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Policy mixes for just sustainable regional development in industrially overspecialized regions: the case of two Norwegian petro-maritime regions

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Abstract

Just sustainable regional development has become an all-important policy agenda in regions overspecialized in carbon-intensive industries. Just sustainable regional development requires coherent innovation policies and legitimacy to simultaneously address long-term and short-term climate, social and economic goals. We argue that an evolutionary perspective emphasizing institutional legacies (and the concept of institutional layering) is productive for analysing and designing just and sustainable policies. Drawing on a longitudinal case study of two Norwegian oil and gas-dependent regions, we shed light on the multi-scalar policy mixes and underlying political dynamics designed to shape the process. We reveal that, underpinned by the Norwegian tripartite cooperation model, the focus of the multi-scalar policy mixes in the regions has been primarily on the decarbonization of the sector, rather than on its active phase-out, along with the development of the renewable energy sector, mainly through technology-push instruments. While supporting business as usual in the short term, this approach may facilitate the growth of the emerging renewable technologies and thereby meet the long-term ‘life-after-oil’ ambitions, reducing the negative impacts of transitions. In light of the urgency for a sustainability transition, we make policy recommendations that can contribute to rapid regional low-carbon transitions while ensuring long-term job security.

Keywords:

Just sustainable transition, tripartite collaboration, coordinated market economy, evolutionary approach, institutional layering

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Introduction

Sustainable development is one of the key issues that dominated the environmental and economic discourse during the 1990s (Berger et al., 2001). The concept appeared for the first time in 1987 with the publication of the ‘Brundtland Report’ by the World Commission on the Environment and Development (WCED), which warned about the negative environmental consequences of (carbon-intensive) economic growth and globalization. At its core, the concept deals with ways to ensure development that meets the needs of the present without compromising the ability of future generations to meet their own development needs (Hatch et al., 2017). Sustainable development embraces three pillars: economic growth, environmental protection, and social equality. Accordingly, since the early 2000s, the transition to a green (low carbon) economy, i.e., achieving a fundamental shift to an economic system that puts less strain on the environment, has become an all-important policy agenda (UNEP, 2011). Simultaneously, in response to the needs to anticipate and adapt to such transitions and to accelerate sustainable development, a burgeoning interdisciplinary literature stream has emerged to disentangle the dynamics and mechanisms of sustainability transitions (STs) (Loorbach et al., 2017).

According to this literature, transitions are conceptualized as coevolutionary processes that involve fundamental shifts from incumbent sociotechnical configurations at a sectoral level towards other emerging alternatives (niches), involving a multiplicity of actors and lasting over several decades (Markard et al., 2012). However, with much focus on the contentious relationships and struggles between incumbent ‘regimes’ and emerging innovations in ‘niches’, transition research has paid little attention to traditional policy instruments and regulations as well as the underlying participatory political process shaping sustainable regional development beyond transitions at a sectoral level. Accordingly, and given the urgency and scale of climate change as a grand societal challenge, recent transition research emphasizes the policies that facilitate the active phase-out of the old carbon-intensive industries (Kivimaa & Kern, 2016). However, such drastic path-breaking policies pose enormous (including practical) challenges for regions that are solely dependent on carbon-intensive sectors (e.g., petroleum extraction), as these sectors account for a significant share of regional employment and are the main source of revenue at the regional and national levels. Hence, for regions that are solely dependent (over-specialized) in these industries, an all-important policy agenda is how to achieve just, sustainable development by ensuring an inclusive carbon-neutral regional industrial transition and growth.

This paper argues that sustainable regional development requires coherent national, regional and local innovation policies and legitimacy among key actors to simultaneously address the long-term environmental (sustainability) goals and the short-term social and economic goals and ambitions of the regions. In studying the regional industrial restructuring process, therefore, this signifies a need for an explicit account of what we call ‘just transition policy mixes’. Arguing for a strong consideration of the question of just, sustainable regional development in sustainability transition research, the aim of this paper is to unpack the multi-scalar policy mixes and the underlying participatory political processes that frame just sustainable industrial transition and development in regions over-specialized in old carbon-intensive and often natural resource-dependent industries. The paper makes an important contribution to the transition research by drawing on an evolutionary perspective, which emphasizes institutional legacies using the concept of institutional layering, which we find productive for analysing and designing just sustainable policies. We

provide novel insight into the geography of sustainable transitions and the legitimation of appropriate multi-scalar policy mixes by asking the following question: How are the economic, social and environmental components of a sustainable transition balanced in policy mixes implemented over time in regions with varying degrees of industrial overspecialization? How can policy support rapid transitions in these types of regions?

The paper relies on the longitudinal case studies of two Norwegian oil and gas (O&G)-dependent regions, Verdal in Mid-Norway and Stord in Western Norway, focusing on three critical junctures. Both regions have been targets for different combinations of policy mixes, such as the traditional regional restructuring programme, and more recent innovation policies, such as cluster initiatives with the aim of restructuring their O&G-dependent economies in the face of periodic oscillations of the sector and low carbon transition imperatives. The paper unpacks the multi-scalar policy mixes, the underlying participatory political process, and most notably, the role of the Norwegian tripartite cooperation model in framing just and predictable sustainable regional development processes over time in the two regions. In light of the ever-increasing urgency of sustainability transitions, the paper makes key policy recommendations that can contribute to rapid transitions to low-carbon economies while ensuring long-term job security in the regions.

The paper is structured as follows. The next section presents the theoretical framework of the paper with a special focus on transition policy mixes and just transition dynamics. The subsequent section presents the methodology of the paper and is followed by sections describing the empirical context and analysis of our empirical findings and a discussion. The last section concludes the paper.

Theoretical framework

Sustainability transition research comprises a large variety of approaches and perspectives that have enriched our insight into the persistence of unsustainable socio-technical regimes and possible transition pathways and transition management strategies to escape lock-in (Loorbach et al., 2017). According to the multi-level perspective (MLP), transitions unfold through the interaction between niches, the regime, and the landscape (Geels, 2004). From this perspective, destabilization and subsequent shifts in incumbent socio-technical systems (regimes) can be achieved through top-down exogenous landscape pressures (e.g., decarbonization targets) and the bottom-up development of several emerging niches, creating opportunities for niche technologies to ‘overthrow’ the regime (Geels, 2002; 2004). Regime actors are, however, often resistant to transitions, as they are locked into incumbent socio-technical systems, and transitions entail, among other things, the loss of market position and eventual bankruptcy (Unruh, 2000).

Due to the increasing urgency of sustainability transitions to meet stringent international decarbonization targets, recent research has emphasized the need to accelerate transitions by actively destabilizing and/or phasing-out of incumbent regimes by weakening the reproduction of core regime elements to create windows of opportunity for the upscaling of niche innovations (see Kivimaa & Kern, 2016). Moreover, technological changes are faced with multiple market, system and institutional failures. Achieving rapid transition is therefore dependent on multifaceted policy

interventions, i.e., policy mixes that combine several policy instruments (Reichardt et al., 2016; Rogge & Reichardt, 2016).

Policy mixes

The concept of policy mixes has become central in the innovation policy debate over the past two decades and refers to the set of policy rationales, arrangements and instruments implemented to deliver public action in specific policy domains, as well as the interactions that can take place between these elements (Rogge & Reichardt, 2016). According to Kivimaa and Kern (2016), the concept is especially relevant in the sustainability transition field, as public policy can play several functions in accelerating successful sustainability transitions. Ideally, policy mixes for transitions embrace elements that ‘destabilize’ the old incumbent regime and ‘create’ a new regime. In concrete terms, in addition to offering support for the development of niche technologies, this includes an active phase-out of incumbent technologies. Phase-out may involve disincentivizing and/or banning incumbent technologies, reforming institutions and market rules to support broader societal goals, eroding the financial resources of carbon-intensive interests through the removal of fossil fuel subsidies, and weakening actor networks and access to decision-makers (Rosenbloom, 2020).

However, the extant transition policy research, predominantly national in focus, has given little attention to the social aspects of these transitions and, more importantly, to the questions of equity and justice at a regional level. While accelerating sustainability transitions is vital and remains the utmost public policy priority, it calls into question the degree to which a rapid low-carbon transition may adversely affect certain economic sectors, communities and regions. Some of the negative consequences of rapid low-carbon transitions may include job losses in sectors such as fossil fuel extraction. Actors at multiple levels, mainly in regions and communities that are overly dependent on such carbon-intensive industries, could see industrial decline and job losses. States that are dependent on revenues from fossil fuel extraction could see the loss of a valuable source of revenues (Green, 2018; Gambhira et al 2018). This in turn could lead to resistance to change, embodied by social and political backlash and a potential slowing or reversal of the regional industrial transition processes (Gambhira et al., 2018). Hence, signifying the wider political and/or (sustainable) regional development dimensions of transitions, a central challenge for transition policy mixes aimed at carbon phase-out is to overcome resistance from negatively affected stakeholders and regions (Green, 2018; Vona, 2019).

As transition policy is contested, the implementation and realization of such policies are dependent on their legitimacy among key stakeholders – organizations with institutional authority (Jordan & Bleischwitz, 2020; Sareen, 2020). A research focus on policy mixes alone thus appears somewhat instrumental if it is not put into a broader political and institutional conceptualization. In other words, research on sustainable transitions should include policy processes, which form the policy mixes in their conceptualization (Kern, et al., 2019). In this regard, Kern et al. (2019) identify a knowledge gap concerning policy experiences, how vertical and horizontal policy mixes take shape and form outcomes and how such mixes should be adjusted over time to support socio-technical transition. In this paper, we engage with the expanding but still embryonic policy-focused ‘just transition’ literature (see, e.g., Gambhira et al., 2018; Green, 2018; Stevis & Felli, 2015 for the origin of the concept). Going beyond mere transitions, this can help us unpack how sustainable

regional development, i.e., more pragmatically equitable and just transitions to a low-carbon economy, can be realized in regions that are heavily dependent on old carbon-intensive industries.

Adopting Stevis and Felli's (2015) notion of *differentiated responsibility*, just transition places strong emphasis on workers' and unions' power and defends the 'losers' of regional industrial restructuring and/or transition process. According to this perspective, jobs may be created in new and important green sectors, but some important sectors will see their activity reduced and may disappear altogether. Therefore, the national and regional authorities have to take full responsibility towards the workers currently employed in the sectors at risk. From the perspectives of the sectors at risk, instead of rapid phase-out, investments in R&D and specifically the generation of socially appropriate jobs generating green innovations, which may prevent or delay the disappearance of specific industries, are emphasized. State-led "green industrial policies" to create new and more sustainable jobs in these sectors, including the reskilling of workers for new jobs through education support, wage subsidies, the provision of social protection and the guarantee of unemployment and retirement benefits in the transition process, are crucial components of the just transition policy mixes. This perspective advocates for proactive state intervention to create jobs in 'green' sectors and aims for state and capital to absorb capitalism's negative social externalities through a 'just transition' and a social safety net for people and communities that have been marginalized by economic developments. This perspective takes into consideration that labour has a weaker position than capital in forming the economy. Therefore, trade unions should be recognized as a key stakeholder participating in this process, not just communicating workers' claims but also framing the process through negotiations and dialogue with other regional actors. This approach is not revolutionary, yet it goes beyond a green Keynesianism that underscores that structural rules are at play (Stevis & Felli, 2015). The paper contributes to the literature on just sustainable transitions by drawing on an evolutionary perspective emphasizing institutional legacies in terms of 'institutional layering'. This signifies gradual institutional transformation through a process in which new elements are added to (not replace) existing institutions and gradually change their status, quality and structure (Mahoney & Thelen, 2010). We find this perspective relevant in analysing and designing policies in the Norwegian institutional context.

More specifically, this perspective is particularly relevant in the political process that is feasible in the context of Norwegian social democracy, i.e., the Norwegian (or Nordic) model of working life relations. The model is characterized by extensive collaboration and coordination between state, industry and labour (social partners) and mirrors the particular 'coordinated market economies' described as one of two basic types of market economies (in addition to liberal market economies (LMEs)) in the Varieties of Capitalism literature (Hall & Soskice, 2001). In Nordic countries, the social democratic labour movement has exercised national and popular leadership since the interwar period (Esping-Andersen 1990). Social democratic leadership includes a strong public commitment to policies that promote employment. The Nordic collaboration between corporatist interests forms a social contract that supports economic stability and international economic competitiveness (Ryner 2007). In this paper, we focus on how this model could contribute to framing predictable sustainable regional development processes (initiatives) in two Norwegian O&G specialized regions. In addressing the neglect of multi-scalar institutional and political aspects, we argue that the inclusion of the regional and local levels is crucial, as it plays a

significant role in the legitimation of sustainable transition processes (Mackinnon et al., forthcoming).

Analytical framework

Based on the above discussion, we distinguish between the *substantive* and *procedural* dimensions of just transition policy mixes (Green, 2018). The substantive dimension is related to the nature, scope and magnitude of the policy mixes, including the transitional assistance and support to be provided to actors made worse off by the process. In concrete terms, these policy mixes can be divided into ‘reactive’ and ‘proactive’ policies. Reactive policies are related to the short-term response, including ensuring existing jobs in sectors negatively impacted by shocks and/or facing decline (Bridle et al. 2017). Proactive policies, on the other hand, are aimed at maximizing the long-term benefits of the transition. These may include targeted skills training, industrial transition support to help firms shift from high- to low-carbon activities, geographically targeted public spending to help vulnerable regions, and investment in R&D, innovation and education to support the development of green (sustainable) industries (Bridle et al. 2017; Gambhira et al., 2018). The proactive policies further include the early implementation of policies and strategies to enable a managed and gradual decline (phase-out) of industries. However, given the urgency for sustainability transitions to meet stringent international CO₂ emission targets, the window of opportunity for gradualism is rapidly shrinking (Gambhira et al., 2018). Nevertheless, there is great (but so far under-appreciated) potential to realize transitions through knowledge recombination and diversification by firms involved in carbon-intensive industries, which, if successful, can dampen the possible negative impacts of transitions, such as job losses and incumbent firm closures (Andersen & Guldbrandsen, 2020).

The procedural dimension is concerned with the nature, scope and magnitude of consultation or other participatory procedures to be engaged in by the relevant authorities with affected parties with respect to the content of the proposed substantive component of transition policy (Green, 2018). Studies have documented the vital role of tripartite collaboration between social partners in ensuring procedural justice and legitimacy (acceptance) by major transition stakeholders (see Gambhira et al., 2018).

In this paper, we primarily focus on the regional level to fill a knowledge gap in the transition literature, where the temporal dimension of transitions have been emphasized over the spatial dimension (MacKinnon, forthcoming). Economic geography research emphasizes the need for spatially sensitive conceptualizations of transitions (Truffer 2015). Thus, when investigating the local capabilities for transition, it is important to take into consideration the degrees of industrial specialization or diversity of the regions. Accordingly, while the more industrially over-specialized regions are more vulnerable to external shocks, the regions with more diverse industrial specializations have greater potential for new industrial development and/or branching (Boschma 2015).

Methodology

In this paper, we adopt a qualitative approach, as we aim to unpack complicated political processes taking place over time and at multiple scales. Given our evolutionary perspective emphasizing

institutional legacies, the methodology chosen is a longitudinal case study supported by empirical triangulation. The analysis focuses on critical junctures that separate phases of development (Grillitsch et al., 2019). We highlight moments in time (e.g., shocks and responses to shocks in terms of new initiatives) that offer(ed) windows of opportunity for change. Our comparative design implies selecting two cases with regard to certain similarities and differences. More concretely, the chosen regions specialize in petroleum or petro-maritime industries. More specifically, specializing in the petro-maritime industry, Stord is an industrial municipality and has approximately 19,000 inhabitants, being a regional centre in the Sunnhordland district in Vestland County in southwestern Norway. Specializing in the petroleum sector, Verdal, on the other hand, is a small industrial town located in Mid-Norway with approximately 15,000 inhabitants. Largely dependent on the cornerstone Aker for employment and other industrial activities, Verdal has been an archetypal single industry town (Karlsen 2011) with a stronger overspecialization in the O&G sector than the petro-maritime region, Stord. Our empirical material is based on a combination of document studies and interviews. We have studied policy documents, programmes, evaluation reports, media, etc. This empirical material further includes 26 interviews of key regional actors conducted and transcribed during the period 2010-2020 with key informants in connection with our previous research.

Empirical background

Norwegian petroleum activity was established in the late 1960s and has since evolved through an interplay between petroleum firms, such as the state-owned petroleum company Equinor, as a key actor, suppliers, large R&D institutes and universities, and supportive policies (Andersen & Guldbrandsen, 2020; Sæther et al., 2011). Signifying the importance of the sector for the national economy, it accounted for approximately 200 000 direct and indirect jobs in the peak years prior to the bust in 2014-15 and between 50 and 60% of export income each year in the last decade (Andersen & Guldbrandsen, 2020). Many of the petroleum-related industrial activities are located onshore and mainly in a few municipalities in the southwestern part of Norway. In 2016, Stord, with 16.5%, had the highest ratio of employees working in petroleum- or petroleum-related industries, as the major companies Aker Stord¹ and Leirvik have been solely directed towards the O&G market. The corresponding ratio at Verdal is only 6% (Eikeland, 2016), but this figure conceals a sub-supplier structure, where Aker spinoffs have more than 60% of their turnover directed towards Aker Verdal and thus are indirectly dependent on the O&G market. Thus, Verdal has a more vulnerable industry than Stord, particularly as the latter is also integrated in a wider region of more diverse petro-maritime industries.

Since the 1970s, the petroleum sector has experienced periodic oscillations resulting in major economic crises at both the regional and national levels. Moreover, the recent structural shifts in the policy and energy landscapes, especially in the context of the Paris Agreement in 2015, and the subsequently changing patterns of energy consumption and growing 'life after oil' narratives imply that the recent downturns very much represent a permanent new situation for the sector (Andersen & Guldbrandsen, 2020). Consequently, in Norway, since the 1980s, there has been emphasis on the restructuring of regional O&G-dependent economies to lessen the impact of periodic oscillations in the sector and, recently, to respond to sustainability transition imperatives.

However, the over-dependence of these regions and the national economy on the petroleum sector means that regional industrial transition initiatives have been a slow and politically complicated process. For example, Figure 1 shows how offshore wind power (OWP) activities by O&G suppliers in Norway were shaped by O&G market fluctuations.

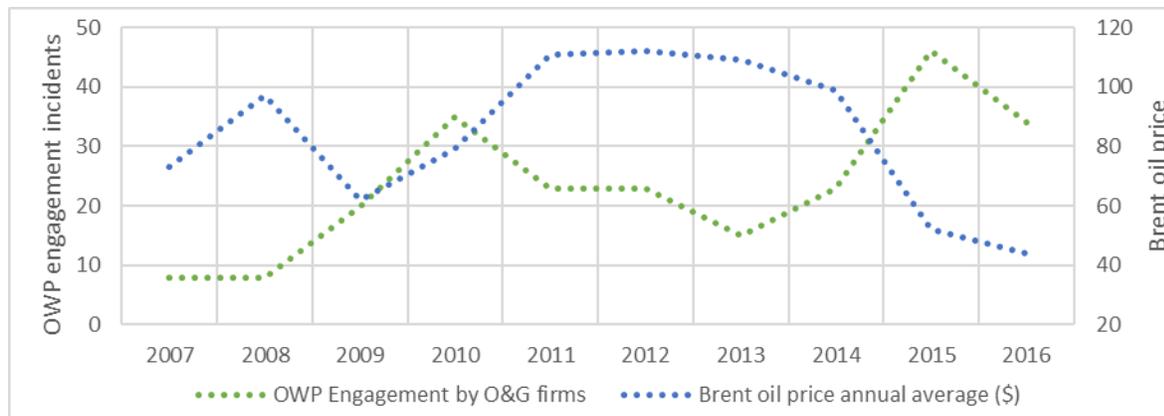


Figure 1. O&G suppliers' activities in OWP in light of fluctuations in the O&G market. Source: Mäkitie et al. (2019)

The figure illustrates the inverse correlation between O&G suppliers' activities in OWP and oil price fluctuations over time. This is related to sectoral competition on attention and investments, as suppliers traditionally stick to the market that appears most familiar and profitable. The shifting activities in OWP over time seem to hamper continuity and predictability, which are critical for long-term OWP development (Steen & Karlsen, 2014).

In the subsequent sections, we turn to multi-scalar policy mixes and the underlying political processes, most notably the role of the Nordic model in regional industrial restructuring processes. We focus on three critical junctures, i.e., moments in time that separate phases of development (Grillitsch, et al., 2019), including shocks, and responses in terms of new initiatives that offer windows of opportunity for change in the regions.

Critical juncture I and its aftermath (c. 1999-2008): Crisis-induced reactive policy mixes for regional industrial diversification and job creations

In 1999, the Norwegian O&G sector was hit by a drop in oil prices. In Stord, taking the overspecialization of the municipality in the petro-maritime sector into consideration, the Hordaland County council conducted an impact assessment. Accordingly, a reduction of 1053 jobs in the region was forecasted over a 5-year period. In response, in 2000, Stord, in collaboration with a neighbouring municipality, Fitjar, decided to apply for a regional industrial restructuring programme (RP). RPs, representing a policy instrument for municipalities and regions facing major challenges and a significant decline in their employment and/or population levels, are jointly funded by the state, county, and municipal levels and are administered locally (Carlsson et al.

2014). RPs have three main objectives: to develop profitable jobs, to achieve a more robust and diversified economic structure and to strengthen business development capacity. According to Carlsson et al., local RP strategies and processes have to align with the top-down requirements enacted by Innovation Norway, the state organization in charge of RPs. This is mainly because, in the late 1980s, the state implemented obligatory strategic business development plans (SBDPs) as a condition for RP support. The idea behind the SBDP was to generate local mobilization that would embed the RP across groups of actors, including the public, private, and civil society, to ensure local legitimacy and support (Carlsson et al., 2014).

In Stord, the RP operated over the period 2002–2006. To be responsible for the programme, the county established an executing body, Samspelsforum for NæringsUtvikling (SNU). The RP set out to create jobs that would in the long run replace the number of jobs lost due specifically to reductions in the offshore O&G industry. To align with the top-down (national-level) requirements, fostering diversification through spinoffs and product and market development was an important target area. Accordingly, spinoffs from industrial enterprises represent an area that has generated many jobs, and the SNU has played a crucial role in realizing these enterprises. Examples of companies that have spun out of the local Aker Stord companies include one firm within electro installation and service, another firm within technology and service and a third firm within ICT (Johansen, 2007).

From the procedural dimension, reflecting a typical Norwegian model (which helped legitimize the process), the restructuring body, SNU, was deliberately established as a limited company where no owner held a dominant position: Stord, Fitjar and Sveio (which joined a year later) municipalities with a 17.2% share each (a total of 51.6%), the business councils of the three municipalities with a 13.8% share each (a total of 41.4%), and the Norwegian United Federation of Trade Unions (Fellesforbundet) with a 7.0% share. Other key partners and participants in the restructuring process have been Innovation Norway, Hordaland County council and the Sunnhordaland Council. Important local actors have been municipal politicians, municipal administration, and cornerstone companies, such as Aker Stord, trade unions and local businesses. Fellesforbundet, with its board representative, was an active contributor to the restructuring work throughout the period (Johansen, 2007).

In terms of the results, the RP's target for new job creation with 472 newly created and approximately 590 ensured jobs was realized reasonably early. Nevertheless, the period coincided with the revitalization of the O&G market, which triggered rehiring processes in the sector. Overall, however, it is evident that the programme played an important role in the diversification of the regional industrial base with the emergence of a new industrial focus on natural gas and renewable energy (Johansen, 2007).

Similar to Stord, the municipality of Verdal, with the active support and involvement of northern Trøndelag County and in close cooperation with Aker, responded to the 1999 crisis by applying for the restructuring programme (RP). Signifying the procedural dimension of the process, the application was thoroughly planned through the establishment of a pre-project that involved representatives from the industry and the municipality. This resulted in the establishment of Verdal vekst AS as an executing organ for the development project, with Aker Verdal and Verdal industry

forum as majority owners and the municipality as the minority owner (Finne et al., 2008). The application was approved by the state and operated over the period 2002–2008. In the case of Verdal, the RP focused, on the one hand, on a comprehensive training programme aimed at laid-off workers to keep labourers nearby during the recession, including those at the Aker plant. The local union had a key role in the swift start-up of this programme on skills upgrading, in close collaboration with the vocational school (centre) and the county authority (Interview with former union leader, 2020). On the other hand, as in Stord, the RP stimulated the diversification of the local economy by providing entrepreneurial support and by attracting new (external) firms to the town. Even if there were periods of disagreement regarding company strategies between the top management and the union, workplace democracy was maintained. The local union participated in strategic decisions at many levels of the Aker organization beyond what is formally required by acts and agreements between the social parties at the national level (Interview with former and recent union leaders, 2020).

To a large extent, the ambitions of the RP to upgrade the local knowledge base and diversify local firms by both entrepreneurship support and acquisition strategies paid off. In 1999, there were approximately 50 firms with 1700 employees at Verdal Industrial Park, of which 1000 worked at Aker. By 2004, 30 additional firms that included Aker spin-offs, local start-ups, and external start-ups, with a total of 200 employees, had been established (Steen & Karlsen, 2014). By 2009, there were over 150 firms with a total of approximately 3000 permanent employees in Verdal. Of these, approximately 650 were at Aker. Thanks in part to the RP, Verdal had grown to become one of the three largest industry sites in Norway (Roel 2012, in Steen & Karlsen, 2014). In both cases, with less focus on environmental (sustainability) issues, the primary focus of the reactive policy mixes was on creating new jobs through diversification and/or securing old jobs in the incumbent sector. However, even though for different reasons (mainly economic and social), the 1999 crisis in many ways provided the initial impetus for the proactive policy mixes, particularly the regional focus, the legitimation for the restructuring of the petroleum-related industry and the growing attention to diversification towards renewables (see below).

Critical juncture II and its aftermath (approximately 2009-2014): Proactive policy mixes for the restructuring of regional petro-maritime industries

In Norway, the 2008-09 financial crisis and the subsequent drop in oil prices led to the realization among national and regional actors that the petro-maritime industry was vulnerable and in dire need of restructuring (renewal). In this period, the 'life after oil' narratives grew stronger. Accordingly, in 2009, induced partly by these narratives and partly by the need for increased domestic energy production and in light of the broader global trends of emerging technologies and industries within the 'green economy', the Norwegian state introduced several measures to stimulate the development of the renewable energy sector. The most prominent policy mix was focused on niche technology development, mostly in terms of technology push (Steen & Hansen, 2018).

At the regional level, in Stord, recognizing the regional potential for cleantech development, a regional actor network applied in 2011 for the ‘Arena’ programme, which is Norway’s public programme for networking and industrial innovation (i.e., industrial cluster development). Acceptance was granted the same year. In 2014, the cluster gained the status of a ‘National Center of Expertise’ (NCE), with a specific focus on ‘establishing future-oriented, innovative and competitive [green] solutions for the maritime industries’ (NCE Maritime CleanTech, 2018, in Sjøtun & Njøs, 2019). As an important public policy tool for cluster development, innovation and restructuring, Norwegian cluster policies are grouped under the heading of the ‘Norwegian Innovation Clusters’ (NIC). The NIC has an annual budget of approximately 200 million NOK/year and is financed by the Ministry of Trade, Industry and Fisheries and the Ministry of Local Government and Modernization and is administered by an autonomous public agency, Innovation Norway, together with the Research Council of Norway and SIVA (Industrial Development Corporation of Norway).

Procedurally, emphasizing the vital role of the underlying (political) processes of policy mixes, the municipality of Stavanger (the oil capital of Norway) and its administrative resources were important drivers in the initial phase of the CleanTech cluster. In addition, the role of the inter-municipal development agency, SNU AS, was key. This participatory process was crucial in bringing the cluster development process forward. The application process involved powerful public and private actors. However, what is interesting is that not one of the parties involved in the process had the power to instruct the others. Instead, reflecting a collaborative environment, all actors were dependent on each other to influence and frame (through creating positive narratives) the scope and priorities of the process. Thanks to these early participatory processes, maritime clean technology had a significant impact on the political agenda and was included in the formal regional and municipal policy priorities and strategies leading to the granting of the application (Holmen & Fosse, 2017). Headquartered in Stord, the cluster currently (in 2020) consists of over 100 members covering the entire traditional maritime value chain (e.g., wharfs, shipping companies, ship design, suppliers), in addition to battery suppliers and energy utilities, R&D organizations and public agencies. The cluster focuses, among other things, on the technological development of batteries and hydrogen (Sjøtun & Njøs, 2019).

In Verdal, this critical juncture coincided with the final year of the RP, in turn leading to a new cyclical downturn and ‘crisis’ situation in 2009 and massive layoffs. Even though the RP had contributed to some degree of diversification of the local economy, as noted above, the role of Aker as the cornerstone company and primary source of local employment remained largely unchanged. According to Steen and Karlsen (2014), the response of firms and local authorities was more proactive in 2009 than in 1999. The crucial part of this forward-looking response was the promotion of regional green industrial restructuring through the development of the Windcluster Mid-Norway (WMN) project. The project aimed to develop a wind-energy cluster, with an initial focus on the emerging offshore wind market due to the global trends in the development of the renewable energy sector, particularly the rapid expansion of offshore wind power mainly in Germany and the UK and the relatively strong standing of the onshore wind power sector in central Norway. Thus, in 2009, with the active involvement of five local firms, which included Aker, the local business development agency IndPro (later Proneo), and with financing by SIVA, Innovation

Norway, and the Research Council of Norway, WMN was granted Arena status as a regional development project and was named Arena Vindenergi.

However, unlike Stord, which has a relatively diversified industrial base with the presence of leading actors from both the O&G and maritime sectors, Verdal was (and still is) heavily reliant on the cornerstone company Aker. As an O&G company at its core, Aker's activities in the wind sector were heavily influenced by conditions in the O&G market (fig. 1). In 2012, as the O&G market boomed again, Aker announced that it would not be pursuing new offshore wind activities. Aker's withdrawal from the wind sector strongly curtailed the growth of the WMN cluster. Unlike Stord, where tripartite cooperation played a vital role in the advancement of the Maritime CleanTech cluster to NCE status, the Verdal case demonstrates the dominant role of a single industry corporate actor in dictating the 'rules of engagement' in spite of the local unions' will (interview with union leader, 2020), which in turn (exposing the vulnerability of the regional economy) adversely affected the development of the regional green transformation agenda.

The decline is also partly due to a lack of focus in the policy mixes on the development of the national offshore wind market. The subsidy schemes needed to support domestic market formation, which were in place in other Northern European countries, did not materialize mainly because in Norway, legitimizing OWP development through the narratives of energy security and the problem of climate change proved difficult. From 2011 onwards, therefore, the momentum that had started to build for the development of OWPs in Norway in 2009-2010 began to drop, even at the national level. As technology neutral, a joint Swedish-Norwegian 'Green Certificate Scheme' (GCS) introduced in 2012 favoured more mature and less costly energy technologies, such as hydropower and onshore wind (Steen & Hansen, 2018). In both cases, at this critical juncture, even though the proactive multi-scalar policy mixes were designed to instigate the development of renewable energy sectors, with an overemphasis on the economic and social goals, the objective was to capitalize on global renewable energy developments (i.e., creating jobs in the green sectors) rather than achieving transitions to a low carbon economy.

Critical Juncture III and its precursor (approximately 2015-2020): Proactive and reactive policy mixes for a low-carbon transition and the response to the twin crisis of COVID-19 and the oil market crash

At the national level, in 2015, with the adoption of sustainable development goals by the UN and the subsequent Paris Agreement, the decarbonization of the Norwegian economy became a high priority on the national policy agenda. Accordingly, in that year, under the European cooperation framework, Norway made fresh commitments to reduce its emissions by at least 40% by 2030 compared with the 1990 level (Ministry of climate and environment, 2015). From the incumbent O&G industry side, mainly due to the strategic importance of the sector (both regionally and nationally) rather than phasing-out, the policy focus has been on stricter sector regulations with regard to emissions. More specifically, the main instruments for restricting greenhouse gas (GHG) emissions, which included the EU emission trading system (ETS) for GHGs and the CO₂ tax,

economically incentivized companies to implement permanent reduction measures. Most of the CO₂ released from the Norwegian continental shelf (NCS) derives from gas turbines used in the O&G platforms (Norwegian Ministry of Oil and Energy, 2020). To help reduce the CO₂ released by petroleum production facilities, generating power from offshore wind turbines was among the several measures proposed by the Norwegian Ministry of Petroleum and Energy in 2018-19.

From the niche development perspective, the policy focus was primarily shaped by the surge in activities in the OWP sector in the North Sea region that coincided with the third bust in the O&G market in 2014-15, which in turn led to the revitalization of the general narrative on OWP development in Norway. In October 2019, Equinor announced its final investment decision (FID) worth NOK 5B (40% of which was state aid) to deploy the first full-scale floating OW project, Hywind Tampen, in Norwegian waters to supply the Gullfaks and Snorre platforms in the North Sea with OWPs using floating turbines to reduce emissions on site. In the project, Aker secured a contract worth NOK 1.5B for the delivery of 11 floating concrete hulls for the wind turbine turbines from Stord and 19 suction anchors from Verdal, providing approximately 800 jobs. The Hywind Tampen project is an important part of the decarbonization process of the Norwegian O&G sector – the model has both long- and short-term implications for Norway's ambitions for a just low-carbon transition.

These initiatives for greening the existing O&G exploitation took place without any policies to destabilize the incumbent regime but rather with policies that stimulated it. For example, the policy of tax incentives (reimbursement system) from 2005 to reduce the entry barriers for new actors and encourage economically viable exploration activity was still in operation (Norwegian Petroleum, 2020). In 2016, the government opened new fields for exploration by awarding 10 licences, 3 of which were located in the Barents Sea (Norwegian Government, 2016). In addition, Aker Stord and Leirvik and later Aker Verdal were heavily involved in the construction of additional platforms, living quarters and substructures (jackets) for the giant oil field Johan Sverdrup (the largest industrial project in Norway) and the minor field, Johan Castberg. In this period, the Aker company had little interest in the less profitable and predictable offshore wind industry.

In January 2020, a new reskilling programme at the vocational school level was started in Stord to strengthen workers' adaptability and competitiveness (Norsk industri, 2020). This was a product of tripartite collaboration nationally but also locally, where it was given form and content that were well adapted to the local industry context (Norsk industri, 2020). Aker Verdal, in collaboration with regional actors, has been preparing a new production line with new technologies. A new generation of automatic welding for the serial production of jackets (for both O&G and OWP) and large ocean fish farms is under development, but no investment decision has been made yet (interview local industry leader, 2020).

In the spring of 2020, the Norwegian petro-maritime sector was hit by another crisis, i.e., the COVID-19 pandemic. O&G prices showed some signs of stability, but COVID-19 meant that the price dropped to its lowest since 2002. As a result, tens of thousands of jobs, a number of cornerstone companies, the supplier industry across the country, and expertise important for both the O&G sector and green restructuring became at risk. Unsurprisingly, both Stord and Verdal were hit hard by the crisis with massive layoffs. At Aker Verdal, 180 employees were already laid off when major projects, such as Aker BP's Hod platform, were put on hold, and a complete shutdown in the following year was possible. The vulnerable situation at Verdal received wide media coverage, and national party leaders visited Verdal. Early on, the local union welcomed the leader of the Labour party, who, as the leader of the largest opposition party, was regarded as key

to the parliamentary negotiations and the agreement to be settled. In political discussions, the local union argued on behalf of the key domestic O&G suppliers (Interview with Union Leader, 2020).

Accordingly, to ensure the activity, employment and continued development of new competences needed for green industrial restructuring, Norwegian O&G companies, the industry (NHO) supported by trade unions (LO) and KonKraft (a collaboration arena for Norwegian O&G, NHO, the Norwegian Shipowners' Association and the LO, Fellesforbundet and Industri Energi) put forward proposals for a temporary change in the petroleum tax system. The main argument in the proposal was that this would provide better liquidity and better profitability for planned projects so that oil companies would find it justifiable to invest in future projects, including in the renewable sector. An agreement was reached in the Norwegian parliament between the government (Centre-right political parties) and the Labour Party, the Centre Party and the Progress Party on temporary changes in taxation for the petroleum industry. Moreover, the parliament asked the government and the O&G industry to present a plan for reducing emissions from O&G production by 50 percent by 2030, compared with 2005, within the current use of instruments.

There was a call to use the opportunity for what can be perceived as a rapid phase-out of the O&G sector from the socialist left and the green party in Norway, which desired a proactive green policy (NRK 8.6.2020). However, this received strong opposition from the LO, which emphasized the importance of a revitalized O&G industry for achieving the goals set in the climate roadmap for the NCS (E24 18.5.2020). A similar narrative was used by the O&G companies. Paradoxically, Aker's owner suggested that the temporary change in the petroleum tax system would accelerate the green transformation of the O&G industry (Røkke, NRK 16.9.2020). However, taking the inevitability of life after oil in Norway, this, as argued by Andersen and Guldbrandsen (2020), can potentially facilitate the recombination and diversification of the sector, dampening the negative impacts of the transition.

While the previous critical junctures were met by regional policies, the policy in the last critical juncture was sectoral and at a national level, albeit using the vulnerable regions as its legitimation. The taxation regime seemed to turn into an incentive for regulating petroleum activity and balancing business cycles. From the perspective of vulnerable regions, which are indirectly supported by taxation relief for oil companies, we recognize this as a scalar strategy (jumping of scales) concerted by elites and subordinate social groups (Brenner 1999).

Discussing institutional legacies and layering

Here, we analyse the policy mixes for Stord and Verdal during three critical junctures and discuss the institutional legacies from former periods to recent periods.

Table 1. Critical junctures, responses and policy mixes

Critical Junctures		Stord	Verdal
1) 1999 -	Response	Reactive (tripartite collaboration)	Reactive (tripartite collaboration)
	Policy mix	Economic, social, environmental	Economic, social,
2) 2009	Response	Proactive (tripartite collaboration)	Mixed
	Policy mix	Economic, environmental	Economic, environmental
3) 2020	Response	Reactive	Reactive (tripartite collaboration)
	Policy mix	Economic, social	Economic, social

As we summarize the two cases at critical junctures, we emphasize the local responses, underlying processes and balances between the three pillars of sustainable development: economic growth, social equality, and environmental protection. Under the first critical juncture, the Norwegian tradition for collaboration in ensuring jobs under economic restructuring is evident at Stord and Verdal. The second critical juncture can be characterized by somewhat proactive policy mixes aimed at a green shift, albeit to a greater extent in the more diverse economy of Stord than in Verdal. Green momentum is somewhat lost in the third critical juncture, with the prioritization of short-term reactive policies. The key actors argue that social issues (the question of justice) will provide time for a green shift, but the international market pull could play a major role in accelerating the process. We still recognize contradictions and dilemmas in these matters.

The emphasis on the green shift (environmental transition), in addition to the economic and social aspects at the second critical juncture, is in line with the institutional layering conceptualization. The social aspects (the question of justice) in terms of ensuring local jobs, facilitated by the tripartite collaboration characterizing the first critical juncture, are revitalized at the third critical juncture. We recognize this as an institutional legacy. Furthermore, we argue that taking the social aspect into consideration more explicitly would provide further legitimacy and thus enhance the feasibility of more radical green shifts. From a pragmatic position, the inclusion of key stakeholders in framing green shifts enhances legitimacy and thereby supports the success of the process. The Norwegian tradition of tripartite collaboration entails institutional conditions that can ensure the procedural dimension for a just, sustainable transition.

Furthermore, we observe more reactive responses to external shocks at critical junctures in Verdal than in Stord. We believe this is due to the more vulnerable industrial structure at Verdal than at Stord. Typically, the vulnerable situation of Verdal received political attention and media coverage at the last critical juncture. Relatedly, we also recognize that the Stord industry demonstrates a greater capability to diversify into new (and greener) industries, advancing step by step over the period studied. These findings support the idea that more diverse industrial specializations have greater potential for new industrial development and/or regional branching (Boschma, 2015).

Conclusion

This paper unpacks the policy mixes and underlying processes designed over time to shape just sustainable development in regions that are solely dependent (over-specialized) on old carbon-intensive industries. In this paper, we make an important contribution to the transition literature by

providing novel insight into the geography of sustainable transitions and the legitimation of appropriate multi-scalar transition policy mixes.

Based on a longitudinal case study of two Norwegian O&G-dependent regions, Verdal and Stord, the analysis focuses on the multi-scalar policy mixes and the underlying political process and most notably on the Norwegian model of working life relations in framing and legitimizing just and predictable regional industrial transition processes over time at three critical junctures between 1999 and 2020. The paper reveals that, underpinned by the Norwegian model, the focus of the policy mixes in the two regions prior to 2015 was more on a crisis-induced industrial restructuring process aimed at achieving regional diversification and job security (i.e., the economic and social dimensions) than on the forward-looking achievement of sustainable transitions (the environmental dimension). In both cases, mainly after the 2008-09 crisis, we find proactive multi-scalar policy mixes designed to instigate the development of renewable energy sectors through cluster policies. In this regard, we observe a shift from the 'Keynesian welfare state' to the Schumpeterian workfare state (Jessop, 1993), which reflects a shift in regional policy to a focus on securing local jobs through restructuring programmes to cluster programmes with an emphasis on innovation and networks to strengthen international competitiveness. However, with an overemphasis on economic and social goals, the objective was to capitalize on global renewable energy developments (i.e., creating green jobs) rather than achieving sustainable development through transitions to a low-carbon economy domestically. Nevertheless, in the social democratic context of Norway's oil-dependent economy, as demonstrated in the last critical juncture, we still see an institutional legacy, which we may consider 'institutional layering' (Mahoney & Thelen, 2010), with the potential to revitalize the Keynesian welfare state.

The environmental dimension, i.e., forward-looking proactive policies focused on achieving sustainable development or transitions towards a low-carbon economy, gained prominence in the aftermath of the Paris Agreement in 2015. However, due to the strategic importance of the O&G sectors both regionally and nationally, reactive and proactive multi-scalar policy mixes have focused on the decarbonization of the sector rather than on its active phase-out while slowly fostering the development of adjacent renewable energy sectors, particularly OWP, mainly through technology push instruments. From the just transition perspective, this can be interpreted as a gradual approach (Gambhira et al., 2018). While to a large extent supporting business as usual and offering an opportunity for continued value creation in the incumbent sector, it will provide time the emerging renewable technology to mature and thereby meet the long-term 'life-after-oil' ambitions, reducing the possible negative impacts of transitions, such as job losses and firm closures (Andersen & Gulbrandsen, 2020). In this paper, we recognize the potential for a just, sustainable transition by leveraging the tradition of tripartite collaboration.

In light of the increasing urgency of sustainability transitions, there are certain elements that must be incorporated in the wider policy mixes for a rapid and just transition to a low-carbon economy in a region. First, we recognize the potential for a just sustainable transition building on the Norwegian model and as such the possibility to avoid reactive policy responses. Second, as they could facilitate the rapid profit-induced diversification of O&G firms, the current innovation policies aimed at the creation of a new regime through a technology push need to be complemented

by accelerated domestic market creation and green regulations and by support for marketing and market access. Third, local workers should attain skills to be competitive in diverse markets and have future-oriented vocational training providing insights into digital technologies, such as automatization and robotization. Fourth, these efforts should be complemented by disincentivizing the O&G sector to make it less attractive for future investments.

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Notes

¹ We refer to Aker Stord and Aker Verdal as the plants through the period studied albeit the owner company has changed name to Kværner in 2011 and merged with Aker Solutions in 2020.

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