

Policy mixes for just sustainable development in regions specialized in carbon-intensive industries: the case of two Norwegian petro-maritime regions

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Abstract

Research on the Geography of sustainability transitions (GOST) has enhanced our understanding in how place-based factors condition sustainability transitions. Its emphasis on the geography of niche development however, neglects regime-level response,s to regional sustainably transitions imperatives. Given the urgency in sustainability transitions, recent sustainability transitions research has emphasized an active destabilization and/or phase-out of incumbent carbon-intensive industries. However, this poses normative and practical challenges for regions heavily dependent in these sectors. Here the challenge is how to ensure an inclusive transition. This paper contributes to GOST by focusing on *distributional* and *procedural* dimensions of policy mixes, relying on policy focused just transition and institutionalist literature. Our longitudinal case study of two Norwegian oil-dependent regions identifies phases separated by critical junctures, with different policy mixes. Underpinned by the Norwegian tripartite cooperation model, the multi-scalar policy mixes in the regions has focused on the sector's decarbonization, rather than its phase-out, while developing renewable energy sectors through technology-push. Supporting short term business as usual, this provides the industry time to prepare for emerging renewable technologies and reducing negative impacts of transitions. We suggest that just sustainable development in such regions requires coherent multi-scalar innovation policy mixes, and legitimacy and participation among key actors.

Keywords:

Geography of sustainability transitions, Just sustainable transition, tripartite collaboration, Norwegian social democratic model, institutional layering

Introduction

Research on sustainability transitions has enriched our understanding into the persistence of unsustainable socio-technical regimes such as energy, transport or food and the possible transition pathways and transition management strategies of promoting, fundamental transformations in these sectors towards more sustainable modes of production and consumption (Markard et al., 2012; Geels, 2011). More specifically, framed within an expanding strand of literature - the Geography of sustainability transitions (GOST) - research on sustainability transitions has further enhanced our insights in how place-based factors i.e., local and regional contextual factors condition sustainability transitions (Coenen et al., 2012; Hansen & Coenen, 2015). One such important factor is, the presence and legacies of local and regional industrial specializations, as the regional sustainable development agendas, and thus the selective regional innovation policies, are shaped by the existence of relevant knowledge, skills, including local organizational and institutional capacities and the locally embedded industrial networks (Coenen et al., 2015; Grillitsch & Hansen, 2019; Hansen & Coenen, 2015). However, with a primary emphasis on the geography of niche development, and formative phases in technological innovation systems,

GOST research has given far limited attention to regime-level responses to regional and local sustainability transitions imperatives (Hansen & Coenen, 2015).

More specifically, in light of the increasing urgency in sustainability transitions to meet stringent international decarbonization targets, recent sustainability transitions research has emphasised on accelerating sustainability transitions through policy mixes that incorporate an active destabilization and/or phase-out of the established incumbent industries. This is in order to create windows of opportunity for the upscaling of clean-tech innovations (Kivimaa et al. 2020; Kivimaa & Kern, 2016). However, such drastic path-breaking policies pose both normative as well as practical challenges for regions that are heavily dependent in these sectors (e.g., petroleum extraction), as these sectors account for a significant share of regional and national value creations and employment. Hence, in regions that are specialized in the carbon-intensive industries (Grillitsch & Hansen, 2019), how to achieve just sustainable development by ensuring an inclusive carbon-neutral regional industrial transition and growth has become an all-important policy and research agenda (Kivimaa et al., 2020; Markard et al., 2020).

In response, this paper aims to provide a novel insight into the geography of sustainability transitions debate by shedding light on the challenges and opportunities of achieving just sustainable transition (development) in regions heavily dependent in the carbon-intensive industries. We specifically ask:

- How is the question of justice addressed in the sustainable regional development policy mixes developed and implemented over time in regions heavily dependent in the carbon-intensive industries?

Central in the innovation policy debate, the notion of policy mixes, refers to, and is operationalized in this paper as the set of policy rationales, arrangements and instrument mixes implemented in regions to deliver public action in specific policy domain, as well as the interactions that can take place between these elements (Flanagan et al., 2011; Rogge & Reichardt, 2016). In this paper, we argue that just sustainable regional transition (development) in these types of regions requires coherent national, regional and local innovation policy mixes 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 unpacking the just sustainable regional transition (development) policy mixes, therefore, we complement the GOST literature with perspectives from the burgeoning policy focused just transition as well as the historical institutionalist literature, which emphasizes institutional legacies (Mahoney & Thelen, 2010). The just transition perspective provides important conceptual apparatus in unpacking the sustainable regional development policy mixes and the underlying political and/or decision-making processes that are aimed at achieving, more pragmatically equitable and just transitions to a low-carbon regional economy and growth (Jenkins, 2018; Williams & Doyon, 2019). The concept of institutional layering, as reflected in incremental changes in the formal rules, policy goals and institutions overtime, is productive for analysing and designing just and sustainable policies (Thelen, 2014).

Empirically, the paper relies on the longitudinal case studies of two Norwegian oil and gas (O&G)-dependent municipalities and surrounding regions, Verdal in Mid-Norway and Stord in Western Norway, focusing on three critical junctures. Both municipalities 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, and 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.

Theoretical framework

Sustainability transitions are conceptualized as coevolutionary processes that involve fundamental shifts from incumbent sociotechnical systems (regimes) such as energy, food or transport towards other emerging alternatives (niches) (Geels, 2011; Markard et al., 2020). Sustainability transitions are geographical processes, occurring in specific geographical locations (Hansen & Coenen, 2015). Research on how geography matters for sustainability transitions is framed within, a burgeoning strand of transitions literature, the geography of sustainability transition (GOST) (Coenen et al., 2012; Hansen & Coenen, 2015). According to the GOST literature, sustainability transitions are conditioned by place-based factors, such as, institutional environments, local cultures, social networks, infrastructural and resource endowments, industrial structures, etc. (Hansen & Coenen, 2015). Of a particular concern within the context of this paper are the important role of two place-based factors, namely, local and regional development visions and policies as well as the local and/or regional technological and industrial specialization (Hansen & Coenen, 2015).

Local and regional visions and policies are outcomes of contestations and struggles among key stakeholders embedded across multi-scalar (i.e., local, regional, national and supra-national) institutional environments. This, in turn signifying the vital role of heterogeneous group of local actors, indicates that transitions are shaped by an interplay between a combination of policy

objectives, and instrument (policy) mixes (Flanagan et al., 2011; Kern et al., 2019; Kivimaa & Kern, 2016; Rogge & Reichardt, 2016). In concrete terms, the current regional and local sustainability transitions policy mixes often combine environmental goals with economic competitiveness, i.e., they are aimed at fostering regional green growth through the development of cleantech industries, wherein the traditional industrial development policies such as (clean-tech) cluster development through R&D support, tax incentives, subsidies, etc. play crucial role (Hansen & Coenen, 2015).

Furthermore, as emphasised in the GOST literature, the innovative potential, and by extension that of sustainability transitions differs qualitatively between regions as it is also conditioned by the technological and industrial specializations of the regions (Hansen & Coenen, 2015). Industrial specialization here refers to the set of interrelated activities within a region and their effects on learning, innovation, and production of regional firms and organizations and notably revolve around a dominant industry located in the region (e.g., petroleum extraction) (Grillitsch & Hansen, 2019). The main argument here therefore is that local technological and industrial specialization (signifying path dependency) can condition the development of sustainable regional industries through the existence of particularly relevant skills and capabilities in the labor market and organizational and institutional capacities of regionally and locally embedded industrial networks, in turn shaping the focus of the regional policy agendas and mixes (Hansen & Coenen, 2015). Notably, in regions dependent in the old carbon-intensive industries it is often difficult to mobilize firm and non-firm actors for strategies that devalue past investments due to strong vested interests (Grillitsch & Hansen, 2019), in turn constraining regional sustainable transition (development) objectives. In other words, regions with more diverse industrial specializations have greater potential for the development of new industrial path (be it sustainable or not) and are less

vulnerable to external shocks, i.e., both the short-term (e.g., oil price plunges) and long-term industrial declines (Boschma, 2015).

Yet, with a primary emphasis on the geography of niche development, GOST research has given far limited attention to these regime-level dynamics in sustainability transitions (Kholer et al., 2019; Hanse & Coenen, 2015). Recently, in light of the increasing urgency of sustainability transitions to meet stringent international decarbonization targets, there has been a growing focus on accelerating sustainability transitions through policy mixes that incorporate an active destabilization and/or phase-out of the established incumbent industries. This is in order to create windows of opportunity for the upscaling of clean-tech innovations (see e.g. Kivimaa et al., 2020; Kivimaa & Kern, 2016). However, as noted above, accelerating sustainability transitions through destabilization and/or phase out policies in regions that are dependent in the old carbon-intensive industries may lead to backlashes that could potentially result in the slowing or reversal of the regional industrial transition processes (Gambhira et al., 2018; Markard et al., 2020). This is mainly because, phase-out threatens existing business models and assets leading to incumbent firms (that control critical resources, finances, ties to policymakers and unions) often trying to slow down (and/or obstruct) sustainability transitions. Phase-out may also lead to massive unemployment. Thus, regional transitions also face resistance from unions and workers whose jobs are at stake (Markard et al 2020). In addition, states that are dependent on revenues from these incumbent industries could see the loss of valuable source of revenues. Hence, this may lead to a lack of political will to facilitate the process (Green, 2018; Gambhira et al., 2018).

From a normative standpoint therefore, as argued (among others) by Williams and Doyon, (2019, 144) 'we cannot achieve a rapid sustainability transition without addressing the question of justice'. This holds particularly true in regions that are dependent in the old carbon-intensive industries

(Green, 2018). For rapid sustainability transitions (development), to be successful in these types of regions, this implies that the regional and local visions and policy mixes, that combine environmental and economic goals should be complemented by social goals to ensure social acceptance and crucially justice (Kivimaa et al. 2020; Markard et al., 2020; Williams & Doyon, 2019). The expanding policy-focused ‘just transition’ perspective provides useful conceptual apparatus in untangling the question of justice in sustainable transitions (see, e.g., Newell & Mulvaney, 2013; Jenkins, 2018; Stevis & Felli, 2015; Williams & Doyon, 2019).

Towards just regional sustainable transitions

Dealing with the question of justice in sustainable transitions entails ensuring that transitions to a low carbon economy are equitable, sustainable and legitimate in the eyes of the communities affected by them (Newell & Mulvaney, 2013). Scholars distinguish between three forms of justice in transitions, namely, distributive, procedural, and recognition. Distributional justice addresses issues associated with access to resources and opportunities in addition to the distribution of environmental goods, costs and benefits. Procedural justice on the other hand, is linked to the underlying participatory processes that underpin policy and/or decision-making processes. Lastly justice as recognition is related to unequal recognition given to individuals, communities, or social groups by cultural and institutional processes and legacies (Jenkins, 2018; Williams & Doyon, 2019).

In this paper, our main focus is on the distributive and procedural dimensions of justice. Going beyond mere transitions, this as noted above, 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 the carbon-intensive industries. Based on

these two dimensions, strong emphasis is placed on workers' and unions' power in defending the 'losers' of regional industrial restructuring and/or transition process. Accordingly, 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 (Newell & Mulvaney, 2013). From the perspectives of the carbon-intensive industries, 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 further takes into consideration that labour has a weaker position than capital in forming the economy. Therefore, procedurally 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 (Stavis & Felli, 2015).

Procedurally and distributionally, just sustainable regional transition (development) policy mixes are particularly conditioned by institutional legacies (setting) and are reflected overtime in the changes in the formal rules, policy goals and institutions (Figure 1). Drawing on the historical institutionalist (HI) perspective (Mahoney & Thelen, 2010), institutional change mechanisms involve: layering, drift, conversion, and displacement (Geels et al. 2016). In line with HI

perspective that institutions change foremost gradually we focus on *layering*. Institutional layering 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). These changes, including in formal rules, policy goals, etc., are often an outcome of critical junctures, such as major economic crises, and/or incremental change processes that take place relatively continuously. Interestingly, signifying institutional legacy, even though, political-economic institutions shift, the traditional welfare regimes of advanced economies might maintain their core logic (Thelen, 2014). Even through critical junctures, the core components of institutions are likely to persist, and become adapted to changes in the economic and political environments in which they are embedded (Mahoney & Thelen, 2010).

In concrete terms, taking into consideration the volatility of the carbon-intensive industries on the one hand, and the vulnerability of the regions dependent in these industries (Boschma 2015) on the other, the policy mixes aimed at achieving just sustainable regional transitions (development) in these types of regions may be comprised (in-turn signifying different critical junctures) of both ‘reactive’ and ‘proactive’ policy components (Figure 1). Reactive policies, emphasising social and economic goals, are related to the short-term response (external to shocks), including ensuring existing jobs in the carbon-intensive ones. Proactive policies, on the other hand, emphasising a combination of the economic, social and environmental goals, are aimed at maximizing the long-term benefits of the transition (i.e., sustainable regional development) (Gambhira et al., 2018).

We argue that the HI perspective is relevant both in analysing and designing policies in the Norwegian institutional context, i.e., in the context of Norwegian social democracy and/or 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). Studies have documented the vital role of tripartite collaboration between social partners in ensuring procedural justice and most importantly legitimacy (acceptance) by major transition stakeholders (Gambihira et al., 2018). In the 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 contributes overtime in framing predictable sustainable regional development processes (initiatives) in two Norwegian O&G dependent municipalities. In addressing the neglect of multi-scalar institutional and political dynamics, 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., 2021). Figure 1. portrays our analytical framework.

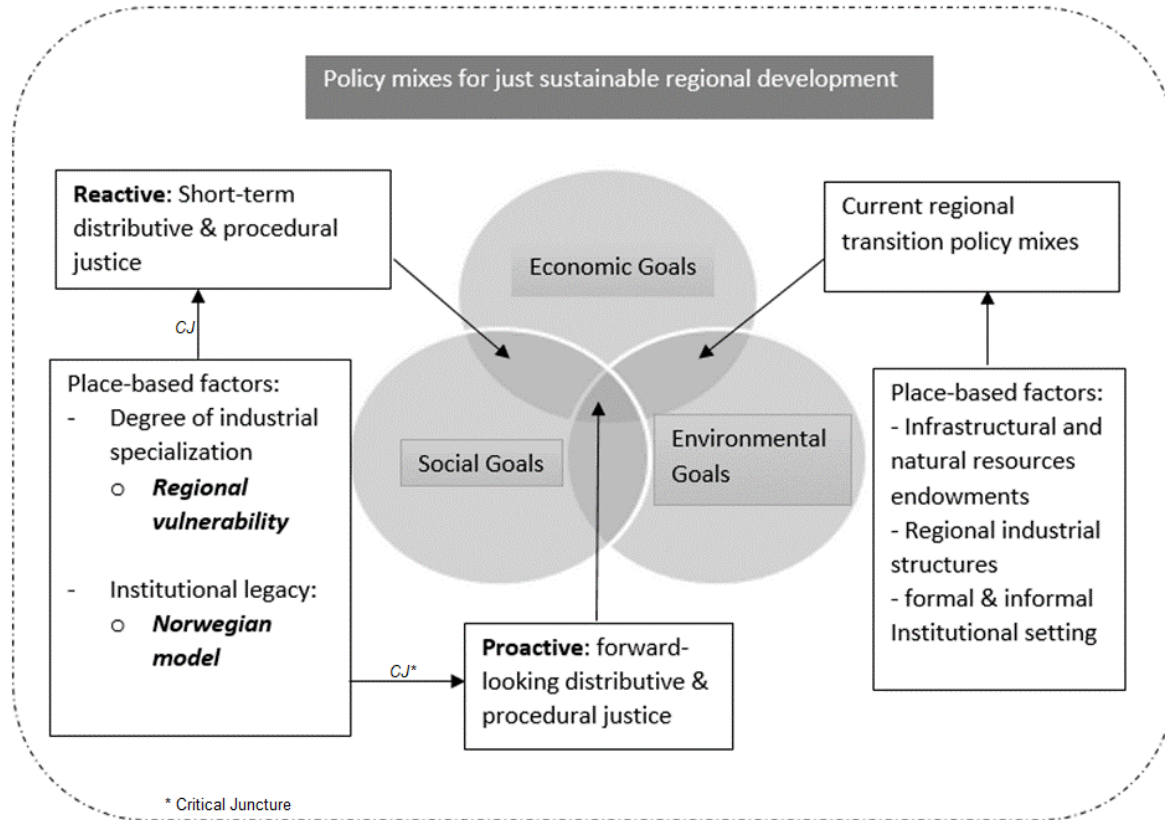


Figure 1. Analytical framework

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 perspective emphasizing institutional legacies, the methodology chosen is a longitudinal case study supported by empirical triangulation. The analysis focuses on critical junctures that separate coherent 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 embedded cases with regard to certain similarities (dependence on carbon-intensive

industries) and differences (degree of industrial specialization). Analyses within each case and across the two cases give evidences that are stronger and more reliable than a single case study, and provides insights into whether differences in initial industrial structure, also might lead to differences in diversification and sustainable transitions (Yin, 2018). More concretely, the chosen municipalities dependent in petroleum or petro-maritime industries. Stord has approximately 19,000 inhabitants, and specializing in petro-maritime industries, is a regional centre in the Sunnhordland district in Vestland County in south-western 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 is an archetypal single industry town (Karlsen, 2011) more heavily dependent on 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 and media coverage. For the restructuring processes at Stord and Verdal at the entrance of this century, we draw on evaluation reports (Johansen 2007; Finne et al. 2008). We also rely on author's previous research based on 21 semi-structured interviews of key regional firm and non-firm actors at Verdal conducted in 2010-2012 and participation at regional offshore wind events (Steen & Karlsen, 2014). In 2017-2020 we conducted 7 further interviews with core actors at Verdal and Stord. The complete collection of interviews covers managers from cornerstone companies, their union and suppliers, infrastructure company and industrial development agencies. All interviews have been transcribed and cover topics on market challenges (critical junctures), restructuring processes and diversification efforts, including sustainability development. The analysis of the cluster

development on CleanTech at Stord is mainly based on Sjøtun and Njøs (2019) and Holmen and Fosse (2017).

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 revenues 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 and Verdal were among the five Norwegian municipalities that had the highest ratio (>5 %) of employees involved in constructing and fitting O&G platforms and supply bases (Ekeland, 2017). As Aker spinoffs have had more than 60% of their turnover directed towards Aker Verdal, 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

growing 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 2 shows the inverse-correlation between Norwegian O&G suppliers offshore wind power (OWP) activities and O&G market fluctuations.

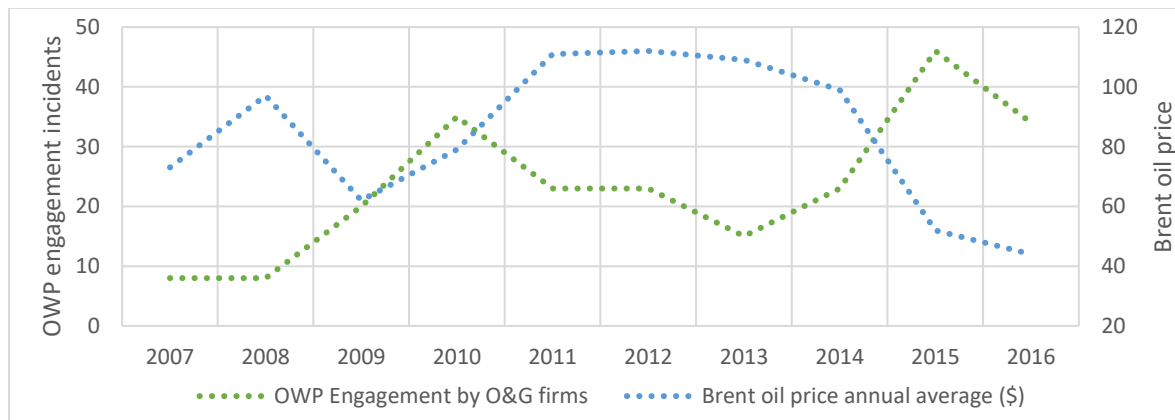


Figure 2. O&G suppliers' activities in OWP in light of fluctuations in the O&G market.

Source: Mäkitie et al. (2019)

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 overdependence 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 economy and to strengthen business development capacity. Local RP strategies and processes have to align with the top-down requirements enacted by Innovation Norway, the state organization in charge of RPs, and were aimed at 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).

The Hordaland County established a RP executing body, Samspelsforum for NæringsUtvikling (SNU). The RP operating 2002-2006, 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 national-level requirements, fostering diversification through spinoffs and product and market development was an important target area. Accordingly, spinoffs from industrial enterprises has

generated many jobs, to which SNU has played a crucial role. Examples of companies that have spun out of the local Aker Stord companies include three firms within electro installation and service, technology and service, and ICT respectively (Johansen, 2007).

Procedurally, reflecting a typical Norwegian model (which helped legitimize the process), SNU, was deliberately established as a limited company where no owner held a dominant position. Other key partners and participants in the restructuring process were 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 (Norwegian United Federation of Trade Unions), with its board representative, was an active contributor to the restructuring work throughout the period (Johansen, 2007).

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, the programme evidently 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 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 (Interviews 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 and external start-ups, with a total of 200 employees, had been established (Steen & Karlsen, 2014). By 2009, there were over 150 firms with 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 (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, i.e., the legitimization for the restructuring of the petroleum-related industry and the growing attention to diversification towards renewables.

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 policy mix focused predominantly on 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 initiative), which 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 together with the inter-municipal development agency, SNU AS. This participatory process was crucial in bringing the cluster development process forward. The application process involved powerful public and private actors. None of the parties involved in the process had, however, 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 2021) consists of over 100 members covering the entire traditional maritime value chain (e.g., wharfs, shipping companies, ship design, and 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, including Aker, the local business development agency IndPro (later Proneo), WMN was granted Arena status as a regional development project and public funding, 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 domestic 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.

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 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 emissions, which included the EU emission trading system for greenhouse gases and the CO₂ tax, economically incentivized companies to implement permanent reduction measures. Most of the CO₂ released from the Norwegian continental shelf 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 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. 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. 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. 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 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 Norwegian Continental Shelf (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 over the period studied.

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

Table 1. Critical junctures, responses and policy mixes

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 (see table 1). 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

The paper provides a novel insight into the geography of sustainability transitions debate by shedding light on the challenges and opportunities of achieving just sustainable transition in regions dependent in the carbon-intensive industries. Successful transition in regions heavily dependent in the carbon-intensive industries is contingent upon a careful consideration of the questions of justice and equity. Thus, we complement the GOST literature with insights from perspectives on the burgeoning policy focused just transition as well as the historical institutionalism literature, which emphasizes institutional legacies. Focusing on the *distributive* and *procedural*, dimensions of just transitions as well as the institutional setting within which the process unfolds therefore, we shed light on the just sustainable regional transition policy mixes

and the underlying (participatory) political processes that underpin policy and/or decision-making processes.

Our 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). The more reactive responses to shocks at the critical junctures in Verdal than in Stord, is primarily due to Verdal's overdependence in the O&G sector, hence, the vulnerability of the region. By contrast, we found that the petro-maritime regional hub, Stord, demonstrating a greater capability to diversify into new (and greener) industries over the period studied. 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, which is a shift from the 'Keynesian welfare state' to the Schumpeterian workfare state (Jessop, 1993). This shift reflects a change in regional policy from focus on securing local jobs through restructuring programmes to cluster programmes with an emphasis on innovation and networks to strengthen international competitiveness. Through the critical junctures and the shifts in regional policy, public-private- and multi-scalar coordination is maintained in line with the idea of institutional layering. 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, 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 sector, 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 local industry time to prepare the regional branching into emerging renewable technology 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 & Guldbrandsen, 2020). In this paper, we recognize the potential for a just , sustainable transition and thereby avoiding reactive responses by leveraging the tradition of tripartite collaboration. Thus, our research further identifies three key areas that public policy could address.

First, as they could facilitate the rapid profit-induced diversification of O&G firms, the current innovation (transition) policies in the regions need to also be complemented by accelerated domestic market creation and green regulations to ensure predictable frames for job creation in renewable energy and clean tech sectors. Second, 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. Third, these efforts should be complemented by dis-incentivizing the O&G sector to make it less attractive for future investments and/or create level playing field with the emerging sectors.

In the end, as our research is based on a specific institutional setting (i.e., the Norwegian social democratic context), there is a need for more (and rather comparative) research in industrially-specialized regions embedded in different institutional settings (varieties of capitalism).

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