jobs [46].

Trade unions have been actively involved in just transition planning. For example, in the “People and Talent” pathway action plan, labour unions “have secured a focus on the support and empowerment of workers during transition, including job clustering, analysis of retraining opportunities and skills audits of the workforce” [45]. The labour union *E Tū* is negotiating roles and responsibilities between government, employers, and employees for such support, and they are establishing multi-employer redeployment schemes.

Investments in energy development are also a central part of Taranaki’s future transformation, which envisions a mix of renewable sources [47]. At present, the Patea Hydro development is the largest renewable energy project in the Taranaki region, but there is limited potential for hydro expansion. Wind technology is commercially viable in New Zealand, and two onshore wind farms are in development in the region, even though there are no offshore wind farms in New Zealand. There is limited use of small-scale and grid-scale solar, with some potential to scale these up, alongside potential for wave, bioenergy, and geothermal energy. Unlike Denmark, which has focused solely on developing a wind industry, there is no single or clear direction for clean energy investments for Taranaki. A range of technologies are being considered. To help develop and scale renewable energy investments, a centre for future energy development, *Ara Ake*, was established in 2020 with national government funding (NZ\$ 27 million). The centre is leading research and the development of clean energy technologies such as wind and wave power and geothermal and hydrogen-based energy. It also forms a centre of expertise on diversifying land use to grow more crops such as quinoa and support reforestation.

4.2.3. Scotland, Aberdeenshire

Scotland—a devolved regional government under the UK’s Westminster government—calls for a rapid transformation across all sectors of the economy and society while “ensuring the journey is fair and creates a better future for everyone—regardless of where they live, what they do, and who they are” in its climate change plan [48]. Unlike Denmark, there is no planned phase out of oil and gas, but rather, a commitment to continued exploration and production alongside investments in sustainable energy and carbon capture and storage (CCS) technologies to reduce sectoral emissions. Scotland has set up a new accountability and reporting framework to manage its transition processes.

In 2017, a coalition of unions and environmental NGOs (the Just Transitions Partnership) formed to advocate for a long-term, independent, oversight-focused commission with statutory authority to track and monitor the government’s Climate Bill and ensure its alignment with just transition principles. In response, the Scottish Government established a Just Transition Commission in 2019 for a two-year term to provide advice to Scottish Ministers. The Commission embarked on a large public engagement exercise and submitted a final report to the Government in 2021 with four main recommendations:

1. Pursue an *orderly, managed transition* to net-zero that creates benefits and opportunities for people across Scotland.
2. Equip people with the *skills and education* they need to benefit from our transition to net-zero.
3. Empower and invigorate our communities and *strengthen local economies*.
4. *Share the benefits* of climate action widely; ensure costs are distributed on the basis of ability to pay [49].

The government accepted the recommendations of the commission in full and is creating a national Just Transition Planning Framework to specify how it will transition to a net zero economy. It has created a junior ministerial post to coordinate these actions, the Minister for Just Transition, Employment, and Fair Work. A new, permanent, statutory Just Transition Commission will advise, monitor and evaluate progress on key targets.

Among devolved UK governments, the Welsh Government has also created a new cabinet position, the Minister for Climate Change, with responsibilities for decarbonizing transport, the housing sector, and energy generation in 2021. As a first priority, the government is developing a transition plan for the energy sector.

Alongside these actions, a UK-wide Oil and Gas Industry Leadership Group (ILG) convenes private and public sector leaders to coordinate, and the industry group has its own GHG reductions roadmap to 2035 [50]. The UK Government's Oil and Gas Workforce Plan (2016) supports displaced workers through online jobs platforms that help them find work in other sectors with similar skillsets alongside an employer-focused one. Scotland's recent (2020) climate change commitments include a £100 million Green Jobs Fund to support investment in low-carbon businesses, and a Green Workforce Academy (a hub for job seekers in green industries). However, investments in skills development and retraining have been limited to date, and the focus on online services may have limited reach.

Regional development is critical to Scotland's just transition response. Employment declines have disproportionately hit certain regions, such as Aberdeenshire. Post-Brexit, the UK and Scotland have needed to reinvent their regional development approaches, which had formerly focussed on EU regional and rural development policies. The UK is also now expanding its "Leveling up" agenda to Scotland—an approach that aims to boost investment in lagging regions and reduce territorial inequalities. This mechanism could be used to meet just transition objectives. In terms of existing initiatives, Scotland has established a CA \$827 million (£500 million) regional development fund to support the energy transition in the northeast and Moray regions. This includes investment guarantees and loans to small and mid-sized firms. Also, all Scottish regions have City Region and Regional Growth deals, i.e., agreements between the Scottish and UK Governments and local governments for long-term economic growth. Some of these agreements support just transition objectives. For example, under the Aberdeen City Region Deal (now in its fifth year), the Oil and Gas Technology Centre has been rebranded as a Net Zero Technology Centre and is shifting its focus to develop tools that can speed up the North Sea oil industry's transition to net zero [51]. City and regional deals have been developed separately from the just transition framework process and do not necessarily correspond to just transition objectives.

The Scottish government has also announced plans to create "green freeports." These are large, zoned areas with rail, sea, or airport links where operators and businesses benefit from tax and other incentives as long as they support the "just transition to net zero emissions by 2045 and the creation of high quality employment opportunities with good salaries and conditions" [52]. These are envisioned as competitive clusters of manufacturing excellence in green technologies.

5. Discussion

The three cases highlight distinct approaches to managing transitions in oil and gas regions, with each being grounded in a unique socio-technical, political, and institutional context. Reflecting on the conceptual framework, interventions across all thematic areas are present in each case, though to varying degrees, and the extent to which interventions are foundationally oriented towards achieving just outcomes for stakeholders and rights holders is not always apparent. Regional development is important across the range of interventions that governments have pursued to manage oil and gas transitions in a manner that is just and fair for communities. Even seemingly aspatial policies such as social security can have important place-based effects or can be targeted to industry/region. However, the degree to which regional development approaches are apparent across the cases differs.

In terms of governance, a formalized development framework is most evident in the case of New Zealand's Taranaki region, where the government has supported a development dialogue on the future of the region alongside associated action plans. This approach identifies the assets and opportunities of the region to transition to a low carbon economy with strong consideration of equity and fairness. Its implementation will rely on the capa-

bilities of a diverse set of actors including *iwi*, local government, the business community, the social sector, and labour, alongside strategic public and private sector investments. In Scotland, the role of regional development policies in managing a just transition is evolving. Scotland's new national Just Transition Planning Framework will develop sectoral plans. Through this process, it will be important to connect sectoral interventions to regional development initiatives in the future, including the City Region and Regional Growth deals. In Denmark, the transition of the oil and gas sector is established and ongoing, and strategic investments in the new wind energy and renewables economy are being made alongside workforce and skills development. From a regional development perspective, the nature of the transition is clear, and strategic investments have been identified. A 'just transition' in this case focusses on ensuring that existing workers find opportunities in new industries alongside preparing for the workforce of the future.

Is there an ideal institutional approach to just transitions management? Does it matter if goals are met via existing institutions and governance networks, or should new ones be developed? There is a large body of literature that explores sustainability, governance, and institutional design [53–55]. Who is recognized and involved, and what are just outcomes (distributional, procedural, and recognitional elements of justice) [13,14]? In the absence of these considerations, systems of injustice can reproduce themselves. As such, accountability and process are linked to the question of effective governance for just transitions. In the case of New Zealand, the Taranaki Framework process has foregrounded these issues by including an evaluative action plan wherein the participants have themselves defined parameters for success in meeting their goals; these are inclusive of Māori knowledge and perspectives. This makes the relationship between governance, actions, just outcomes, and accountability (through reporting) clear. Given the often-contested nature of the term 'just transition,' a benefit of the type of formalized process grounded in public engagement and dialogue as in New Zealand is that it helps to build consensus for action. However, such regional development processes can remain separate from the ways in which labour, industry, and government engage in transition support as it relates to specific negotiated benefits. Support mechanisms are less clear at the regional level in the Danish and Scottish cases; however, this may not mean that they are less effective. For example, in the Danish case, there is effective collaboration and coordination between labour, industry, and government authorities [56]. As such, existing networks may serve effectively to support just transitions.

In terms of climate solutions, all three states have climate plans that detail their decarbonization objectives. However, Denmark's is the most ambitious and clear, setting an end date for oil and gas extraction, and there is regulatory certainty of these goals, since the climate law was adopted with cross-party support. In all places, there are examples of workforce development strategies, the strongest of which are in Denmark, followed by Scotland. Comparisons of the interventions in these contexts must be made while recognizing that each jurisdiction is at a different place in terms of its transition; in the case of Denmark, the shift to a wind energy economy has been established, and robust workforce development strategies have been put in place. In New Zealand's Taranaki region, there has been no major shift in employment from the offshore oil and gas sector to date, and as such, targeted workforce development initiatives are not yet in demand. Among the mix of policies, social security systems can play a key role in managing transitions. Targeted instruments such as early pensions have been used to manage coal transitions in, for example, Poland and the United States. In states with highly comprehensive social support mechanisms, such interventions targeted to specific industries/regions in transition may not be needed.

6. Conclusions

The literature on transition management highlights the need to balance sectoral interventions with regional development approaches that identify the key stakeholders, networks, and strategic investments. These case studies demonstrate that there are differ-

ing approaches in terms of how these types of interventions are used and combined in oil and gas regions facing transition. A strong regional development approach involves local actors and networks in transition planning alongside a clear framework for ensuring just outcomes. Comparative policy leaning can draw out leading practices such as accountability and reporting frameworks and multi-level governance and coordination mechanisms; however, transitions all have their unique features and characteristics. Some regions will have established networks that can be effectively leveraged in support of transitions management, such as the case in the Taranaki region of New Zealand, while in others, these types of regional development networks may be less well developed or apparent. For oil and gas regions facing transitions, support to establish or strengthen such networks is an important part of inclusive planning for a just transition.

This paper has provided a high-level overview of the types of interventions that have been employed in regions that have faced industrial transitions alongside short case studies of transitions in three oil and gas regions. There is much to be learned about how transitions in oil and gas regions can be managed in a way that is fair for workers and communities. This is a relatively new and evolving area of transitions management for which much remains to be learned about how to combine sectoral and regional development interventions with effective multilevel governance and accountability mechanisms.

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