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Shaping the policy mix for energy transition in peripheral regions: Case study of the offshore oil and gas industry in Newfoundland and Labrador

par
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Résumé

Avec l'intensification des changements climatiques et de l'impact environnemental de l'utilisation et l'exploration des énergies non renouvelables au courant de la dernière décennie, une attention accrue est portée aux enjeux de la transition énergétique et à l'importance de mobiliser tous les acteurs et parties prenantes de nos sociétés. Ainsi, les gouvernements et les industries explorent de nouvelles solutions pour mieux adresser ces enjeux énergétiques. La transition durable et la transition énergétique prennent d'ailleurs de l'ampleur dans la littérature existante, notamment dans la littérature sur les régions, les politiques et l'innovation. Bien que le rôle du dosage des politiques en lien avec la transition énergétique ne soit déjà bien exploré, le rôle des acteurs et le contexte des périphéries restent peu développés. Cette étude cherche à contribuer aux recherches existantes sur les régions, le dosage des politiques et la transition énergétique, à travers une étude de cas de l'industrie du pétrole et du gaz naturel *offshore* à Terre-Neuve et Labrador. Notre étude se concentre sur le rôle des acteurs gouvernementaux et de l'association industrielle. Cette recherche analyse l'industrie et ses dynamiques sous-jacentes, examine le dosage des politiques qui réglementent et encadre l'industrie, et elle évalue comment les spécificités locales et le contexte de périphérie influencent le rôle des acteurs et le dosage des politiques. Afin d'évaluer le rôle des acteurs et leurs stratégies de changement dans l'action, cette étude se base sur la définition du dosage des politiques développée par Rogge et Reichardt (2016). Cette étude applique aussi le cadre conceptuel et la théorie de *trinity of change agency,* ou « théorie du changement dans l'action » [traduction libre] (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022). Une des implications théoriques principales de cette recherche est qu'elle applique ces deux cadres théoriques existants, et contribue ainsi à la littérature en présentant une étude empirique d'une région en *lock-in* selon la typologie de Nilsen et al. (2022). Pour les implications pratiques, cette étude présente différentes stratégies que les acteurs gouvernementaux ou d'industrie peuvent déployer afin de transformer le dosage des politiques actuel pour faciliter la transition énergétique.

Mots clés : transition énergétique, dosage des politiques, changement dans l'action, industrie du pétrole et du gaz naturel *offshore*, géographie économique, périphéries, Terre-Neuve et Labrador

Méthodes de recherche : étude de cas, entrevues semi-structurées

Abstract

With rising climate change challenges and environmental impacts of the exploration and production of non-renewable resources over the last decade, increasing attention has been paid to the imperative of energy transition and the need to mobilize efforts from all actors and stakeholders. Governments and industries have been exploring new paths to address energy concerns. In fact, sustainability and energy transitions have gained traction in various fields of existing literature, from regional studies to policy and innovation studies. While the role of the policy mix has been extensively studied in relation to energy transition, the role of actors and the context of peripheries remain underexplored. This paper aims to contribute to existing regional, policy mix and energy transition research, through a case study analysis centered around the role of actors within the policy mix of the offshore oil and gas industry in Newfoundland and Labrador. Our study focuses on governmental actors and industrial associations. More specifically, this research analyzes the offshore oil and gas industry and the dynamics at play, examines the existing policy mix regulating and framing the industry, and evaluates how local specificities and the context of peripheries, influence the role of actors and the policy mix. To assess actors' agency within the regional context and the policy mix, this study adopts a conceptual framework based on the theory of the *trinity of change agency* (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022) and the definition of the policy mix concept from Rogge and Reichardt (2016). One of the main theoretical implications of this study is that it applies these two existing frameworks and provides empirical evidence of actors' change agency in a locked-in region as per Nilsen et al.'s (2022) typology of peripheries. Practical policy implications are advanced by identifying different strategies that actors, whether governmental actors or industry actors, can employ to shape the current policy mix to facilitate energy transition.

Keywords: energy transition, policy mix, change agency, offshore oil and gas industry, economic geography, peripheries, Newfoundland and Labrador

Research methods: case study, semi-structured interviews

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List of abbreviations and acronyms

ACOA: Atlantic Canada Opportunities Agency

CAPP: Canadian Association of Petroleum Producers

CCUS: Carbon capture, storage, and utilization

CDEV: Canada Development Investment Corporation

CER: Canada Energy Regulator

CHHC: Canada Hibernia Holding Corporation

C-NLOPB: Canada-Newfoundland and Labrador Offshore Petroleum Board

CNSOPB: Canada Nova Scotia Offshore Petroleum Board

ECC: Department of Environment and Climate Change (Government of Newfoundland and Labrador)

ECCC: Environment and Climate Change Canada

ERI: Energy Research & Innovation Newfoundland and Labrador

GHG: Greenhouse gas

IET: Department of Industry, Energy and Technology (Government of Newfoundland and Labrador)

IRCC: Immigration, Refugees and Citizenship Canada

ISED: Innovation, Science and Economic Development Canada

JV: Joint Venture

MLP: Multi-level framework

MNE: Multinational enterprise

NEIA: Newfoundland and Labrador Environmental Industry Association

NOIA: Newfoundland and Labrador Oil and Gas Industries Association

NRC-IRAP: National Research Council of Canada Industrial Research Assistance Program

NSERC: Natural Science and Engineering Research Council of Canada

OilCo: Oil & Gas Corporation of Newfoundland and Labrador

PERT: Premier's Economic Recovery Team

REGI: Regional Economic Growth through Innovation

RIS: Regional innovation systems

SDTC: Sustainable Development Technology Corporation

SME: Small and medium enterprise

techNL – Newfoundland & Labrador Technology & Innovation Industries Association

TRL: Technology readiness level

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Chapter 1: Introduction

Over the past decade, international and local pressures have intensified to urge countries and economies to take immediate action on the global environmental crisis. António Guterres, Secretary-General of the UN, declared that *"... [c]ountries should also end all new fossil fuel exploration and production, and shift fossil fuel subsidies into renewable energy"* (United Nations, 2021).

This research project is embedded in this key contemporary challenge: the imperative of the energy transition. With the Paris Agreement signed in 2015, Canada – among 196 countries – committed to limit global warming, ideally below 1.5 degrees Celsius (Office of the Auditor General of Canada, n.d.). To achieve that common goal, countries must drastically reduce their emissions and reach carbon neutrality by 2050 (United Nations, n.d.). At the national level, governments have deployed numerous initiatives and made extensive investments to achieve global targets. Expectedly, the political and economic sphere, along with scientific discourse have been studying sustainability and energy transitions closely (Loorbach et al., 2017). More specifically, the policy mix perspective has gained some traction in innovation and transition studies (Kanger et al., 2020; Ladu et al., 2019; Loorbach et al., 2017; Markard, 2017), as governments and scholars seek to understand how to leverage policy instruments to steer technological and system innovation towards energy transition (Flanagan et al., 2011; Reichardt et al., 2016; Reichardt et al., 2017).

While the role of the policy mix for sustainability and energy transitions has been explored extensively in the literature (Kemp et al., 1998; Kern & Howlett, 2009; Ladu et al., 2019; Markard et al., 2016; Rogge & Reichardt, 2016), existing studies do not emphasize enough the spatial dimension of energy transitions (Caragliu & Graziano, 2022; Coenen et al., 2012; Mattes et al., 2015; Trippl et al., 2020), nor the role of agency in regional development (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022; Trippl et al., 2020). This research project thus emerges from this gap in the literature and aims to contribute to existing studies on policy mixes, energy transitions and peripheries.

1.1 A case study approach

This research project adopts a case study approach, as this method is ideal for studying a current phenomenon within a given real-life context that the researcher cannot really control (Yin, 1994). The main objective of this thesis is to explore through a case study of the offshore oil and gas industry in the province of Newfoundland and Labrador, how actors of a given ecosystem in a peripheral region integrate environmental challenges and influence the policy mix towards energy transition and a greener regional development.

This thesis focuses on the energy transition of the offshore oil and natural gas industry in the province of Newfoundland and Labrador. This industry covers operations related to the extraction, production and exploitation of oil and natural gas happening along the coastal areas and in high seas (Cleveland & Morris, 2015). Canada is one of the largest producers of oil and natural gas in the world, and the offshore industry in the province of Newfoundland and Labrador accounts for 25% of the national production of conventional light crude oil (St. John's, n.d.). Moreover, the context of Newfoundland and Labrador is interesting to examine as it allows us to study how energy transition challenges are integrated in a particular regional context: the development of peripheral coastal regions.

COP26 in 2021 highlighted just how challenging it is for many economies to evolve towards growth and development models less reliant on non-renewable resources, such as fossil fuels (e.g., oil, gas and coal) (Hill & Babin, 2021; Sommer, 2021). With recent developments in the exploitation of new oilfields, or even with the controversial nomination of Sultan Al Jaber, the head of the UAE's state oil company as the President of the COP28 (Khadka, 2023), it is clear that fossil fuels are still largely present and play a predominant role in our economies. The offshore oil and gas industry is therefore one of the key sectors in Canada for the energy transition. So, how can actors push towards energy transition, especially in spaces where fossil fuel energy is intrinsic to activities? This research project will address the following question:

> *How can actors shape the policy mix for energy transition in peripheral regions?*

To answer this main research question, this thesis will be articulated around three underlying questions:

- What are the main components and characteristics of the policy mix around the offshore oil and gas industry in Newfoundland and Labrador?
- Who are the main actors of the offshore oil and gas industry and what are the key dynamics and networks among them?
- How does the specific context of Newfoundland and Labrador influence the policy mix and the energy transition of the offshore oil and gas industry?

The first question analyzes the context of the offshore oil and gas industry in Newfoundland and Labrador through a policy mix perspective, by examining the different components and processes of the policy mix. The second question focuses on understanding the dynamics and networks at play in the offshore oil and gas ecosystem and explores how actors influence the policy mix and the industry through change agency. The third question examines how local specificities and challenges influence policy mix processes for the energy transition of the offshore oil and gas industry of St. John's.

1.2 Why this research project?

The case of Newfoundland and Labrador is particularly interesting to explore when examining energy transition in peripheries. While the province is relatively small in terms of its contribution to Canada's economy, it possesses characteristics that may be key to the energy transition. In fact, the city of St. John's specifically is recognized as a strategic hub for state-of-the-art ocean technology and expertise not only regionally but globally (World Energy Cities Partnership, n.d.), which positions the region as a particularly interesting case for clean energy innovation. Also, we chose the offshore oil and gas industry in Newfoundland and Labrador as the context of our study, since it is a key economic driver in the region, and it not only significantly contributes to the regional economy, but it also generates opportunities for other sectors. Indeed, the job multiplier of the offshore oil and gas industry (5.0) is the highest in Newfoundland and Labrador (*The Big Reset – The Report of PERT,* 2021; p. 89). Besides, as that industry inherently relies on non-renewable resources, it is directly affected by the energy transition. While Newfoundland and

Labrador is a peripheral region in Canada, the offshore oil and gas industry remains a key strategic sector, not only in Canada but in the global energy industry (Nickel & Valle, 2022).

Furthermore, as the Government of Canada identified the ocean economy as one of its five priority sectors to boost economic development and to position Canada as a world-leader (ISED, 2023a), Newfoundland and Labrador's offshore oil and gas industry emerges as a key industry to examine.

In conclusion, studying St. John's and Newfoundland and Labrador is highly relevant when discussing energy transition within the context of peripheral regions. The empirical field of study is the offshore oil and gas industry in Newfoundland and Labrador, and the scope of analysis is the role of local actors within the policy mix in the province.

Nonetheless, it is worth noting that the reality of the empirical field of study brought certain difficulties and limitations for our research project. Indeed, due to the relatively small size of the industry, the insular culture among local industrial actors and the political sensibility around themes of energy transition in offshore oil and gas, many actors were reluctant and had reservations to participate in the project.

1.3 Contributions

This thesis aims to contribute to policy mix, energy transition and regional development literature. More specifically, the contributions are twofold. First, this research adopts a policy mix perspective on energy transitions, meaning that it looks at the policy mix in place to assess existing preconditions and structures, the dynamics and play and the role of actors when it comes to institutional and technological change. Second, this thesis contributes to regional development literature by providing an empirical case study of energy transition within the context of a periphery. Through this research, we examine how the geographical context influences energy transition and policy mix processes, but also how change agency is leveraged in a peripheral region. By emphasizing the spatial dimension and the role of actors' agency in energy transitions, this research project brings practical and theoretical implications for policymakers and stakeholders in similar regional contexts.

This research project contributes to existing literature by applying a policy mix framework to better understand local dynamics in a peripheral region. We use the specific geographical context Newfoundland and Labrador as a concrete example of how a region that is relatively peripheral geographically and economically and that is highly dependent on non-renewable resources, works towards energy transition.

1.4 Structure of research project

For the structure of this thesis, Chapter 2 will first present the literature review on the policy mix perspective, energy transitions and peripheries. Chapter 3 will describe the conceptual framework used for this research project, based on the paper by Nilsen et al. (2022) analyzing peripheries according to actor composition, regional preconditions and the trinity of change agency (Grillitsch & Sotarauta, 2020). Then, Chapter 4 will detail the methodology adopted for this thesis, each step of the research protocol and the justification, and the quality criteria for this research project. After that, Chapter 5 will analyze the case study context, namely the offshore oil and gas industry in Newfoundland and Labrador and the evolution of public policies around the industry. Chapter 6 will present the analysis of the offshore oil and gas ecosystem and the findings, while Chapter 7 will present the main findings from the analysis of the policy mix. To conclude, the last chapter (Chapter 8) of this thesis will discuss the theoretical and practical implications of this research findings, and disclose the limitations of this study, along with future research prospects.

Chapter 2: Literature Review

This Chapter reviews the existing literature on the policy mix perspective, sustainability transitions and peripheries. The intersection of these three bodies of literature provides the theoretical ground to explore and understand the role of public policies in energy transitions, and how the specific context of peripheries may influence transition processes. This literature review is divided into four sections. The first section will present the context of this study, rooted in the policy mix perspective, and will discuss the literature on policy mix analysis. The second will examine the emerging and relatively recent literature on sustainability and energy transitions, and the principal approaches used to study them. The third section will emphasize the importance of studying the regional context and the role of actors in peripheral regions, and especially the role they can play in facilitating energy transition processes and policies. Finally, the last section of this chapter will identify the gap in the literature from which this research study emerges, and we will attempt to present a comprehensive theoretical framework situated at the convergence of our three main bodies of literature.

2.1 The policy mix perspective

According to the neo-institutional theory, institutions are defined as the formal and informal constraints that structure interactions and behaviours within societies (North, 1991). This theory puts an emphasis on the role of institutions, and argues that institutions play a key role in economic growth and development, as they serve as a foundation for stable social and economic systems (Scott, 2008). More specifically, the neo-institutional theory states that economic development is a result of economic growth and efficient institutional change North (1990). In turn, the theory of institutional change supports that growth also influences and transforms institutions, as collective experiences of individuals and societies will lead to changes in value structures and thus in institutions (Bush, 1987; North, 1990). Neo-institutional authors have put forward the role of governments as central institutions ensuring the well-being of societies (Coase et al., 1987; McMillan, 2003; North, 1991). Based on that theory, many studies have emerged to understand the role of governments, notably through the study of public policy (Hassel, 2015; Jann & Wegrich, 2017; Jenkins-Smith & Sabatier, 1993; Knill & Tosun, 2020; Knoepfel et al., 2007).

The interest in studying policies was developed at the same time as urban civilization emerged, since societies wanted to understand "changes in social and, above all, political organization that accompanied new production technologies and stable patterns of human settlement" (Dunn, 2018, p. 33). Building on the neo-institutional perspective, studying public policy becomes essential as policies are important institutions that affect all areas of societies (Cairney, 2019).

Public policy can be broadly defined as the set of all government or political actors' intentions and actions (or non-actions), made to address, influence or frame a specific problem (Cairney, 2019; Hassel, 2015; Knill & Tosun, 2020). This definition gives a rather broad scope of what public policy is. For Cairney (2019), the underlying assumptions of such a simple definition of public policy actually highlight the complexity of public policy analysis. The author notes four main questions to clarify the definition of public policy: (1) Does it only take into account what governments do or also what they say?; (2) Does it only consider policymakers' decisions or also the effects of such decisions?; (3) What is the definition and composition of a 'government'?; (4) Does public policy also considers what a government does not do? (Cairney, 2019, pp. 24-25). In that sense, studying public policy can be quite complex if there is no clear framework or perspective. To properly understand the role of public policy, many scholars have actually framed their analysis from a policy mix perspective (Kanger et al., 2020; Ladu et al., 2019; Lindberg et al., 2019; Reichardt et al., 2016; Rogge & Reichardt, 2016).

2.1.1 Framing the policy mix perspective

In his book *'Understanding Public Policy – Theories and Issues'*, Cairney (2019) presents the major concepts and theories of public policy. The *policy cycle,* according to Cairney (2019), is not necessarily a model *per se*, but it does help visualize policymaking processes conceptually. Specifically, the policy cycle helps understand how policymaking processes should function, and it also describes how they actually function (Cairney, 2019). The main stages of the policy cycle are described as follows:

1. **Agenda setting**: identify specific issues for government intervention and formulate a corresponding problem;
2. **Policy formulation**: set goals, assess costs and potential repercussions, and define solutions by choosing a combination of policy instruments.

3. **Legitimation**: ensure that policy instruments are supported and approved by interest groups.
4. **Implementation**: appoint an organization for the implementation and provide it with adequate resources, and monitor the completion of policy decisions.
5. **Evaluation**: evaluate the success (or failure) of a policy decision by assessing its implementation and effects.
6. **Policy maintenance**: decide whether a policy should be continued or stopped.

Other scholars also corroborate a similar approach to organizing policy making processes (Howlett & Ramesh, 2003; Jann & Wegrich, 2017; Jenkins-Smith & Sabatier, 1993). Nowadays, as the policy cycle encompasses the important concepts for the study of public policy and policy mixes, it is more used as a framework to organize the study of policy (Cairney, 2019). The key takeaways from this policy cycle conceptualization are that studying public policy entails analyzing policy processes, and that there are different stages to evaluate that evolve through a continuous loop. Some branches of the literature focus on different stages or aspects of the policy cycle.

According to Cairney (2019), how one defines policy will influence the subsequent analysis and interpretation of policy processes. This does not mean that there is a perfect model or approach to follow, however it is essential to determine how a study is framed. While there is no consensus on policy mix analysis, we will explore various studies and theories on policy mixes, including the main phases of evolution of the concept, and the different approaches that are predominant in the existing literature.

2.1.2 The evolution of policy mix literature

Broadly speaking, public policy and policy mix can be distinguished as follows: public policy is the set of tools that a government or legislature has at its disposal, and a policy mix corresponds to an optimal combination of tools (i.e. policy instruments) (Flanagan et al., 2011). However, when we look further into the policy mix, it actually covers all the rationales, strategies, instruments and processes that are linked to a particular sector (Kanger et al., 2020). In fact, policy goals, strategies and implementation processes are essential elements to properly evaluate the implications of public policies (Flanagan et al., 2011). This distinction illustrates how the policy mix perspective

is relevant to study the role of public policy. Policy analysis is embedded in policy-making processes (Dunn, 2018). This subsection will present the main evolutions of the policy mix concept and analyses.

Policy mix emerged as a concept in the literature in the 1960s, primarily within the economic policy literature (Flanagan et al., 2011). Earlier studies had a more disjointed view of public policy, as they analyzed administration practice and policy instruments in silos (Rayner & Howlett, 2009), and many scholars pursued the 'best policy mix' for a given issue (Kanger et al., 2020).

Policy mix literature really developed from the late 1980s on (Flanagan et al., 2011). It became an increasingly important subject explored in various bodies of literature, most notably in policy analysis literature, innovation studies and environmental economics (Howlett & Rayner, 2007; Kanger et al., 2020). From that point, policy mix studies evolved towards a more integrated view of public policy (Rayner & Howlett, 2009). During the 1990s, scholars were mostly interested in analyzing policy instrument interaction, the development of a policy mix, or design coherence in policy mix strategies (Kern & Howlett, 2009; Ladu et al., 2019; Rayner & Howlett, 2009). Then, at the turn of the century, as policy mix literature expanded further in different scientific discourses, the concept of policy mix evolved in relatively distinctive ways.

2.1.3 Main approaches to policy mix

As we have seen so far, the policy mix perspective allows for a systemic understanding of what public policies are, by identifying policy instruments and studying their interactions, but also by assessing policy processes, including policy creation and policy implementation (Flanagan et al., 2011; Rogge & Reichardt, 2016). Since the concept of policy mix expanded in various fields of research, it benefited from insights in different fields of research. However, until recently, policy mix evolved in silos, meaning that research in innovation studies, environmental economics and policy sciences did not extensively intersect on a conceptual level (Rogge et al., 2017).

First of all, *policy mix in environmental economics* is defined as *"several – instead of one – policy instruments are used to address a particular environmental problem"* (Braathen, 2007). These different instruments that compose the policy mix are designed to address specific market failures. For that reason, scholars in that field of research focused on finding optimal combinations of

policies (Fischer & Preonas, 2010; Lehmann, 2012), and analyzing the complementarity of policy instruments and interactions between them (Rogge et al., 2017).

Secondly, the *policy mix in policy studies* not only takes into account the complex combinations of policy instruments, but it also includes the different policy goals and the governance context (Cairney, 2019; Rogge et al., 2017). Regarding policy mix analysis, policy studies concentrate on the characteristics of policy mixes, meaning the coherence, consistency and congruence between policy instruments and policy objectives (Kern & Howlett, 2009; Rayner & Howlett, 2009).

Lastly, *policy mix in innovation studies* corresponds to the combination of a government's policy instruments that have direct or indirect effects on the quantity of R&D investment and the development of R&D and innovation systems (Guy et al., 2009; Nauwelaers et al., 2009).

Some key contributions to discussions around policy mixes actually emerged from innovation policy studies (Edler & Georghiou, 2007; Smits & Kuhlmann, 2004). Drawing from innovation studies, these scholars argue that there can (and should) be 'systemic rationales' behind policy instruments, meaning that measures could influence the functioning of innovation systems (Edler & Georghiou, 2007; Flanagan et al., 2011; Wieczorek & Hekkert, 2012). The primary implication for policy mix literature is that policy instruments can have direct or indirect effects not only on other instruments (i.e. instrument interaction), but they can also help achieve (or facilitate) other policy goals then the ones they were created for (Edler & Georghiou, 2007; Smits & Kuhlmann, 2004).

Drawing from various conceptualizations and approaches to the policy mix, Rogge and Reichardt (2016, p. 1622) offer a more comprehensive and interdisciplinary definition that reads as follows:

> *"[..] we define the policy mix as a combination of the three building blocks elements, processes and characteristics, which can be specified using different dimensions. Elements comprise the (i) policy strategy with its objectives and principal plans for achieving them and (ii) the instrument mix with its interacting policy instruments. The content of these elements is an outcome of policy processes. Both elements and processes can be described by their characteristics, including the consistency of elements, the coherence of processes, as well as the credibility and comprehensiveness*

of a policy mix. Finally, the policy mix can be delineated by several dimensions, including policy field, governance level, geography and time."

This conceptualization of the policy mix highlights how essential it is to account for the complexity of policy processes in policy mix analyses (Rogge et al., 2017). Based on their definition, Rogge and Reichardt (2016) propose a comprehensive framework to analyze policy mix.

While the literature we have reviewed so far focuses more on policy instruments and processes, other key contributions from innovation policy studies emphasize how power is shifting and not just concentrated around governments anymore (Flanagan et al., 2011). Power is not only more dispersed, but it is also multi-actor and multidirectional. The implications for the policy mix are that more actors and stakeholders have a direct and indirect influence on and input into policy processes and instrument interaction. This means that actors' actions and strategies should also be taken into consideration when analyzing policy mixes (Geels, 2020; Nilsen et al., 2022; Rogge & Reichardt, 2016; Trippl et al., 2020). Moreover, it is important to distinguish between top-down and bottom-up initiatives when framing policy mix analysis, and especially to assess the role actors and institutions (Quitzow, 2015; Rogge & Reichardt, 2016). This shows a gap in the literature on policy mix, that scholars in innovation studies and sustainability transitions have been exploring more and more over the past decade (Quitzow, 2015; Rogge & Reichardt, 2016). Lindberg et al. (2019) argue that while the policy-oriented perspective is important, literature focuses more on policies than actors. Their paper combines an analysis of both the policy mix and the policy preferences of industry actors. This thesis aims to contribute to policy mix studies by analyzing the role of actors in policy mix processes.

With climate change and natural resources depletion, there is an increasing need for countries to evolve towards more sustainable and environmentally-friendly economies. Over the last thirty years, public and scientific discourse has been studying transition-oriented policies to investigate how to encourage and implement more sustainable and viable development models. However, such profound transformations require the involvement of all stakeholders, each group with different interests and agenda. Therefore, it is crucial to look into the role of institutions and actors, especially into their influence on shaping policies, facilitating and supporting institutional change towards more environmentally sustainable development (Halseth et al., 2019). To better study the

effects of policies, and the role of actors in policy mixes for technological change, some scholars have drawn insights from a technological innovation systems approach (Raven & Walrave, 2020; Reichardt et al., 2016; Weber & Rohracher, 2012). More scholars explore the links between policy and systems change (Edmondson et al., 2019). In fact, transition studies and technological innovation systems are in part interested in the role of actors and institutions and their influence on overarching systems (Edmondson et al., 2019; Isaksen & Jakobsen, 2017; Kern et al., 2019; Reichardt et al., 2016; Rogge et al., 2020). From a transitions perspective, there is an interdependence between changes in policies or policy mixes, and changes in socio-technical systems (Markard et al., 2016). Policy mixes have been increasingly studied in the innovation and sustainability transition literature (Kanger et al., 2020; Ladu et al., 2019; Loorbach et al., 2017; Markard, 2017). Loorbach et al. (2017) mention that there is not only more interest in innovation for sustainability, but also in transition and system innovation in policy studies and theories. Since *transition* implies a transformation of existing systems and institutions, analyzing the policy mix is a relevant perspective. In addition, we can observe a trend in recent literature. Some of these studies analyze policy mixes and how they (can) encourage innovation and transformation towards more sustainable technologies and innovation systems (Ladu et al., 2019).

The idea of studying the role of actors and institutions within policy mixes has raised interest in sustainability and energy transitions, as transitions affect multiple stakeholders and, by definition, bring institutional change. In fact, numerous frameworks used for policy mix analyses are relevant to study the impacts of policies on technological change, as transition studies and policy mix literature overlap. An interesting aspect in the theory of institutional change that we mentioned earlier is the emphasis on the efficiency of such change. North (1990) states that in response to societal transformations, institutions could evolve and become more efficient, but they could also become dysfunctional. So how can a system ensure to promote development? The different paths and direction that institutional change can take is determined by the skills and opportunities that the structures in place will nurture (North, 1990). Building on the theory of institutional change, many authors have furthered the literature on path dependency and the directionality of change. While these topics are not the focus of our study, the theory of institutional change and the neo-institutional theory in general are essential theoretical foundations to the literature around sustainability and energy transitions. The next section of this literature review will delve deeper into the sustainability and transition literature.

2.2 Sustainability and energy transitions

As mentioned in the previous section of this Chapter, the policy mix perspective is particularly relevant to assess the role of policies in institutional and technological change. The increasing pressure to attain carbon neutrality and energy security concerns are forcing governments and industries to tackle energy transitions more seriously (UN Climate Change, 2022; International Energy Agency, 2022). Our review of the existing literature around the policy mix perspective highlighted the rising interest in sustainability and energy transitions. As noted by Kanger et al. (2020), the perspective on policy mixes in energy transitions has evolved in the literature from searching for 'one single best' policy intervention, to analyzing the interaction and combination between different policy instruments. What the policy mix perspective brings is that technological change implies systemic and long-term transformations, not just at a firm-level but also at an institutional level (Weber & Rohracher, 2012). In other words, to adequately assess transitions, it is essential to evaluate existing processes and policy instruments, but also underlying networks. This section will further dive into the concept of transition and explore the emergence of the field of research on sustainability and energy transitions.

2.1.1 The emergence of sustainability and energy transition research

Technological change has been a recurring topic in literature, as industrial revolutions implied not only new technologies but also profound societal transformations (Rip & Kemp, 1998). Bruun and Hukkinen (2003) argue that in evolutionary economics, the emergence of new technologies brings new practices and routines that also bring, in the long run, institutional change. With increasing concerns around environmental issues, discussions around change now often incorporate the environmental and sustainability dimensions. As mentioned previously, sustainability transition has become a significant topic in policy mix studies. With the SDGs set for 2030, societies and governments rethink and reorient technological change towards sustainability objectives. Transition research – and *transition* as a concept – really emerged in the 1990s as its own field of research, at the junction of science and policy (Loorbach et al., 2017). Looking at transition literature, intellectual and theoretical origins seem to be mainly rooted in innovation research (i.e., evolutionary economics, innovation policy, etc.), and environmental studies and sustainability

sciences (Loorbach et al., 2017). This shows how sustainability and energy transition literature is fundamentally intersectional.

2.1.2 Key definitions

Transitions can be broadly defined as *"...shifts or 'system innovations' between distinctive socio-technical configurations encompassing not only new technologies but also corresponding changes in markets, user practices, policy and cultural discourses as well as governing institutions"* (Coenen et al., 2012, p. 968).

Socio-technical transitions represent all the processes allowing for a deep, long-term transformation of traditional socio-technical systems, whether it be communication, agrifood or transportation systems (Geels & Schot, 2010; Geels, 2020; Markard et al., 2012). A socio-technical system refers here to *"a configuration of actors, rules and technologies for the fulfilment of a particular societal function"*. Geels and Schot (2010) describe socio-technical transitions as being (a) evolutionary (with socio-technical configurations evolving and transforming at the same time), (b) relational (interactions between multiple actors from different groups), (c) radical (profound systemic changes), (d) long-term processes. This means that socio-technical transitions are quite complex to study, as they cover multiple levels of stakeholders and governance, and they influence different systems simultaneously.

Sustainability transition builds on the definition of socio-technical transition and focuses on deep societal transformations that address environmental problems. More specifically, Markard et al. (2012, p. 956) define sustainability transitions as *"long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption"*. The distinctions between socio-technical transitions and sustainability transitions are that the latter aim towards more sustainable configurations (Geels, 2004, 2011; Kemp et al., 1998), and that governance is particularly important to steer towards that goal (Smith et al., 2005).

One could argue that energy transition research is a subset of the sustainability transition literature, as both share common theoretical grounds (Coenen et al., 2012; Mattes et al., 2015).When defining *energy transition* specifically, while there is not one unique definition, scholars agree that it

represents the transformation of an energy system, from one based on an energy source to one based on a cleaner one (Abraham-Dukuma, 2021; Sovacool, 2016).

A (*sustainable) energy transition* is thus defined as all the socio-technical long-term processes that encourage a deep transformation of existing systems towards more sustainable and low-carbon practices (Cherp et al., 2011; Coenen et al., 2012; Mattes et al., 2015). This encompasses systems of production, supply and consumption (Cherp et al., 2011; Geels, 2004, 2011; Kemp et al., 1998), but also underlying networks and interactions between actors (Geels & Schot, 2010). (Sustainable) energy transitions are multidimensional in nature (Sovacool & Geels, 2016), as they imply multiple shifts and transformations in socio-technical systems (Geels & Schot, 2010). Consequently, the approach chosen to analyze them must account for that.

2.1.3 Main theoretical models

As policy mix studies highlight, it is essential to include actors and the dynamics amongst them in analyses. The definition of socio-technical systems suggests that there are various networks of actors and institutions at play and interacting with one another (Markard et al., 2012). Therefore, it is relevant to assess dynamics and networks in given socio-technical systems when studying sustainability and energy transitions.

There are four main approaches that are present in the existing sustainability and energy transition literature (Markard et al., 2012; Weber & Rohracher, 2012): strategic niche management (Rip & Kemp, 1998; Schot & Geels, 2008), transition management (Rotmans et al., 2001), technological innovation systems (TIS), and the multi-level perspective (MLP). Transition management provides a framework and vocabulary to help decision-makers conceptualize what transitions are, and structure their strategies (Rotmans et al., 2001). Transition management encourages system innovations, and argues that transition decisions operate 'separately' from regular policy activities (Nill & Kemp, 2009). Nonetheless, This approach supports that policies should be thought out on a long-term scope, that policymakers should improve and transform existing systems but also keep an open mind on policy options, and that learning is a key element of transition processes (Rotmans et al., 2001, p. 22). Transition management also suggests that governance of processes and system innovations are essential (Nill & Kemp, 2009). Strategic niche management (SNM) is based on innovation studies, and emphasizes the analysis of internal processes within technological niches

(Schot & Geels, 2008). The idea is that transitions operate from a bottom-up dynamic, meaning that they emerge from technological niches and then influence and change the dominant regime within which they evolve (Schot & Geels, 2008). The key takeaway for sustainability and energy transitions is that niche innovations should be encouraged and facilitated in order to lead to regime shifts (Kemp et al., 1998), as niches play a crucial role in the development of new technologies (Markard et al., 2012). While SNM has faced some criticism, notably in its limited understanding of transition dynamics (Berkhout et al., 2004), it still puts forward concepts and theories that are fundamental for sustainability transition studies (Hoogma et al., 2002).

MLP and TIS are two predominant approaches in transition literature, especially for sustainability and energy transitions studies (Coenen et al., 2012; Mattes et al., 2015; Raven & Walrave, 2020). The TIS approach takes its origin in industrial dynamics and evolutionary economics literature. A technological innovation system can be defined as *"a dynamic network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure and involved in the generation diffusion, and utilization of technology"* (Carlsson & Stankiewicz, 1991, p. 93). What this definition implies is that when studying the emergence of new technologies and innovations, it is just as essential to analyze not only the institutional infrastructure within which a technology is developed, but also the relations and interactions between actors of the TIS (Carlsson & Stankiewicz, 1991; Markard et al., 2012). One of the most relevant elements of TIS analysis for sustainability transition research is to allow policymakers to assess a given system and identify potential intervention points to facilitate its growth (Jacobsson & Bergek, 2011). More specifically, the TIS approach focuses the analysis on *"emerging actor constellations, networks and institutional structures and primarily seeks to analyze potentially radically new socio-technical configurations that cross-cut established sectoral and spatial delimitations"* (Coenen et al., 2012, p. 969). This means that TIS analysis views new technology development as the root of major socio-technical regime shifts (Markard et al., 2012), and is thus particularly relevant to sustainability and energy transitions studies. Nonetheless, TIS research has faced some criticism in transition literature. Indeed, some scholars argue that the TIS approach fails to properly assess the relationship between innovation system policies and long-term change objectives (Weber & Rohracher, 2012). Furthermore, innovation systems are not homogenous in their structure, meaning that when analyzing TIS, it is important to also consider that actors may not have access to the same opportunities or resources (Weber & Rohracher, 2012), depending on their relative

power and agency within the innovation system (Nilsen et al., 2022; Trippl et al., 2020; Weber & Rohracher, 2012), or the spatial and regional dimensions (Coenen et al., 2012; Cooke, 2010; Mattes et al., 2015).

The MLP combines neo-institutional theory, evolutionary economics, and innovation studies, to create an integrated approach. Where the TIS analysis recognizes the role of networks of actors and dynamics within a given socio-technical regime, the MLP takes an even broader view and argues that TIS and networks of socio-technical regimes themselves are embedded in a larger context called the landscape (Geels, 2002). The MLP therefore distinguishes three levels to study: the niche, the regime and the landscape (Geels & Schot, 2007). Niches are where radical innovations occur, while socio-technical regimes encompass technology development patterns and existing routines that help stabilize the trajectory of technology development (Geels & Schot, 2007). The landscape represents the external macro-environment, namely geography, cultural trends, demographics, and socio-economic, political and technological changes (Geels, 2002; Rip & Kemp, 1998). According to the MLP, transitions are the product of *"interactions between processes at these three levels: (a) niche-innovations build up internal momentum, through learning processes, price/performance improvements, and support from powerful groups, (b) changes at the landscape level create pressure on the regime and (c) destabilisation of the regime creates windows of opportunity for niche innovations."* (Geels & Schot, 2007, p. 400). In the context of studying sustainability and energy transitions, the MLP analyzes the different dynamics and processes present at the three different levels that lead to radical socio-technical changes towards sustainability (Geels & Schot, 2007; Loorbach et al., 2017; Markard, 2017). The implications of this framework are that for transitions to happen successfully, processes at these different levels must be aligned and work together (Coenen et al., 2012; Geels & Schot, 2007; Rip & Kemp, 1998).

2.1.4 Criticism of existing models

One of the main limitations of MLP and TIS studies, however, is the lack of spatial dimension in the analysis (Coenen et al., 2012; Mattes et al., 2015; Trippl et al., 2020). Some authors have drawn from evolutionary economic geography to highlight the importance of geographical and relational proximity (Coenen et al., 2012; Cooke, 2010; Trippl et al., 2020). Coenen et al. (2012) compare

the MLP and TIS approach to show the shortcomings of both approaches when it comes to the spatial dimension of sustainability transitions. In their analysis, authors connect the economic geography perspective to the sustainability transition literature and leverage economic geography and a spatial perspective to study sustainability transitions (Coenen et al., 2012). This arguably allows for a better understanding of the importance of overlapping relationships and networks, and the subsequent place-specific impacts (Coenen et al., 2012). A spatial perspective is critical because it considers the local dynamics of the networks at play within transitions, and the spatial configurations (Coenen et al., 2012; Mattes et al., 2015; Nilsen et al., 2022).

Another criticism of existing frameworks in transitions studies is rooted in the conceptualization and exploration of agency (Coe & Jordhus-Lier, 2011). Human agency refers not just to actors' actions, but also to actors' ability to influence development (Nilsen et al., 2022). In that sense, agency is related to power, and actors will have varying degrees of causal power, based on their knowledge, position, and the institutionalization of relations (Coe & Jordhus-Lier, 2011; Nilsen et al., 2022, p. 4). The main critique is that the role of agency is underestimated (Geels, 2020) and, more specifically, that the interplay between intra-regimes dynamics and regime changes is understudied (Weber & Rohracher, 2012). While many authors disagree with this criticism, scholars recognize that the existing conceptualization of agency in sustainability and energy transitions needs to be elaborated further (Geels, 2020; Grillitsch & Sotarauta, 2020). Therefore, a research gap emerges in the sustainability and energy transition literature from the duality of structure and agency.

2.1.5 Towards a comprehensive approach to energy transitions

As mentioned so far, sustainable energy transitions are multidisciplinary and complex phenomena to study. While it is impossible to analyze all dimensions of policy mixes in energy transitions within one framework, some authors have advocated for more comprehensive approaches to study energy transitions.

Some studies advocate for a hybrid approach to analyzing energy and sustainability transitions, leveraging specifically both the MLP and TIS approaches (Markard & Truffer, 2008; Weber & Rohracher, 2012). These two frameworks share common theoretical grounds and are seen as potentially complementary to study transitions (Markard & Truffer, 2008). To analyze a given

ecosystem within the context of energy transitions, combining MLP and TIS approaches would allow exploration of the ecosystem leveraging the innovation systems literature, while also taking into account the configurations and dynamics that are relevant to sustainable energy transitions and innovation policy literature. Weber and Rohracher (2012) note how the drawbacks in the TIS perspective are answered by the MLP approach. For example, while the TIS studies lack in the directionality of change, the nature of the MLP allows it to fill that gap (Weber & Rohracher, 2012). From a policy perspective, while policies are included in TIS analyses, the impact of policies on the whole system remains understudied, and the policy mix perspective still needs to be further explored in MLP studies.

Considering the different criticisms of existing theoretical approaches, sustainability and energy transitions studies have started to address those gaps over the past few years by developing more comprehensive frameworks. This research will mainly focus on integrating actors' agency and the spatial dimension to the study of the policy mix in energy transitions.

2.3 Understanding energy transition processes in peripheries

2.1.6 Spatial considerations: the regional innovation systems perspective

The policy mix and sustainability transition perspectives have underlined the analysis of institutional dynamics and networks as one of the key components to understand energy transition processes (Raven & Walrave, 2020; Rogge et al., 2020; Talmar et al., 2022). This research project adopts a policy mix perspective on energy transitions, and thus explores how to better understand institutional settings and transformation processes that are happening in energy transitions. However, emerging from the aforementioned research gaps, this thesis will focus more specifically on regional institutional settings, in order to better capture the scope of energy transitions (Strambach & Pflitsch, 2020).

Spatial theories in the literature generally refer to the concept of distance. In a traditional sense, distance can mean physical or geographical distance, but it could also imply economic distance and unevenness (Coenen et al., 2012; Grillitsch & Sotarauta, 2020). When talking about 'space', the spatial dimension can actually adopt a relational view of the concept (Amin, 2002; Bathelt & Glückler, 2003; Coenen et al., 2012), meaning that space represents the distance in terms of

relationships: the frequency (or lack there) of interactions between actors will determine proximity (or distance) and strengthen networks and institutions. Networks and their inherent dynamics therefore help define the distance or proximity between actors (Boschma, 2005; Caragliu & Graziano, 2022). In the context of energy transitions, spatial considerations can be threefold. First, the scale of energy transitions is constructed by social actors and their strategies, within a given spatial framework (Coenen et al., 2012). Second, the analysis must integrate the relational view of space, since actors have multiple simultaneous relationships at different scales, and their strategies and actions are influenced by those relationships (Coenen et al., 2012). Third, spatial considerations should avoid scalar hierarchies, meaning that the analysis should focus on relations among actors, and interrelations between different scales, but not the implicit power hierarchy (Coenen et al., 2012).

When conducting an empirical study of energy transitions, it is fundamental to contextualize in space. Energy transitions do not occur at the same pace nor with the same pattern depending on the context and region studied. Indeed, many scholars have documented the dichotomy of city-regions and peripheries, as different regions possess their own characteristics and place-based features that shape energy transitions in different ways (Baldwin et al., 2011; Coenen et al., 2021; Mattes et al., 2015; Nilsen et al., 2022; Strambach & Pflitsch, 2020; Trippl et al., 2020). Furthermore, there is an increasing interest in studying geographically defined systems in transition (Loorbach et al., 2017). Based on local specificities, there can be geographical unevenness of transition processes (Coenen et al., 2012), which is why studying peripheries is crucial to energy transition literature. Adopting a regional perspective becomes relevant, as there are not only differences in local capabilities, but also different dynamics in play among actors and networks, depending on the region studied (Cooke, 2010). Also, this perspective highlights the diversity in transition processes, which stems from a 'natural' disparity in institutions, networks, actor strategies and resources, depending on the location (Coenen et al., 2012; Cooke, 2010). The spatial contextualization of sustainability and energy transitions is therefore done by accounting for territorial institutional embeddedness (Coenen et al., 2012). From a policy perspective, including the socio-spatial construction of sustainability transitions helps improve the transferability of policy and practice recommendations (Coenen et al., 2012).

While the literature on energy transitions is developing and becoming more intersectional, many authors highlight the importance of further studying peripheries and rural regions (Grillitsch & Sotarauta, 2020; Halseth et al., 2019; Mattes et al., 2015; Trippl et al., 2020). The integration of the spatial dimension to energy transition studies actually puts into perspective the importance of local specificities. Therefore, this research project contributes to transition literature by further analyzing the spatial dimension of energy transitions, and notably how the context of peripheral regions influences energy transition processes and actors involved.

2.1.7 The context of peripheries

There is no clear definition of a *periphery* or *peripheral region* (Pugh & Dubois, 2021). As previously stated, the relative perception of 'distance', and thus of what is considered a periphery can vary, depending on the lens and framework of analysis. Also, there can be varieties of periphery (Nilsen et al., 2022), as regions are heterogeneous. Nilsen et al. (2022, p. 1) suggest a broad definition of peripheral regions, describing them as *"regions that fall outside the labour markets of large cities or metropolitan regions– in other words, as a synonym for non-metropolitan regions."*. The apparent challenge of defining what a periphery is reinforces the need to further study the specificities of regions. Indeed, peripheries have specific challenges to consider, related to the success of transition processes (Halseth et al., 2019). Many challenges arise and block transition processes' success when existing ecosystems, dynamics and networks are closely interrelated to older industries (Edenhoffer & Hayter, 2013). In that sense, assessing regional innovation systems, and the emergence of new institutions and new paradigms becomes relevant to understanding shifting dynamics.

The regional innovation systems (RIS) perspective in transition studies builds on common foundations to TIS, MLP and strategic niche management, though the RIS approach aims to better address the need for spatial considerations (Mattes et al., 2015). Since the analysis of institutional settings and processes is essential to understand energy transitions, adopting a regional perspective implies taking a closer look at regional components. There are different approaches to examine existing structures and networks. RIS theory is particularly pertinent to the study of energy transitions in peripheries, as theoretical foundations in innovation systems allow to capture all the

subsystems involved, and the different processes and interactions (Mattes et al., 2015; Nilsen et al., 2022).

Mattes et al. (2015) propose a subsystem analysis leveraging the RIS perspective. The authors study energy transitions in peripheries by analyzing subsystems interactions through four dimensions: interaction (type of relationship, whether informal or formal); coordination (between actors, organization, structure); inclusiveness (concentration vs. dispersion, exclusion); evolution (changes over time, changes in strategy, etc.) (Mattes et al., 2015). According to their findings, local development dynamics are a consequence of the interaction of different subsystems: science, politics, public administration, industry, finance, intermediaries and civil societies (Mattes et al., 2015). As a result, energy transitions seem to be shaped by local actors and institutions. Yet, interactions and coordination between actors and subsystems have different patterns in the different cases studied, which further implies that location-specific or city-specific characteristics shape local processes and activities.

2.1.8 Regional preconditions

Studying existing structures and networks in peripheral regions can also be done through the analysis of regional preconditions (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022; Trippl et al., 2020). Regional preconditions are based on the theories of RIS structures. The concept relies on the notion that new institutional development and implementation do not happen on a 'clean slate', but rather are embedded in pre-existing conditions, incumbent networks and systems (Rayner & Howlett, 2009). One of the reasons to study regional preconditions is because they vary greatly based on the availability of resources and spatial configurations (Tödtling et al., 2020). Subsequently, they can provide a better understanding of regional specificities and characteristics.

Regional preconditions can be divided into three main categories: (a) pre-existing industrial structures, which could help or constrain the potential transfer of assets from old to new sectors; (b) organizational support structures, including financial organizations, non-firm actors and their (lack of) connections and capabilities to promote green path development; (c) institutional set-ups, formal (laws, regulations) and informal (values, behaviours, etc.) (Trippl et al., 2020). Those structural preconditions will shape the dynamics, behaviours and experiences of actors, and thus create or hinder the region-specific and actor-specific opportunities available to push for change

(Grillitsch & Sotarauta, 2020). Regional preconditions can therefore become obstacles or enablers for the emergence of new development models (Grillitsch & Sotarauta, 2020), and system transformations towards energy transitions. Consequently, it is pertinent to examine regional preconditions because they vary depending on the context (Trippl et al., 2020), but mostly because they can help understand local actors' strategies (Nilsen et al., 2022) and influence on change processes.

When analyzing development and transition processes in peripheral regions, scholars recognize that a lot of emphasis is put on structures to the detriment of institutional agency (Sotarauta & Suvinen, 2018). The role of institutional structures and territorial institutional embeddedness are key determinants for new path development or transition. However, while favourable existing structures provide great insight into energy transition processes, they do not necessarily lead to new path development and potential energy transition (Trippl et al., 2020). In fact, recent studies argue that agency can be a determinant driver for transition processes in peripheries, since it can shape the structures and the opportunity spaces available to different industries (Sotarauta & Suvinen, 2018).

2.1.9 Assessing energy transition processes through change agency

The previous sections of this literature review emphasized how essential it is to further explore the role of actors in policy mixes and energy transition studies, especially in the context of deep socio-technical transformations. But how are energy transition challenges incorporated into the policy mix? How is the energy transition orchestrated through actors involved in the implementation and elaboration of public policies? The relevance of the policy mix perspective relies on the fact that it takes into account and analyzes the complexity of policy processes, and it highlights how different policy instruments, components and actors interact with one another (Lindberg et al., 2019). Rogge et al. (2017) argue that focusing on actors and institutional contexts can provide key insights to better assess how policy mixes evolve and are shaped by actors for energy transition. While existing literature has been taking a closer look at actors to understand their motivations and actions (Isaksen & Jakobsen, 2017; Rogge et al., 2020; Talmar et al., 2022), actors' role in energy transitions can be much further explored, and this section will present the main theories used to define and analyze actors involved in energy transitions.

In innovation studies, RIS theory provides some relevant insights on *actors*. The concept of regional innovation systems accentuates how innovation actually occurs within and thanks to a defined network of actors (Cooke, 2010; Gerstlberger, 2004). Similarly to what we mentioned before for the spatial dimension, analyzing networks of actors underlines the importance of relational proximity to facilitate transition, and in our case energy transition (Cooke, 2010; Gerstlberger, 2004). The RIS approach can therefore inform on how different actors can shape transition processes, and how the interplay of networks and institutions can encourage or hinder those processes (Tödtling et al., 2020). Also, when analyzing the role of actors, the diversity of regions implies a diversity in actors' strategies and resources (Coenen et al., 2012), which will further help define the specific context of peripheries. Furthermore, actors can widely differ, depending on institutional contexts (Jackson, 2010).

In institutional analysis, from which the policy mix perspective emerges, *actors* represent the different groups of stakeholders – in defined socio-technical regimes – who actively participate in institutional processes and have the power to influence them (Beritelli & Laesser, 2011; Lindberg et al., 2019). In the literature, power is defined as *"'a potential to influence' and characterized influence as a process in which the actor exercising power 'makes other actors see things, people, functions, etc., differently from before and as a result do something that they would not otherwise do'"* (Nilsen et al., 2022, p. 4). Subsequently, appropriate characteristics to examine are power relations between actors. Power relations between actors reflect how actors can exert their influence through their networks and their relational and social strategies (Sotarauta, 2009). This is especially true in the context of regional development, as actors in those settings can encourage or facilitate new transition processes, to compensate for the lack of local institutional structures (Bækkelund, 2021).

The policy mix perspective often analyzes actors through their policy preferences, including their opinions on policy instruments, goals and strategies (Lindberg et al., 2019). Still, when assessing the role of actors, particularly in the context of institutional change, an important component in the literature is the duality of structure and agency, but more specifically the relational perspective between actors and structures, and their mutual interdependence (Bourdieu, 1990; Jackson, 2010). Actors play an active role in institutional settings and policy processes. In order to adequately assess that role, this thesis aims to combine a policy mix perspective with an analysis of agency

(Geels, 2020; Sotarauta & Suvinen, 2018; Trippl et al., 2020), and particularly the key role of change agency in shaping regional policy processes for energy transitions (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022).

Agency can be defined as *"a temporally embedded process of social engagement, calling for a strong capacity to interpret past habits and future prospects"* (Emirbayer & Mische, 1998, p. 963). Additionally, the concept of human agency refers to *"actors' ability to affect regional development, which is in turn directly related to the concept of power."* (Nilsen et al., 2022, p. 4). This research project is interested in the human agency concept. In the literature, the question of agency is often concerned with examining the strategies and actions that actors undertake to achieve a specific outcome or effect (Emirbayer & Mische, 1998; Sotarauta & Suvinen, 2018), and with understanding how different actors (e.g. economic, political, public, etc.) can create, recreate or change processes or structures (Martin, 2014, p. 619). Some authors choose to distinguish different types of agency, such as firm-level and system-level agency (Isaksen & Jakobsen, 2017; Trippl et al., 2020). Firm-level agency refers to actors creating new firms or introducing new innovations within existing firms, while system-level agency refers to actors modifying innovation systems or initiating change (Isaksen et al., 2019). In this distinction, actors will engage in asset modification processes (i.e., the creation, modification and destruction of existing natural, infrastructural, human or institutional assets) to encourage change (Trippl et al., 2020).

Building on the previous definitions of agency and energy transitions, *change agency* represents, in the context of this study, actors' ability to influence socio-technical changes and new processes towards more sustainable energy regimes. Grillitsch and Sotarauta (2020) propose the *trinity of change agency* as a framework to analyze regional structural change, as they identify the three following types of agency:

- Innovative entrepreneurship
- Institutional entrepreneurship
- Place-based leadership

(Schumpeterian) innovative entrepreneurship encompasses economic actions attempting to combine knowledge and resources in new ways, in order to develop and realize new (unexplored) potential. *Institutional entrepreneurship* represents the actions influencing the creation or

transformation of institutions, which in turn shape the preconditions that will facilitate or hinder innovative entrepreneurship. Finally, *place-based leadership* refers to all the actions implemented to transform specific places (e.g. regions) by gathering and structuring resources, competencies and powers to benefit individual and regional agents (Grillitsch & Sotarauta, 2020). Place-based leadership thus links directly to the importance of spatial considerations.

In this framework, agency does not come from individual agents but from the relationships between agents in given opportunity spaces (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022). These three types of agency and the dynamics amongst them are the key drivers of regional structural change, and are consequently significant to assess energy transition in peripheries. Therefore, the trinity of change agency emerges as a particularly relevant framework to analyze the role of actors in the energy transition of peripheries.

Building on those conceptualizations of agency, Nilsen et al. (2022) argue that in addition to the trinity of change agency, the actor composition is an important layer of analysis when examining regional structural change. When evaluating power relations in peripheries, the dynamics and networks will vary depending on the differentiation of actor composition within the region (Nilsen et al., 2022). The differentiation of actor composition refers here to the variety of actors present in the region. *Actor composition* can change depending on the sectors, access to resources, institutionalized relations, or depending on the group of actors (e.g. universities, public administration, businesses etc.) (Nilsen et al., 2022). Actors will have varying degrees of causal power, based on their knowledge, positions in networks and institutionalization of relations (Nilsen et al., 2022; Trippl et al., 2020). The notion of pre-existing structures mentioned previously becomes crucial to assess agency, since actors' strategies, interventions and capabilities will highly depend on the pre-existing structures available regionally and locally (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022; Trippl et al., 2020). Therefore, the propensity for change and thus energy transition will be highly reliant on pre-existing structures and institutions, but also on actors' abilities to influence those structures, hence the importance of agency.

Research gap

This literature review presented key points of policy mix, energy transitions and regional studies, altogether composing the conceptual ground of this thesis. This Chapter has shown how analyzing change agency is especially appropriate to understand how actors integrate environmental concerns and shape policy processes to push towards energy transition. Further analyzing agency is relevant and has important policy implications since it shows how actors can influence the region and opportunity spaces, through social engagement and change agency (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022).

This thesis aims to contribute to regional and policy mix perspectives on energy transition research. More specifically, this research focuses on an industry in the context of a peripheral region, to further explore the variety of regions and elaborate a valuable case study.

Understanding the *role* of change agency signifies studying the "function or part performed especially in a particular operation or process" (Merriam-Webster, n.d.). So, to assess the role of change agency, our study will need to *map out* the context (understand here energy transition processes and the policy mix), identify the *place* of actors and change agency within the policy mix in this context, and evaluate the *dynamics* between the policy mix, actors, and pre-existing structures. Since energy transitions are complex phenomena, our study will focus mainly on the role of change agency, and how actors' strategies influence and shape policies towards energy transition in peripheries. Based on the existing literature on energy transitions and peripheries, this thesis will be framed through a policy mix perspective to better understand change processes and specifically change agency. The following chapter will present in detail the conceptual framework chosen for this research project.

Chapter 3: Conceptual framework

This Chapter will present the conceptual framework applied for this research study.

3.1 Policy mix analysis

While there are many frameworks and analytical models available in the current literature, Rogge and Reichardt's (2016) framework offers a comprehensive understanding of the dynamics at play when it comes to the policy mix, which is one of the central elements of this thesis. This research will thus analyze the policy mix pertaining to the case study at hand, following the policy mix framework as it is described in the article *"Policy Mixes for Sustainability Transitions: An Extended Concept and Framework for Analysis"* (Rogge & Reichardt, 2016). This paper is highly cited in the literature and is recognized as a key paper in policy analysis, especially in examining the distinction and interplay between policy processes and instruments (Essential Science Indicators, 2023; Köhler et al., 2019; Schot & Steinmueller, 2018). One of the applications of this framework is to study the links between policy mixes and technological change, and how policy mixes can facilitate technological change towards more sustainability. This makes this approach particularly relevant to our research project. The following sections will define the main concepts that pertain to that framework.

3.1.1 Policy mix definition

This study adopts Rogge and Reichard's (2016) comprehensive definition of the policy mix presented in Chapter 2. According to this framework, the policy mix consists of three main blocks: (1) elements; (2) processes; (3) characteristics. This definition implies that in order to properly define policy mixes, it is essential to analyze the strategic component of the mix, the policy processes and take into account the characteristics of said policy mixes. It is also important to consider the dynamics at play related to policy mixes. Figure 1 illustrates the policy mix concept as per Rogge and Reichardt (2016).

3.1.2 Policy elements

Elements in the policy framework refer to the strategic components of the policy mix. More precisely, elements of a policy mix encompass the *policy strategy*, which includes the policy objectives and the plans to achieve them (Rogge & Reichardt, 2016, p. 1623), and the *policy instruments*.

In the context of sustainability and energy transitions, analyzing the *policy strategy* would mean looking at the long-term objectives and the vision behind those objectives, and it can also include socio-economic considerations. They are generally reflected by a specific target. The principal plans to achieve policy objectives usually present the path chosen by governments. These can take the form of roadmaps, strategic action plans, frameworks or guidelines (Rogge & Reichardt, 2016).

Policy instruments and the *instrument mix* are the two other key policy elements to analyze in this policy mix framework. *Policy instruments* are the specific tools or governance techniques used to achieve the overarching policy objectives. Instruments can be specific policies, measures, programs, etc. Policy instruments usually correspond to specific *goals*, which means that there are clear intended impacts or effects, or long-term quantifiable targets contributing to the overarching policy objectives (Rogge & Reichardt, 2016). There can be different types and purposes for instruments that are not mutually exclusive, but Rogge and Reichardt (2016) elaborated an instrument typology with three primary types of instruments and three primary purposes. The three primary instrument types are economic instruments, regulation and information, and the three primary purposes are technology push, demand pull and systemic.

Table 1: Rogge & Reichardt's (2016) Policy instrument typology

Table 2
Type-purpose instrument typology (with instrument examples).

	PRIMARY PURPOSE		
PRIMARY TYPE	Technology push	Demand pull	Systemic
Economic instruments	RD&D* grants and loans, tax incentives, state equity assistance	Subsidies, feed-in tariffs, trading systems, taxes, levies, deposit-refund-systems, public procurement, export credit guarantees	Tax and subsidy reforms, infrastructure provision, cooperative RD&D grants
Regulation	Patent law, intellectual property rights	Technology/performance standards, prohibition of products/practices, application constraints	Market design, grid access guarantee, priority feed-in, environmental liability law
Information	Professional training and qualification, entrepreneurship training, scientific workshops	Training on new technologies, rating and labelling programs, public information campaigns	Education system, thematic meetings, public debates, cooperative RD&D* programs, clusters

Source: (Rogge & Reichardt, 2016, p. 1624)

Instrument design features are also relevant to assessing the effectiveness of policy instruments. In fact, some authors in the environmental economics literature believe that the instrument design feature might actually be more important within the policy mix than the instrument type itself (Kemp & Pontoglio, 2011; Volleberg, 2007). There can be descriptive and abstract design features. Descriptive design features refer to the legal form of the instrument, the target actors, and the duration. While there is no clear consensus on the list of abstract design features (Johnstone et al., 2009; Kemp & Pontoglio, 2011; Rogge & Reichardt, 2016), stringency, level of support, predictability, flexibility, differentiation and depth seem to be the main abstract design features to consider when it comes to sustainability transitions (Rogge & Reichardt, 2016, p. 1624). Stringency usually is associated with regulatory and economic instruments. This feature can refer to the instrument's goal and design, and it more generally assesses the level of ambition of the instrument (Rogge & Reichardt, 2016). Level of support describes how many positive incentives are provided by a policy instrument (e.g., financial incentives, volume of R&D support). Predictability is the degree of certainty of a policy instrument, and it can help assess how a policy instrument influences investor uncertainty. Flexibility evaluates to what extent actors are allowed to choose how they want to comply with a given policy instrument. Differentiation, in terms of instrument design feature, identifies whether a policy instrument is particularly tailored to a given industry, technology or geographical location (Rogge & Reichardt, 2016). Lastly, depth evaluates the range of innovation incentives associated with a given policy instrument.

The *instrument mix* is the third policy element. It implies the analysis of the interactions between different policy instruments. Indeed, in this conceptualization of the policy mix (Rogge & Reichardt, 2016), the effects of one instrument will be influenced by the other instruments within the instrument mix. It is also important to consider the context in which the instrument interactions happen. In fact, outcomes of instrument interactions are not only shaped by the instrument mix, but also by the overarching policy mix, which is the whole framework proposed by Rogge and Reichardt (2016). Consequently, a policy mix analysis is only complete when assessing policy processes and policy characteristics as well, to understand the context around specific policy instruments.

3.1.3 Policy processes

Policy processes correspond to the political interactive processes between the government and actors, in order to find solutions to resolve societal issues (Rogge & Reichardt, 2016). While policy processes span all stages of the policy cycle, there is an important distinction to make between policy making and policy implementation. For policy making processes, it is essential to consider policy adaptation and learning, especially in the context of energy transitions. Indeed, as transition processes come with inherent resistance from actors, policy making processes should remain somewhat flexible by continually monitoring the effects of the existing policy mix (Kemp, 2011), and thus learning and adapting. Policy implementation processes are the different ways that governments and other actors put policy instruments in place and enforce them. Therefore, implementation processes are key within the policy mix, as they directly impact the efficiency and success of policies. Finally, the style of policy processes can potentially influence the policy mix. It is important to understand the difference between policy strategy and policy processes. While policy strategy highlights the specific policy outputs (i.e., specific objectives and plans), policy processes encompass the interactive and flexible process leveraged to elaborate, reformulate, and implement policy objectives. Policy processes not only shape policy strategy and its adjustments, but they also influence how instruments are designed.

3.1.4 Policy characteristics

Policy characteristics correspond to how elements and policy processes can be described as. These characteristics are consistency of elements, coherence of processes, credibility and comprehensiveness (Rogge & Reichardt, 2016).

The consistency of elements is determined by how well aligned and consistent all elements of a policy mix are. When examining the policy mix, it can be important to look for contradictions or synergies within the instrument mix, but also related to the overall policy strategy and objectives.

Coherence of processes refers to “synergistic and systematic policy making and implementation processes” (Rogge & Reichardt, 2016, p. 1626). When assessing coherence of processes, it is pertinent to look across policy fields and governance levels, as incoherence can hinder the efficiency of processes and policies. Coherence can indirectly or directly impact actors’ behaviours or impact the policy mix elements and their consistency. Some tools to address policy coherence

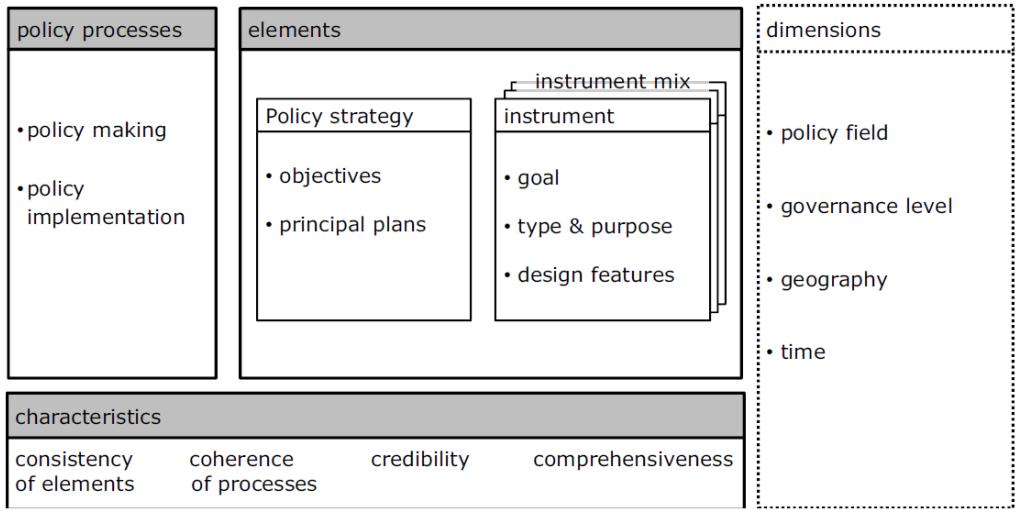
are policy integration, by ensuring coherence in the overall thinking of all policy sectors, and coordination, by ensuring coherence through aligned efforts of public sector organizations.

While credibility can be interesting to consider for policy mixes for energy transitions, it remains a little vague as a concept in the literature. The main idea is that credibility informs how reliable the policy mix is (Newell & Goldsmith, 2001).

The last characteristic presented in this framework is comprehensiveness. Comprehensiveness informs how extensive and exhaustive policy elements and policy processes and thus, how well the instrument mix covers all instrument purposes (see Table 1).

Figure 1 and 2 provide an illustration of the policy mix concept according to Rogge and Reichardt (2016).

Figure 1: Building blocks of the policy mix concept



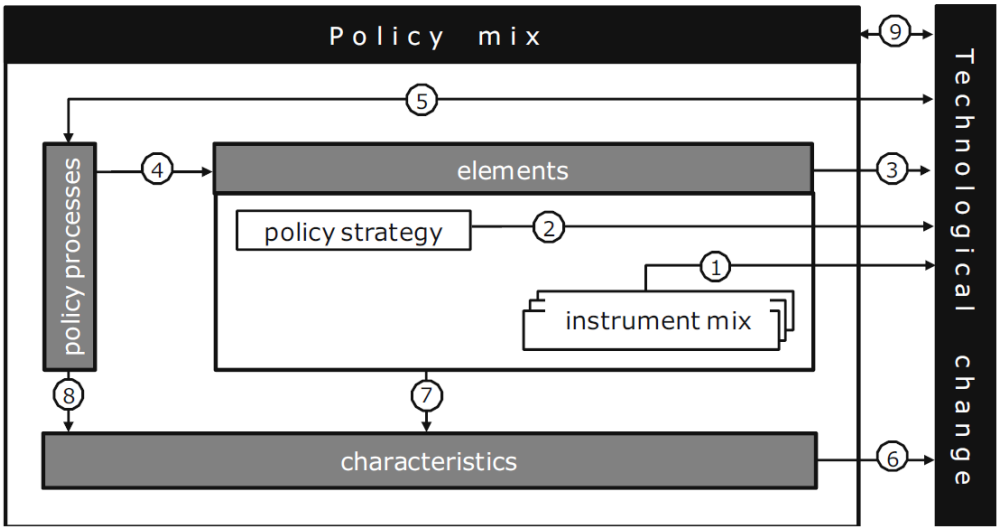
Source: Rogge and Reichardt (2016, p. 1629).

3.1.5 Applying the policy mix framework

The overall logic of the interrelation between the three main building blocks of this policy mix definition is that *policy processes* will determine the *policy elements*, and thus the content of the policy strategy and instrument mix and the interactions among instruments. Furthermore, these policy processes can directly influence technological change by modifying the *characteristics* of

the overall policy mix. Consequently, in order to assess how policy mixes can influence energy transitions, it is crucial to analyze the instruments and the instrument mix, but also the overarching policy strategy, as the combined efforts of all these policy elements and processes will contribute to facilitating or hindering energy transitions. Additionally, policy mixes can and will impact innovation and those impacts will in turn contribute to the evolution of the policy mix. Figure 2 illustrates those links and how to apply the policy mix concept of this framework.

Figure 2: Framework for analyzing the link between the policy mix and technological change



Source: Rogge & Reichardt (2016, p. 1630).

3.2 Assessing actors' agency

The other portion of our study's conceptual framework is focused on assessing actors' agency. As this research aims to specifically analyze the role of actors with the policy mix for energy transition, we choose to leverage the *trinity of change agency* framework (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022). The advantages of this framework are that it shows how actors can influence the region they are in for opportunities, through social engagement and the trinity of change agency. According to this framework, agency does not come from individual agents, but rather from the relationships between agents in given opportunity spaces (Grillitsch & Sotarauta,

2020). Additionally, the change agency framework, as it is explored in the research paper *"Varieties of periphery and local agency in regional development"* (Nilsen et al., 2022), accentuates the importance of considering the specificities of peripheries. This thesis is thus applying the change agency framework, following that research paper by Nilsen et al. (2022).

3.2.1 Regional preconditions

Adopting a RIS approach, our conceptual framework will analyze the regional preconditions to understand the overall context of the peripheral region studied, and thus better examine the policy mix and the role of change agency. As mentioned in the previous chapter, regional preconditions inform us on the pre-existing structures that are in place in a given region. Indeed, energy transition processes and institutional change in general are embedded in those pre-existing structures (Rayner & Howlett, 2009). The regional preconditions presented by Nilsen et al. (2022) are *actors, networks and institutions*. The idea is that peripheries vary in their preconditions, and thus actors' roles and impact will differ as well, since actors' actions draw from those pre-existing conditions. This will also influence the policy mix and its evolution, as outcomes of specific policies and their implementation will depend on the overall context.

Actors represent here firm-level actors and system-level actors, including local government and universities (Nilsen et al., 2022), who participate actively in institutional processes and can influence them (Beritelli & Laesser, 2011; Lindberg et al., 2019). *Networks* refer to the relationships and linkages among actors. These can be local, regional or international linkages, and can help understand relational distance and interconnectedness (or lack thereof) within the region and with global markets (Boschma, 2005; Caragliu & Graziano, 2022; Cooke, 2013). *Institutions* represent the set of rules – formal and informal – that determine and structure the actions and interactions within a society (Trippl et al., 2020). For this study, we will look specifically at the institutions that directly and indirectly shape the industrial ecosystem studied, actors' behaviours and the dynamics in place.

3.2.2 Actor composition

In Nilsen et al. (2022), in addition to identifying actors in the regional preconditions, the analysis should examine *actor composition*, which describes how differentiated the landscape of actors is

within a given region. Each actor has different roles and goals within a region or industry, but also different structures. Actors differ from one another in their access to knowledge, networks and institutionalized relationships (Nilsen et al., 2022). The implication is that depending on the differentiation of actor composition within a region or specific industry, opportunities for energy transition will vary. The framework states that in a region with highly differentiated actor composition, there are further possibilities to access more knowledge, networks and resources, and leverage institutionalized relationships (Nilsen et al., 2022).

3.2.3 Power relations

As what actor composition informs, actors will have different access to knowledge and institutionalized relationships, and they will hold different positions within networks. Consequently, actors will not exercise their power in the same manner either, which is reflected in the *power relations*. Power here refers to actors' ability to influence new path development through their networks and relational strategies (Sotarauta, 2009). When analyzing peripheral regions, power relations can be either balanced or skewed. In regions with highly skewed power relations, power will be concentrated in only a handful of actors, which would make the region greatly dependent on their actions.

Combining actor composition and power relations, the analysis aims to determine the resilience of peripheries (or lack thereof), and the underlying causes and mechanisms in place locally. Based on that analysis, Nilsen et al. (2022) propose a typology of peripheries:

Table 2: Nilsen et al. (2022) Typology of peripheries

Table 1. Typology of peripheries.

		Actor composition	
		Differentiated	**Undifferentiated**
Power relations	Balanced	Type I: Resilient regional service centres	Type III: Vulnerable rural regions
	Skewed	Type II: Locked-in specialized regions	Type IV: Locked-in and vulnerable resource-based regions

Source: Nilsen et al. (2022).

3.2.4 The role of change agency

The last dimension of our conceptual framework is change agency. This thesis leverages the *trinity of change agency* to assess the role of local actors in influencing the policy mix for energy transition in a peripheral region. More specifically, change agency will contribute to determining the opportunity space in a region or industry, so the potential development of new pathways towards energy transition. Opportunity space refers to *"the time or set of circumstances that make a change possible"* (Grillitsch & Sotarauta, 2020, p. 713).

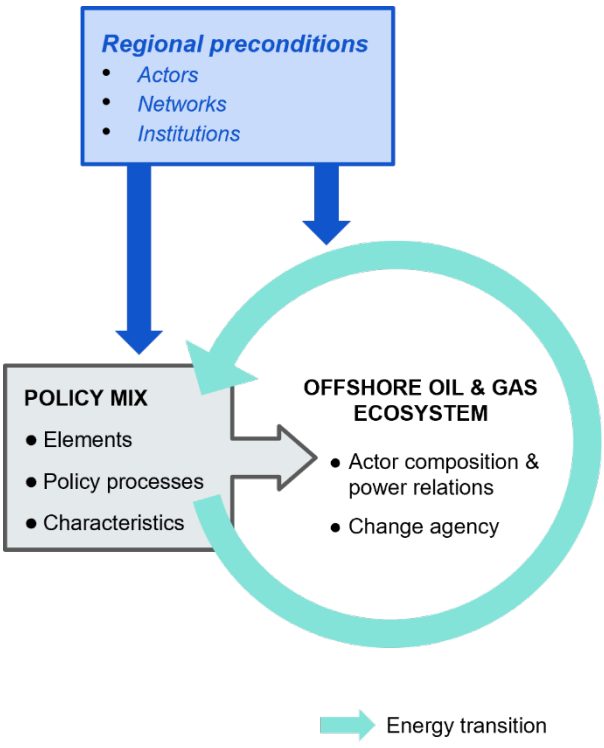
The *trinity of change agency* identifies three types of change agency: *Schumpeterian innovative entrepreneurship, institutional entrepreneurship, and place-based leadership* (Grillitsch & Sotarauta, 2020). *Schumpeterian innovative entrepreneurship* represents the economic actions attempting to combine knowledge and resources in new ways, in order to develop and realize new and unexplored potential. Innovative entrepreneurship forges new and unknown growth paths in a given region or industry (Grillitsch & Sotarauta, 2020). *Institutional entrepreneurship* englobes all actions that are influencing the creation or transformation of institutions, which in turn shape the preconditions and rules that will facilitate or hinder innovative entrepreneurship. Lastly, *place-based leadership* refers to all the actions implemented to transform specific places (e.g. regions) by gathering and structuring resources, competencies and powers to benefit individual agents and regions (Gibney et al., 2009; Sotarauta, 2016). The trinity of change agency puts forward the idea that those processes are profoundly interlinked with one another. For instance, the lack of resources locally and place-based leadership can either discourage innovative entrepreneurship to develop and stay in the region, or it could actually motivate entrepreneurs to engage themselves in place-based leadership (Grillitsch & Sotarauta, 2020).

The purpose of this multilevel framework is to provide a comprehensive understanding of the role of local actors in shaping the policy mix for energy transition in peripheral regions. Regional preconditions help understand the overall pre-existing conditions and structures in which industry actors and the policy mix evolve. Local actors will therefore act based on and leveraging regional preconditions. In addition, the role of change agency in peripheries specifically helps assess how actors directly and indirectly influence the opportunities that can encourage or hinder energy transition (Nilsen et al., 2022). By framing this case study through a policy mix perspective, our analysis will focus specifically on examining local change agency within the policy mix of the

industry of interest. The potential policy implications of Nilsen et al. (2022) are two-fold. The framework can identify opportunities to empower local actors, and to facilitate their active participation in regional transformation processes. This framework can be particularly useful to determine place-based policies that want to include local actors in policy making and implementation processes (Nilsen et al., 2022).

The conceptual framework therefore defines how to approach this research, and it identifies the main elements and phenomena that will be analyzed. Figure 3 shows a visual representation of the conceptual framework and the elements that will be studied. The following chapter will explain in depth the methodology chosen and the detailed steps taken to conduct this research project.

Figure 3: Conceptual framework



Source: Author's own elaboration, adapted from Rogge and Reichardt (2016) & Nilsen et al. (2022).

Chapter 4: Methodology

This Chapter will present the different methodological choices made throughout this research project.

4.1 Research strategy

In order to conduct this research project, a case study approach was adopted, as this method is most adequate to understand a current real-life phenomenon over which the researcher has little to no control (Yin, 1994). Since this thesis explores how actors of a given ecosystem in a peripheral region integrate environmental challenges and influence the policy mix towards energy transition, there are multiple factors and dimensions to consider. Therefore, this research applies an embedded single-case study design, which accounts for different units of analysis (Langley, 2009; Yin, 1994). An embedded single-case study analysis allows us to compare the different units of analysis to identify differences and similarities in their strategies. As the main objective of this thesis is to examine the role of actors within policy processes in the offshore oil and gas industry in Newfoundland and Labrador, the units of analysis in this case study are the different actors that have a direct influence on the policy mix. The policy mix includes multiple actors at different levels of governance, with different roles. Consequently, the main units of analysis would ideally be at different levels of governance, such as **federal government organizations, provincial government organizations and industrial associations**. Our scope of analysis is the offshore oil and gas industry in the province of Newfoundland and Labrador.

4.1.1 Choosing the offshore oil and gas industry as a case study

In May 2017, the Government of Canada announced the launch of its Superclusters initiative, which aims to support and champion five high-growth sectors, to boost economic growth and to position Canada as a world-leader in those highly innovative industries (ISED, 2017). Among those five sectors, the Ocean Supercluster concentrates on the sectors contributing to the ocean economy in Canada, which includes marine renewable energy, fisheries, ocean technology, aquaculture, defence, shipbuilding, transportation and **offshore oil and gas** (ISED, 2023b). The activities and the members of this supercluster are mainly concentrated in Atlantic Canada (ISED, 2023b; Doloreux & Frigon, 2021; Shearmur et al., 2023) and the leading organization is located

in St. John's. As this research study revolves around energy transition in peripheral regions, the province of Newfoundland and Labrador, and specifically the offshore oil and gas industry, emerges as a particularly interesting case study.

The offshore oil and gas industry inherently operates with non-renewable resources, as it covers operations related to the exploitation, production and extraction of oil and natural gas that are conducted off the shores and on the high seas (Cleveland & Morris, 2015). Consequently, that industry is directly affected by energy transition processes in the region. As for choosing a 'peripheral region', Newfoundland and Labrador is a unique and relevant case to examine, as the province is mainly composed of rural areas, while also, being the site of St. John's, a city globally renowned as a strategic hub for ocean technology and expertise (World Energy Cities Partnership, n.d.).

The main components of a case study are contextual data, information of the different stakeholders and their strategies, triangulation of data and a multi-factorial analysis (Langley, 2009, p. xxxiv). Therefore, the rest of this Chapter will present the sampling strategy used to identify and select participants for this study and explain the data collection and analysis processes.

4.1.2 Sampling strategy

For the purpose of this thesis, our methodology adopts a theoretical (or purposeful) sampling strategy. We chose theoretical sampling because we wanted to purposefully choose a case study and units of analysis that would allow us to replicate the theory. For each unit of analysis, we selected specific people for theoretical reasons and not statistical reasons, based on the theory from our conceptual framework (Miles & Huberman, 1994). The sampling strategy for selecting participants was divided into three phases. According to Ghauri (2004), sampling should be done following criteria that are coherent with the research question. Without a clear theoretical positioning, the evaluation of the context of a case study remains ambiguous (Ghauri, 2004). Consequently, the first phase of the sampling strategy was to analyze the offshore oil and gas industry and identify the main actors and categories of actors present that are relevant to our study.

Based on this first list of actors, the second phase of the sample strategy was to identify criteria that would guide actor selection and thus participant selection. The selection criteria used for this study are as follows:

Table 3: Actor selection criteria

Actor category	Criteria
Governmental organizations	○ Actor's mandate is entirely or partially focused on Newfoundland and Labrador ○ Actor that is directly involved in the elaboration, application, support or monitoring of the policy mix ○ If not directly involved, the actor has an indirect influence on the policy mix through their mandate, strategies and actions ○ Actor is working directly and indirectly with the offshore oil and gas industry: assessing collaborators, mandates, programs ○ The participant(s) selected has a decisional role within the organization and/or works directly with the offshore oil and gas industry
Industrial association	○ Actor's mandate is entirely or partially focused on Newfoundland and Labrador ○ Actor is a non-governmental and nonprofit organization ○ Actor is an industrial association ○ Actor directly represents private sector companies from the offshore oil and gas industry ○ Actor supports the development of the offshore oil and gas industry ○ Actor works/collaborates directly and indirectly with governmental organizations relevant to the offshore oil and gas industry ○ The participant(s) selected has a decisional role within the organization and/or works directly with the offshore oil and gas industry

Due to feasibility and accessibility constraints, the focus of the sample has been on public actors and industrial associations that can influence and participate directly or indirectly in policies in the offshore oil and gas industry in St. John's, NL. Also, given the limited resources (e.g., contacts, time) available to the student researcher, and on advice from the Research Director private sector companies, including MNEs, were excluded. **These two actor categories represent the two units of analysis of our case study**.

Lastly, to research potential participants and their contact information, the following steps were taken.

First of all, relevant organizations were preselected based on our industry analysis and our actor selection criteria presented above. After that, I consulted official websites of said key organizations within the offshore oil and gas industry and ecosystem to find organizational organograms and contact information of employees whose responsibilities and job titles corresponded to our research study. If that information was not available, I identified specific departments that could be relevant to contact. For the departments and organizations I could not find specific contacts through their official websites, I also searched for potential participants through LinkedIn, focusing on people currently working at the corresponding organizations. Additionally, I searched on Google the names of potential participants previously identified on official organization websites or LinkedIn, to see if they have communicated and disclosed their contact information on official and public reports, communications or websites available (other than the main website of the organization). For instance, I was able to find contact information available on the website of a specific initiative or program that the potential participant partakes in. I also looked at contact information available within relevant industry reports I consulted for my research study. For organizations I could not find specific email addresses, I looked for general inquiry email addresses to be able to reach out to an employee who would redirect me to a potential participant relevant to my research.

This resulted in a primary contact list of 34 email addresses, including general inquiry email addresses. I reached out by sending an email to all those addresses, with a short summary of my study and the Consent Form approved by the REB of HEC Montréal.

Based on that initial reach out, two people agreed to participate in my study, and although I received many refusals or no response from multiple organizations, some of the people who declined to participate referred me to other actors who could potentially be pertinent. Also, a few of my general inquiry emails were answered and I was redirected to the relevant team and department. In addition, some of the participants referred me to other potential participants they know. Two of the participants who had originally agreed to participate in my research study did not follow up and finally declined to participate.

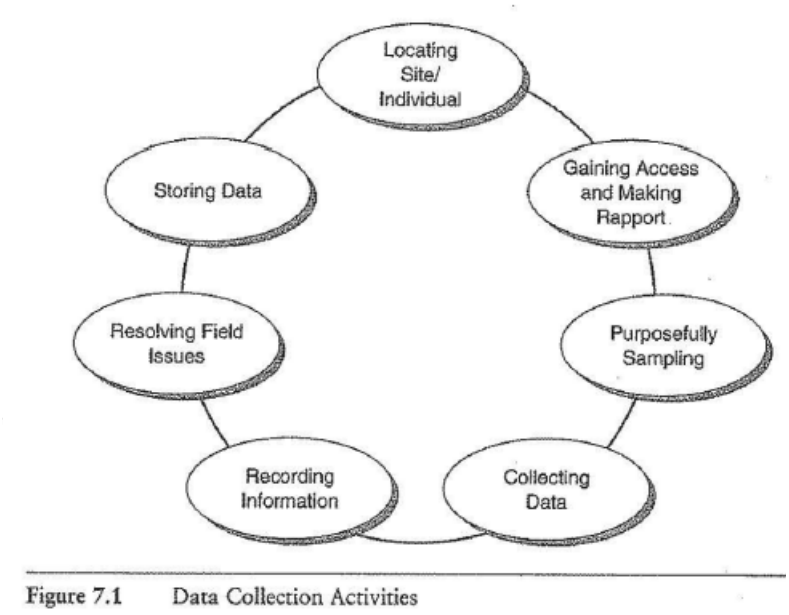
In total, 53 people were contacted, and six of them agreed and confirmed their participation in the study.

The selection of and outreach to participants revealed to be quite laborious and difficult. Many of the people contacted refused to participate and some did not reply at all, apparently due to the nature of our study. Indeed, throughout this research and other research projects conducted completely independently by the Research Director, it appeared that actors within the offshore oil and gas industry in Newfoundland and Labrador were quite reluctant to discuss, especially on themes of policy efficacy, energy transitions and offshore industries. Although some participants seemed to be much more inclined to participate in the research when they learned that it was conducted by a student as part of an academic research project, many declined or stopped responding. Based on our concrete experience of participant outreach, we hypothesize that the relatively small size of the industry, insular local culture and relational and geographical closeness among industry actors may have discouraged many to participate in such research.

4.2 Data collection

For this research, data collection follows the principle of data triangulation (Pauwels & Matthyssens, 2004), by utilizing and cross-referencing data from different sources. Primary data was collected through semi-structured interviews, as these are ideal for comparing different participants' answers to similar questions (Patton, 2002), and interviews are the most significant aspect of case study analyses (Yin, 1994). For primary data collection, this study follows Creswell's (2013) process as presented in Figure 4. Additionally, for triangulation purposes, our analysis was enriched by other documents – subsequently referred to as secondary data material – that include official reports and studies conducted on Atlantic Canada and Newfoundland and Labrador about the offshore oil and gas industry. This helped not only bonify but also corroborate data from our study.

Figure 4: Primary data collection process



Source: Creswell (2013)

Semi-structured interviews

For primary data collection, semi-structured interviews were conducted, as they are a prevalent method in qualitative research (Yin, 2016). This qualitative method allows to have a common base structure to all interviews, to conduct them in a systematic manner, and collect comparable data. This also allows for minor changes during interviews, to reorder the questions or ask probing questions if needed, solely to encourage a fluid conversation with each participant (Berg, 2009). In total, there were six interviews with different participants, each working for a relevant actor within the offshore oil and gas industry in Newfoundland and Labrador, that also had a key role in policies. Based on the previously established selection criteria, the participants interviewed were all directly involved with the offshore oil and gas industry, and all of them had a pertinent position to provide insights on the policy mix. The objectives were to understand the policy mix and the industrial dynamics within the offshore oil and gas industry in Newfoundland and Labrador and reveal key insights on energy transition processes in the region.

One main interview guide (see Appendix 1) was designed based on the key themes of our conceptual framework presented in the previous chapter. Based on those themes and concepts from the conceptual framework, broad categories then specific questions were elaborated to ensure that

they address the information we want to collect and analyze (Berg, 2009). The questions were then regrouped to form three different sections of the interview, to allow for a fluid discussion with participants. The first section includes introductory questions to understand the mandate of the participant and their organization and start to assess their position within the policy mix. The second section dives deeper into their role within the offshore oil and gas industry and its ecosystem. The last section covers questions about energy transition processes, and the influence of the local context. Our final guide was inspired by an interview guide provided by the Research Director that had been used in another research project with similar participants. Two additional questions were added to ask participants for participant suggestions, and encourage them to share additional information or documentation, when possible.

The timeframe for the interviews was between June and August 2023. Depending on participants' availability and whether they agreed to the audio-recording of the interview for transcription purposes or not, the length of interviews varied from 55 minutes to 86 minutes.

Table 4: Summary of interviews with participants

Participants						
Code	**Category**	**Organization**	**Role**	**Date**	**Duration**	**Location**
A	Economic development agency	ACOA	Manager	June 5, 2023	59 min	Teams conference call
B	Provincial government	Department of Environment and Climate Change for the Government of Newfoundland and Labrador	Director	June 9, 2023	55 min	Teams conference call
C	Federal government agency	NRC-IRAP	Director	June 30, 2023	55 min	Teams conference call
D	Federal government agency	NRC-IRAP	Industrial Technology Advisor	July 25, 2023	59 min	Teams conference call

E	Industrial association	Energy NL	Manager	August 24, 2023	1h 23 min	Teams conference call
F	Economic development agency	ACOA	Senior Advisor	August 25, 2023	1h 26 min	Teams conference call

Secondary data material (triangulation)

Triangulation (Ghauri, 2004) is a key element of case studies. Triangulation refers to collecting data either from distinct sources or through different methods, to study a given phenomenon (Ghauri, 2004). The purpose of using triangulation is to validate data collected. For this research project, triangulation is used to corroborate information gathered in the semi-structured interviews, and to complement the primary data, as the sample is small.

The evolution of the offshore oil and gas industry in Newfoundland and Labrador, and of the federal and provincial political and economic contexts surrounding that industry were analyzed through secondary data material, namely policy documents and regional strategic plans from the Government of Canada and the provincial Government of Newfoundland and Labrador, public reports conducted by and for key actors within the industry (e.g., official audits, industry reports), newspaper articles, government press releases and other relevant studies.

Table 5: Summary of all data collection and purpose

Data type	**Sources**	**Timeframe**	Purpose
Interviews	*6 in-depth semi-structured interviews*	June-August 2023	• Primary data to be coded and analyzed • One of the main sources of data for understanding actors' strategies, their roles and interactions within the industry
Public documentation issued by actors directly relevant and included in the case study	*Official websites of organizations and agencies included in the primary data collection, governmental press releases, official reports*	2020-2023	• Triangulation • Corroborate insights and information gathered from semi-structured interviews

	and studies, policy reports, legislation and regulations documents		
Public documentation external to participants but from other important stakeholders within the industry	*Consulting reports and academic case studies, public strategic plans published by key actors in the industry, newspaper articles, press releases*	2016-2023	• Provide insights to contextualize the caste study analysis • Triangulation • Corroborate results gathered from semi-structured interviews

4.3 Data analysis method

This research study uses qualitative data, so first and foremost, we had to process the primary data collected through our semi-structured interviews before analyzing it (Miles et al., 2014).

Before the data collection process, all participants provided their written or verbal approval to the Consent Form of this research project. Four out of the six participants agreed to being audio-visually recorded, while two participants agreed to participate in the study but declined to be recorded. All recordings were used for transcription purposes only and were deleted once transcription was done.

After each recorded interview, a first draft of the transcripts was obtained and exported directly from Microsoft Teams Transcription tool. Based on those initial transcripts, the researcher listened back to the recordings and 'cleaned' the raw qualitative data by producing a legible verbatim transcript of each interview. The interview questions were highlighted to structure the documents.

For the two interviews that did not have a recording, live note taking on Microsoft Word was used as a method to collect data during interviews. These notes describe the answers of each participant's answers to the interview questions, using the exact words from the participants as much as possible, to avoid any subjectivity. To allow for as much detail as possible in the notes, those two interviews were longer than the audio-visually recorded ones. The researcher went through her notes directly after each of those two interviews, to make them as legible and coherent as possible, and to avoid forgetting any detail or major information. For all six interviews, each

participant was assigned a letter to maintain confidentiality, and all pronouns used are 'they' 'them' to remain confidential.

The method used was a thematic analysis of the qualitative data from the interviews (Berg, 2009; Miles et al., 2014). The coding process started with the identification of a list of preliminary codes (see Appendix 2) reflecting the key concepts from our conceptual framework elaborated and presented in Chapter 3. To process all the primary data collected, the transcripts and notes for all six interviews were then all coded through the NVivo software. Coding through NVivo is an elemental method that uses keywords or short sentences used by a participant to identify the preliminary codes from our conceptual framework, and to bring out new codes emerging from the data (see Appendix 3) (Miles et al., 2014, p. 74). This method is used by many beginner researchers, which is why it was preferred for our study. This allows us to apply a deductive-inductive approach, by first interpreting the data according to our conceptual framework, and then identifying new themes emerging from the interviews that were not present in our framework (Berg, 2009). Subsequently, the main themes that are analyzed and discussed for this research are the recurring ones that are corroborated by multiple actors and participants from the primary and secondary data material.

4.4 Quality criteria

Four quality criteria are important to assert the trustworthiness of qualitative research: credibility, transferability, dependability and confirmability (Shenton, 2004). To ensure the reliability of the results obtained from our qualitative research, multiple strategies have been used to address those four criteria, based on the strategies suggested by Shenton (2004).

4.4.1 Credibility

Credibility is key to understanding how qualitative research results are aligned with reality (Shenton, 2004). To ensure the internal validity of our research study, we adopted a case study approach and collected our qualitative data through semi-structured interviews. According to Shenton (2004), adopting well established research methods is essential in improving the credibility of qualitative research. In our case, we used semi-structured interviews as these are the most prevalent methods used in qualitative research (Yin, 2016). Additionally, our interview guide

was inspired by a guide used in previous studies by the Research Director, in order to follow a preferred structure for discussions with similar participants. The template interview guide provided was divided into three sections, starting with a general section to set the context, one focusing on the ecosystem studied, and the last section focusing on broader spatial effects. As per one of Shenton's (2004) recommended strategies, this research project's interview guide is based on a previous template that was used in other similar successful studies by the Research Director. Our interview guide was also divided into three main sections, starting with a first section setting the context and asking participants more general questions about their organization. The second section focused on questions to analyze the industry studied and the underlying dynamics, in our case the offshore oil and gas industry and its actors in Newfoundland and Labrador. For the last section, we also looked at broader spatial effects and assessed the role of the regional context of St. John's and Newfoundland and Labrador on energy transition and the policy mix.

Moreover, data triangulation was used to improve the credibility of the data collected. To do so, participants from different organizations were interviewed to provide various data sources and viewpoints to the phenomena studied (Shenton, 2004). In our case, we interviewed participants from different governmental agencies and bodies, and from an industrial association. Furthermore, this research study relies on a wide range of data sources used to corroborate or complete primary data and diversify data source material (Shenton, 2004). For this thesis, multiple studies published on the offshore oil and gas industry in Newfoundland and Labrador were consulted, as well as all the official websites of the relevant governmental agencies and actors in our case study. Additionally, many news articles and key legislative texts were consulted and analyzed.

Throughout the data collection process, specific tactics were leveraged to ensure honesty in participants (Shenton, 2004). Participants were given the option to continue or refuse to participate in the study, to make sure that all are genuinely interested in participating (Shenton, 2004). Participants were also given the choice to agree or refuse to be recorded for transcription purposes only. Each participant who agreed to participate signed a consent form stating the level of confidentiality they agreed to, and at the beginning of each interview, participants confirmed verbally their consent to being recorded or not for our research. It was reiterated multiple times during the outreach phase and during recorded interviews that audiovisual recordings would be used for researcher's use for transcription purposes only.

Lastly, previous research findings were consulted and examined to confirm whether the results of this research study were aligned with those from previous studies (Shenton, 2004). As previously mentioned, multiple studies on the offshore oil and gas industry were consulted as additional source material, and this research's conceptual framework is based on existing frameworks from policy regional development literature (Nilsen et al., 2022; Rogge & Reichardt, 2016). In fact, this study applies Nilsen et al.'s (2022) framework and provides empirical evidence for that framework and its typology of peripheries, which furthers existing literature on peripheral regions. Besides, this study builds on Rogge and Reichardt (2016) definition of the policy mix.

4.4.2 Transferability

In qualitative research, a study and its findings are to be understood as embedded within a particular context (Shenton, 2004; Lincoln & Guba, 1985). Thus, when it comes to qualitative research, it is essential to thoroughly explain the context and configurations of a study to allow other researchers to assess whether the findings are transferable to another situation they are studying (Shenton, 2004). As part of this methodology chapter, the boundaries of this study were set, by identifying the number of organizations and participants included in our research. This chapter also documented in depth the data collection methods and processes followed, and the details on each interview conducted. The following chapter (Chapter 5) presents in detail the context of our case study to encapsulate all the contextual factors that may be relevant for comparability. Also, the analysis chapters (Chapter 6 and 7) thoroughly describe the phenomenon studied to facilitate comparability and transferability to similar peripheral regions and policy mix configurations.

4.4.3 Dependability

In qualitative research, phenomena observed can change and evolve by nature. Therefore, dependability is a key criterion closely related to credibility, as credibility can greatly help the dependability of the study (Shenton, 2004). To assert the reliability of qualitative research, ensuring dependability allows future researchers to potentially replicate our study (Shenton, 2004). To address this, our research protocol has been extensively documented in this methodology chapter, by describing all the steps of our research process, from research design to the strategy and the methodology used. Notably, this methodology chapter also explains the operational and

logistical details of the data collection process and the strategy for data analysis (Shenton, 2004). For instance, the logic behind the interview guide design highlights the link between the guide and the conceptual framework on which this study relies. The interview guide was presented and included as well in Appendix 1. Each step of our research protocol was presented and justified to ensure that future researchers understand each decision, thus improving the dependability of our study.

4.4.4. Confirmability

To ensure confirmability of this research, it is crucial that the results of the analysis emerge from the experiences and ideas of participants, and not from the researcher's preferences (Shenton, 2004). Therefore, to improve the confirmability of this study and its findings, data triangulation was used by interviewing participants working for different actors within the industry. Also, information from various data sources such as news articles, government press releases, legislative texts and similar published studies were analyzed and incorporated to this study to minimize researcher's bias. Also, the limitations of this research and the research are presented in this chapter. Moreover, when relevant, direct quotes from interviews were incorporated within this research in Chapters 6 and 7 to corroborate the analysis of results obtained from primary data collection.

4.5 Limitations and constraints

Although the methodology of unique case studies and the use of semi-structured interviews are quite prevalent in qualitative research, there are some limitations and constraints inherent to this research. Qualitative semi-structured interviews rely on participants' own experiences (Berg, 2009), therefore insights from those interviews depend on participants' understanding of phenomena studied and their own viewpoints. For example, insights may depend on the participants' role and hierarchical position within their organization, or their professional experience and expertise (i.e., technical vs generalist) within the industry studied. Besides, interviews also rely on the researcher's experience and their ability to conduct interviews. Lastly, the limited primary data collected is important to keep in mind when reading this study. Although extensive secondary data was thoroughly analyzed and included in this research, only a limited number of interviews were conducted due to the inaccessibility of participants and of organizations

in general within this industry and this region. As previously mentioned, many of the people contacted throughout our sampling process declined to participate, did not reply, or stopped responding. Based on our practical experience, we hypothesize that the relative geographical and relational closeness among actors and the tight-knit mentality within the offshore oil and gas industry may have deterred many from participating in research projects that touched on seemingly sensitive topics such as policy efficacy and energy transitions in the context of an industry inherently dependent on non-renewables. Researcher's resources were also limited, which did not allow for any field observations or in-person interviews.

4.6 Ethical considerations

Although participants interviewed do not belong to a vulnerable population group, and the phenomenon studied does not imply classified information, there were numerous ethical considerations included throughout this study. As previously mentioned, all participants were sent a summary of the study to understand the context and purpose of their interview with the researcher, and each participant signed a consent form. To maintain the confidentiality and anonymity of participants and data collected, all names of participants are redacted from this research as per participants' respective consent forms, and from the analyzed verbatim files.

Since this research involves the participation of human subjects, it was submitted to, reviewed and approved by the Research Ethics Board (REB) of HEC Montréal. This means that the research complies with the REB's *Policy on Ethical Conduct for Research Involving Humans*. The ethical approval of this research project was received on March 8th, 2023 and can be found in the appendix (Appendix X). All information collected was processed and analyzed in confidentiality and will not be shared with other people, companies or organizations.

Chapter 5: Context of case study

This chapter will present the regional context relevant to this case study. The first section will describe the geographical, environmental and socio-economical context of St. John's and Newfoundland and Labrador. The second section will present an overview of the offshore oil and gas industry. The last section will provide some background on public policies and their evolution until now in the offshore oil and gas industry.

5.1 The regional context of St. John's and Newfoundland and Labrador

5.1.1 Geographical and socio-economic considerations in the province

The province of Newfoundland and Labrador is situated on the Northern East coast in Atlantic Canada. As of July 2023, it has a population of 538,605 habitants (Government of Newfoundland and Labrador, 2023). The province is mainly composed of rural areas and small towns and municipalities, with 40% of the population living in those rural areas in 2021 (Statistics Canada, 2022). In its Census of Population, Statistics Canada (2022) defined rural areas as having less than 1,000 habitants. Compared to the national average population density of 3.7 habitants per square kilometer, Newfoundland and Labrador has a lower population density of 1.4 people per square kilometer (World Population Review, 2023; Statistics Canada, 2023a), with 50% of the population living on the Avalon Peninsula of Newfoundland. That peninsula contains St. John's, the capital and the largest city of the province, which is the easternmost city in North America. The metropolitan area of St. John's accounted for 212,579 habitants in 2021, and the population density is significantly higher compared to the rest of the province (228.2) (Statistics Canada, 2023b).

Newfoundland and Labrador is characterized by a rugged coastal terrain composed of many fjords and bays (Harris & Hiller, 2023). The province has a coastline of more than 29,000 kilometres and over 7,000 small islands offshore and, by land size, it is one of the smallest provinces of Canada. These elements contribute to the rather challenging conditions of the region, but also to economic opportunities. Indeed, the geographic location allowed for the development of many ocean industries such as fisheries, aquaculture, offshore oil and gas, tourism, transportation and ship building (Investor Relations Newfoundland and Labrador, n.d.). The region has become key for the ocean economy and notably for offshore energy sectors, in Canada and globally. Nonetheless,

that section of the Atlantic Ocean coast still hosts quite hazardous environmental conditions, with extreme weather especially in the winter, various sea-ice cover areas, strong winds and ocean currents (Government of Newfoundland and Labrador, 2012). Also, the presence of ice and icebergs is a hazard for infrastructure (Hatch, 2021).

Table 6: Socio-economic data of Newfoundland and Labrador compared to other provinces

	Newfoundland and Labrador	Nova Scotia	Québec	Ontario
Population (in thousands), 2023*	**538,605**	1,058,694	8,874,683	15,608,369
Population growth, 2013-2023*	**2%**	11%	9%	14%
Unemployment rate (%), 2022*	**10.8**	5.7	3.8	4.6
GDP (in millions chained 2012 Canadian dollars), 2022	**30,150**	40,011	391,189	779,145
Primary sector (%)*	**33.6%**	3.3%	3.9%	2.2%
Manufacturing & construction (%)*	**10%**	13.9%	19.6%	18.3%
Services (%)*	**56.4%**	82.8%	76.5%	79.5%
Sources: * Statistics Canada (2023a; 2023b; 2023c; 2023d) ** Statista Research Department (2023a; 2023b; 2023c; 2023d; 2023e; 2023f)				

As Table 6 shows, Newfoundland and Labrador has a resource-based economy, with around 34% of the GDP generated by the primary sector. The extraction industry, which is composed of the mining, quarrying and oil and gas extraction, has by far the highest labour productivity in Newfoundland and Labrador with 667.5 chained 2012 dollars per hour in 2022 (Statista, 2023b). This means that for each hour worked in that sector, it added 667.5 chained 2012 Canadian dollars to the province's GDP.

5.1.1 The city of St. John's

St. John's is the commercial centre of the province, and it is renowned as the 'City of Ocean Excellence' due to the strong local ocean expertise; it is also where Canada's Ocean Supercluster is located (Advantage St. John's, n.d.-a). Being the most easterly point of North America and possessing a landlocked harbour, the city and its port have a strategic location notably for commercial reasons, but also for transportation, defense, and communications purposes (Harris & Hiller, 2023). Indeed, St. John's is located between Canada's Arctic and European markets and therefore has a key port for major international routes (IET, n.d.).

The city is home to around 450 companies that play a significant role in the global ocean sector (Advantage St. John's, n.d.-a), and approximately 42% of businesses in the province are concentrated in the metropolitan area of St. John's, further underscoring the city's economic importance (Advantage St. John's, n.d.-b). Moreover, the city represents nearly 40% of the province's population, making it a crucial demographic center. St. John's notably boasts the presence of Genesis, an innovation incubator, and Verafin, a financial tech giant in Atlantic Canada, which contributes to the city's status as a strategic hub of innovation and technological advancement in the region. The city's key sectors for development and competitive advantage are identified as ocean technology, offshore energy, aquaculture and fisheries, and tourism. St. John's is also a member of the World Energy Cities Partnership (WECP), connecting it to leading cities in the energy sector and promoting the transition to a more sustainable energy future (World Energy Cities Partnership, n.d.).

For the context of our study, St. John's prominence in the region and for the offshore oil and gas industry is well-established, with a concentration of corporate activities and services related to this sector. St. John's aspires to become a global leader in offshore energy expertise and marine and ocean technologies, in alignment with the city's 2021 Roadmap's main goals (City of St. John's., 2021). The 2021 Roadmap 2021 (City of St. John's., 2021) emphasizes the strong presence of research facilities, businesses, and expertise in offshore energy development and ocean technology. It further highlights local expertise in harsh environments and locally developed competencies that can be applied and leveraged globally, providing opportunities to develop an "Arctic" expertise, including the creation of an "Arctic Thinkers Forum" as one of the short-term goals. The presence of educational institutions such as Memorial University of Newfoundland, the

College of the North Atlantic, and private colleges offers further potential for innovation and local expertise development as well.

Nonetheless, while it possesses valuable advantages, St. John's and the region at large face certain challenges. As stated previously, the economy heavily relies on the oil and gas industry, indicating a lack of economic diversification, a pending major issue as these activities are based on non-renewable resources. The challenging business environment is also a notable problem, necessitating the development of more initiatives and regulations to enhance the business landscape and encourage business development. St. John's private sector is largely composed of small businesses, making it relatively small compared to other cities on global markets.

Regarding the socio-demographic factors, the city's density is also an important challenge when compared to the rest of the province. At the provincial scale, the aging workforce also presents a risk for the economy, as the workforce over 55 years old increased significantly from 2014 to 2019, while the workforce under 55 years old decreased by 4% over the same period (Statistics Canada, 2020, as cited in IRCC, 2020). This accentuates the already present labour shortage in the region. Indeed, as is the case for other regions and provinces in Canada, Newfoundland and Labrador suffers from a major labour shortage, and relies on immigration to reduce that shortage. Besides the aging workforce, the province is also affected by the out-migration, especially among younger people and in rural areas (Economic Division Department of Finance, 2023). Over the past few years, the province has put even more emphasis on attracting new immigrants, and it is observed in the province that immigrants have a higher participation rate and lower unemployment rate compared to people born in Canada (Economic and Social Development Canada, 2023).

To conclude, when considering the regional context of Newfoundland and Labrador, it is essential to highlight the role and traction of the city of St. John’s compared to the rest of the province. The city of St John’s is one of the key particularities of the regional context. While the province at large can be considered a peripheral region in Canada, both geographically and economically, St. John’s is quite connected. The city possesses local specificities that allow it to assert its pivotal role within the region, but also globally when it comes to ocean and Arctic expertise.

However, it is difficult to dissociate both, as most of the population and economic activities are concentrated in the metropolitan area of St. John's, and most companies in sectors that are highly influential regionally have their office in St. John's. Therefore, when thinking about the local context and specificities, it is important to keep in mind the duality of the region, as St. John's is the main economic hub and has the strongest traction, while the rest of the province is predominantly composed of rural areas.

5.2 Overview of the offshore oil and gas industry in Newfoundland and Labrador and St. John's

In 1959, the development of the offshore industry started with the exploration of Sable Island in Nova Scotia (NRCan, 2020). Later in 1966, drilling began off the shores of Nova Scotia and Newfoundland (Bott, 2004). The first major discovery in Newfoundland and Labrador happened in 1979, with the discovery of the Hibernia site.

Looking at Newfoundland and Labrador specifically, the province is the largest producer of crude oil in Eastern Canada, and the third oil producing province in Canada (CER, 2023a). Nowadays, there are five offshore oil fields that are explored in Newfoundland and Labrador: Hibernia, Terra Nova, White Rose, and North Amethyst, and Hebron. Relatively new projects have been approved, such as the West White Rose project in 2017, so production keeps expanding in the region (CER, 2017). Figure 5 shows the location of those project sites.

Assessing the impact regionally, the province's economy relies heavily on the offshore oil and gas industry, which represents 25% of the GDP. The industry has generated over 5,000 direct employment and 14,600 indirect employment (Hatch, 2021, p. 8). It is also interesting to observe the job multiplier of the industry (5.0), as it is the highest in the province (*The Big Reset – The Report of PERT,* 2021; p. 89). This shows how the industry not only contributes directly to the regional economy, but it also favors the creation of opportunities for other sectors in the region, such as ocean technology or transportation.

However, in the past few years, there has been a notable decline in the industry, with a 10.4% decrease in oil and gas extraction (Statistics Canada, 2023d), which had repercussions on the

economy. In fact, Newfoundland and Labrador is the only province that saw a decline in its real gross GDP in 2022 (-1.7%) (Statistics Canada, 2023d). Since the COVID-19 pandemic, the price of oil collapsed, which negatively affected offshore exploration activities, profitability and jobs (PERT, 2021). Offshore activities also represent an important source of revenue for the provincial government, as offshore royalties represented 532.7 million dollars of revenue for the province in 2020-2021 (PERT, 2021).

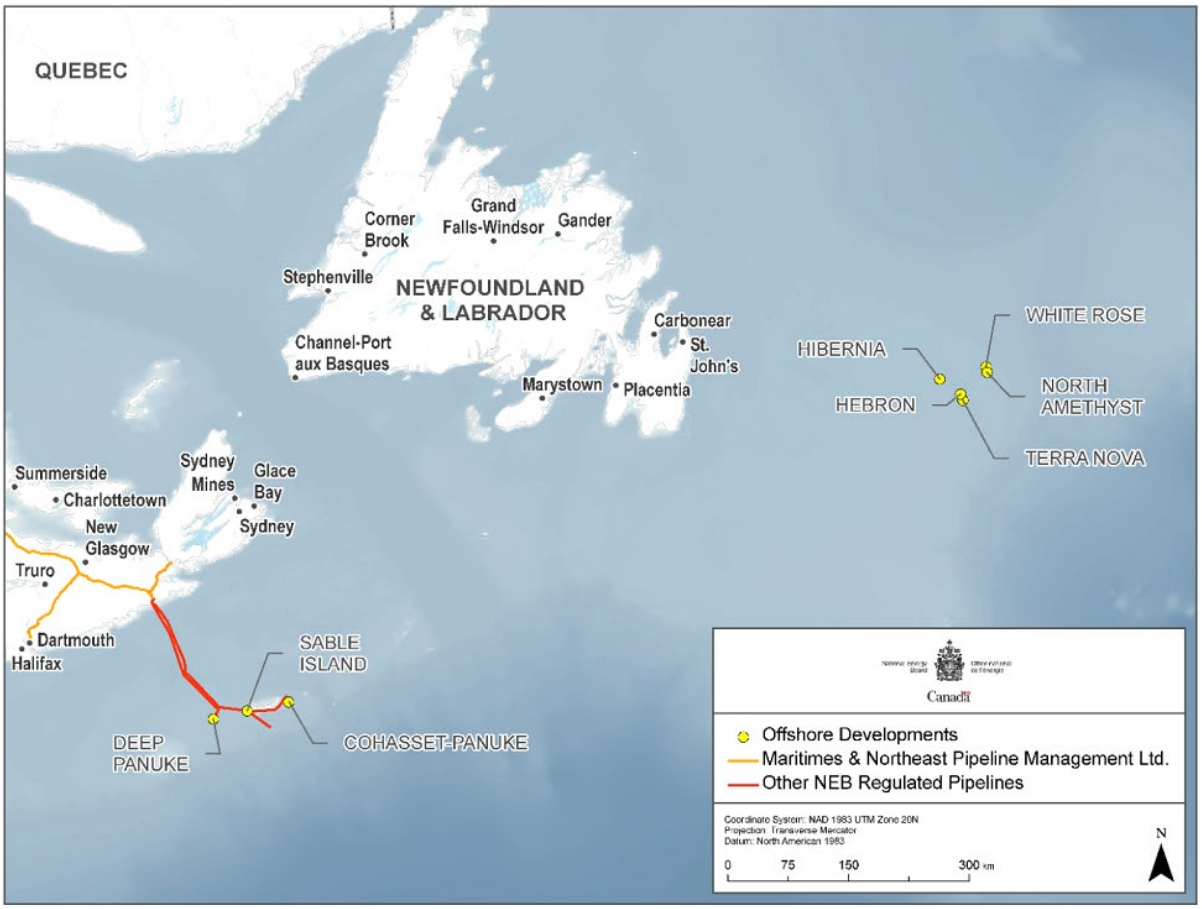
Furthermore, the industry has been heavily criticized in the light of Canada's commitments to reduce emissions. NGOs and communities have notably voiced their concerns in the last few years regarding the recent project developments (e.g., Bay du Nord), as they represent a threat to ocean ecosystems (Brooks, 2022). Furthermore, environmental organizations such as World Wildlife Fund (WWF) have noted how current policies seem inadequate for environmental regulations and protection of ecosystems, and prevention (Brooks, 2022).

Nonetheless, the industry remains a key economic driver, and despite national net zero commitments, governments do count heavily on the offshore oil and gas industry for regional economic development. In March 2023, the Government of Newfoundland and Labrador announced that it would allocate 50 million dollars to help the industry recover, and notably to motivate operators to continue drill exploration in the region (Roberts, 2023a).

Another important element in the context of the offshore oil and gas industry is regarding the infrastructure available for offshore activities. Indeed, the power mix in the province is very clean, with 95% generated by hydropower (Cooper, Caron Hawco Group Inc. & Rystad Energy, 2021, p. 17). This presents an opportunity for the industry to electrify their offshore activities and leverage clean energy to green their operations. Newfoundland Transshipment Limited is a renowned transshipment facility based in the province, that provides its transportation and trade services for offshore oil activities (Newfoundland Transshipment Limited, n.d.). Nonetheless, there are no pipelines in the region for crude oil or natural gas. All offshore production is transported from oil fields to refineries by ship. Lastly, St. John's Port Authority is a major port in the region and for international routes. The port is the main supply and service centre of offshore energy on the East Coast of Canada. It is also worth noting that the Port of Argentia is the only monopile marshalling port in North America, and that it plays an important role in supporting US

energy transition and offshore wind developments (Port of Argentia, n.d.). This existing infrastructure can become a key asset in energy transition efforts in Newfoundland and Labrador.

Figure 5: Map of Newfoundland and Labrador's main exploration fields



Source: CER (2021).

5.3 Evolution of public policies in the offshore oil and gas industry

As our study focuses on the role of actors within the policy mix, it is important to first understand the context and history around public policies in the region and for this industry specifically. This section presents the development and main evolution phases of public policies for the offshore oil and gas industry.

5.3.1 Evolution of offshore public policy 1985-2022

Canada's oil and gas industry is one of the most regulated and strictest in the world (CAPP, n.d.). Specifically, offshore oil and gas in Canada is mainly regulated based on four Acts (NRCan, 2016):

- *The Canada Petroleum Resources Act*: for the lease of federally owned oil and gas rights on frontier lands to companies;
- *The Canada Oil and Gas Operations Act*: aiming at promoting environmental protection and safety, and conservation on industrial operations;
- Two Accord Acts that implement agreements between federal and provincial governments in regard to offshore petroleum. All offshore activity needs to be approved through one of the agencies regulating these acts, therefore all offshore operators need an authorization.
    - *The Canada-Newfoundland Atlantic Accord Implementation Act*: the law that governs all oil and gas offshore activities in Newfoundland and Labrador
    - *The Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*

Through this legislation, the federal government can lease federally owned oil and gas rights to oil and gas companies for the exploitation of "frontier lands" and can implement agreements between the federal and provincial governments regarding offshore petroleum resources (Manning & Tamura-O'Connor, 2020). This legislation also frames the development of oil and gas in marine areas controlled by the federal government (Manning & Tamura-O'Connor, 2020).

The Canada-Newfoundland Atlantic Accord Implementation Act is the most important legislation for offshore Newfoundland and Labrador. Industry monitoring and environmental assessments fall under provincial regulations and jurisdiction. All projects and plans are reviewed and monitored by the **C-NLOPB** (following provincial regulations), but companies also need to follow additional federal regulations for their offshore activities (e.g., Fisheries Act, Canadian Environmental Protection Act, etc.) (CAPP, n.d.-b). Since exploration areas are also strategic for fisheries, C-NLOPB works with fisheries stakeholders, Fisheries and Oceans Canada (DFO), other federal and provincial agencies and other stakeholders throughout the land tenure process (C-NLOPB, 2022).

Table 7 presents the major policy development phases when it comes to the regulatory and monitoring framework for the offshore oil and gas industry, from the very beginning of industry development until 2022. For each evolution of the regulatory framework, the corresponding policy strategies were identified.

Table 7: Major development phases of regulatory framework for offshore oil and gas industry in Newfoundland and Labrador

POLICY DEVELOPMENT PHASES	POLICY PROCESSES	POLICY STRATEGIES
Joint Management Regime	**1985** • Creation of the first agreement between the Government of Canada and the Government of Newfoundland and Labrador on the joint management of offshore petroleum resources: Canada-Newfoundland and Labrador Atlantic Accord Implementation Act • C-NLOPB to regulate this accord and all offshore petroleum activity (within their jurisdiction) **1986** • Joint Management Regime - mirroring federal and provincial legislations • Canada & Nova Scotia – agreement between Canada and Nova Scotia: Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act • C-NSOPB to regulate this accord and all offshore petroleum activity (within their jurisdiction)	Mirror federal and provincial legislations, to ensure consistency and coherence between federal and provincial regulations and joint management of resources.
Further development of the joint management regime	Continuation of the joint management regime's implementation, with the additional of new regulations and requirements on: **1988** - issuance and acquisition of operations licenses **1995** - geophysical and geotechnical data - installation design and the associated certificates of fitness (i.e. *"fit for purpose and is in a condition that it can be operated safely."*) **2009** - drilling and production activities	Implement legislations and requirements to ensure safe operations of offshore petroleum activities
Frontier and Offshore Regulatory Renewal Initiative	**2002** - Creation of the Atlantic Energy Roundtable (AER) • Forum to discuss and work towards a sustainable offshore petroleum industry in the region • Governments, industry actors, regulators, labour leaders, etc.	Create forum between governments and industry actors, to facilitate discussions and provide recommendations for a sustainable offshore petroleum

	2005 - Creation of the Frontier and Offshore Regulatory Renewal Initiative (FORRI) FORRI led by NRCan, and other participating entities are: • Crown-Indigenous Relations and Northern Affairs Canada; • ECCC; • IET; • Nova Scotia's Department of Natural Resources and Renewables; • C-NLOPB, CNSOPB, and • CER **2009** - updates of the Offshore Petroleum Drilling and Production Regulations, addressing safe operations of offshore petroleum activities **2015** - Development of new regulations for Newfoundland and Nova Scotia's offshore activities: 1. Offshore Petroleum Administrative Monetary Penalties Regulations 2. Offshore Petroleum Cost Recovery Regulations 3. Offshore Petroleum Financial Requirements Regulations 4 Implementation of the federal Energy Safety and Security Act	industry FORRI was created to oversee policy processes around renewal and modernization of the regulatory framework, and to improve existing regulations
Standing Joint Committee on the Scrutiny of Regulations	**2011** – Stakeholders shared feedback on duplication issues in existing regulations Committee relayed those concerns and advised for harmonization of regulations between Newfoundland and Labrador and Nova Scotia Industry stakeholders doubt the competitiveness of the existing regulatory framework in terms of the administrative burden and lack of clarity in regulation processes.	Improve policy coherence between provinces to ensure more efficiency in implementation processes
New proposed Regulatory framework	**2016 -** Beginning of policy making processes with stakeholder consultation through: • Multilateral fora, roundtables, other engagement opportunities held in Ottawa, St. John's and Halifax • Indigenous communities involvement • Consultation with environmental NGOs (e.g., World Wildlife Fund) • Technical feedback and policy advocacy from industrial associations	Create a new modern regulatory framework that is 'technology-neutral', to allow for more flexibility and the use of advanced technologies and approaches to offshore petroleum activities. Improve regulatory framework to

	• Consultation with Engineers Canada Other stakeholders involved: offshore operators, local supply and services companies, land surveyors, certifying authorities, industry consultants and one standards organization **Starting 2022** – Implementation of proposed regulatory framework in 10 parts: 1) & 2) Updating (carrying over most) current requirements for applications and authorizations present in the *Offshore Petroleum Drilling and Production Regulations*, but also extending those requirements to <u>all</u> petroleum activities. Strengthening environmental protection, regarding spills response - spill-treating agents 3) Certificate of fitness: new requirement to also submit a Certification Plan with their project application, proposing standards and solutions to meet regulations on design, construction, installations, etc. 4) Technical requirements → applicable to all regulated activities 5) Requirements for geoscientific, geotechnical and environmental programs <u>Similar to previous act but portion about equipment requirements removed</u> 6) Drilling and production activities: requirements for evaluation of activities Strengthening requirements for equipment used Limiting hazards 7) Diving: new technical and design requirements for equipment used 8) Installations: new regulations on installation (design, standards, etc.) requirements to allow for more flexibility and adaptability to new technologies 9) Support operations: similar to previous requirements but now applicable to all regulated activities 10) Records and reporting: consolidation of all existing regulations and provisions	ensure better safety, environmental protection and resource management. Provide a comprehensive framework for better efficiency of policy instruments and implementation processes.

Own elaboration, adapted from Canada–Newfoundland and Labrador Offshore Area Petroleum Operations Framework Regulations (2022).

As the last section of Table 7 suggests, the offshore legislation has recently been updated (Canada–Newfoundland and Labrador Offshore Area Petroleum Operations Framework Regulations, 2022). These changes are significant as they address key elements of the regulation of offshore petroleum activities. The main reason for these updates in the regulatory framework is that previous regulations were created in the 1980s-1990s and did not account for new technology developments and new practices or contexts (Canada–Newfoundland and Labrador Offshore Area Petroleum Operations Framework Regulations, 2022). The policy making process for that latest policy development phase spanned over six years, as initial policy intent actually started early 2016.

5.3.2 The Big Reset (post COVID-19 recovery)

In order to revitalize the economy after the COVID-19 pandemic, the government elaborated and published a recovery plan for Newfoundland and Labrador called The Big Reset:

> *"The Big Reset is a transformational plan for Newfoundland and Labrador that attempts to tie all aspects of the economy and society together to meet some of the biggest challenges and opportunities ever faced by the Province. The technological revolution and the revolution related to climate change requires a shift in how the Province and the world does business. There also needs to be a change in how government manages its financial affairs."* (PERT, 2021).

Four 'strategic resets' emerge from this plan:

1) to improve governance accountability and transparency.
2) Focus on building a "greener, technologically advanced economy" (PERT, 2021, p. 6), leveraging benefits from its current resources (hydroelectricity, oil and gas).

> *"The province can be a leader in the transition toward a greener economy based on sustainable management and a transition to net-zero carbon emissions. In partnership with the Federal Government and the private sector, the province can take advantage of the opportunities this shift presents."* (PERT, 2021, p. 55)

> *"Unfortunately, with the exception of green electricity generation, the province is behind the curve on the economic transition to a greener economy relative to many other provinces. Substantial work is required to mobilize the economy to focus on this key area."* (PERT, 2021, p. 56).

3) Refocus on improving education system and accessibility, and supporting senior citizens
4) Controlling the fiscal situation and implementing a solid fiscal plan.

The Big Reset hence highlights the increased importance of transitioning to a greener economy for Newfoundland and Labrador.

5.3.3 The influence of national targets

Following the Paris Agreement in 2015, Canada committed to significantly reduce GHG emissions by 40-45% below 2005 levels by 2030 (Government of Canada, 2023), and to carbon neutrality by 2050 (United Nations, n.d.). These stringent targets and accompanying roadmaps therefore dictate public policies in provinces, as each province must contribute to national emissions reduction efforts. Besides the Paris Agreement, Canada has also committed to the World Bank's "Zero Routine Flaring by 2030" initiative (World Bank, 2021), which means that upcoming regulations and policy framework will also greatly affect the offshore oil and gas industry.

Chapter 6: Analysis of the offshore oil and gas ecosystem in Newfoundland and Labrador

This chapter includes our analysis of the offshore oil and gas ecosystem in Newfoundland and Labrador. This analysis answers our research sub-question: *"Who are the main actors of the offshore oil and gas industry and what are the key dynamics and networks among them?"*. To answer that question, this section will present the regional preconditions on which the offshore oil and gas industry and its actors operate. Our analysis leverages the conceptual framework presented in Chapter 3. We will first present the actors, institutions and networks within the industry, and then we will assess actor composition and power relations.

6.1 Main industry actors in the offshore oil and gas industry

At firm-level, the main actors are MNE operators, supply and services companies, contractors, technology experts and OilCo.

6.1.1 MNE operators

MNE operators (operators) are the principal actors within the offshore oil and gas industry, as they are the ones operating the oil fields and managing platforms offshore and on the high seas. They focus primarily on exploration and production activities. The operators present in Newfoundland and Labrador are ExxonMobil Canada, Chevron Canada Resources, Suncor Energy, Murphy Oil, Equinor Canada Ltd., and Cenovus Energy. All these companies are large MNEs, as operating in this industry implies significantly high costs and expenditures. Thus, these MNEs have activities not only locally but globally in multiple jurisdictions and markets. Table 8 presents the main projects within the industry, and the corresponding ownership.

Table 8: Main projects & respective ownership

Oil fields - production of crude oil	
Hibernia	**1998** - First offshore oil field beginning of production

	Oil platform operated by: ExxonMobil JV ownership between: - ExxonMobil Canada (33.125% ownership) - Chevron Canada Resources (26.875%) - Suncor Energy (20%) - Canada Hibernia Holding Corporation (CHHC) (8.5%) - Murphy Oil (6.5%) - Equinor Canada Ltd. (5%) - Provincial Crown corporation, the Oil and Gas Corporation of Newfoundland and Labrador (OilCo) (8.7%) → government owned organization
Terra Nova	**2002** - beginning of production Operated by: Suncor Energy JV ownership between: Suncor Energy, Cenovus Energy, and Murphy Oil.
White Rose & the White Rose expansion projects *(North Amethyst was the first expansion of White Rose)*	**2007** - beginning of production **2010** - beginning of production for North Amethyst **2017** - approval of West White Rose **2020** - construction of West White Rose halted due to COVID-19 pandemic **2022** - West White Rose project restarted Operated by Cenovus (majority owner – 60%) JV ownership with Suncor (40% On the White Rose expansion project, Cenovus still has major JV ownership between: Cenovus (56%), Suncor (39%), and OilCo (5%).
Hebron	**2013** - project announced **2017** - beginning of production

	Operated by ExxonMobil JV ownership: - ExxonMobil Canada (35.5%) - Chevron Canada Resources (29.6%) - Suncor Energy (21%) - Equinor Canada Ltd. (9%) - OilCo (4.9%) → government owned organization
Refined Petroleum Products	
North Atlantic Refinery	North Atlantic Refinery is the only refinery in Newfoundland and Labrador **2021** - facility bought by Cresta Funda Management (American private equity firm) Facility renamed Braya Renewable Fuels, and will now focus on renewable fuel: corn oil, animal fats, used cooking oil
Natural gas	
The natural gas produced offshore is not sold, but rather used to power the offshore facilities or reinjected into the ground for pressure support	
Latest major offshore energy project in development	
• Bay du Nord – owned by Equinor, this project is currently on hold for up to three years • West White Rose Expansion project (see White Rose) is in development and 70% complete	

Own elaboration, information compiled from sources: CER (2017); CER (2023a); Government of Newfoundland and Labrador (2023); IET (n.d.); Cooke (2023); Roberts (2023b).

It should be noted from Table 8 that the Government of Canada also ensures their interest in those oil projects, through wholly owned subsidiaries such as the CHHC, or through their government owned organization OilCo, which is the Provincial Crown corporation, the Oil and Gas

Corporation of Newfoundland and Labrador. CHHC is a wholly owned subsidiary of Canada Development Investment Corporation (CDEV) – which is a federal crown corporation – and it was created solely to ensure that the federal government's interests were respected in the Hibernia project (CDEV, n.d.). This was implemented through the CHHC's participation in the JV ownership on that project, with 8.5% ownership of this operation (CDEV, n.d.).

6.1.2 The supplier industry

Besides operators, the private sector in the offshore oil and gas industry is actually quite diverse. The landscape is composed of many supply and services companies, Tier-1 contractors and suppliers, and marine experts. These companies providing supply and services to the offshore oil and gas industry are mostly local SMEs. The main services provided to operators in the region are maintenance and operations services (53%), Engineering, Procurement, Construction & Installation (EPCI) services (34%), and subsea services (11%) (Cooper, Caron Hawco Group Inc. & Rystad Energy, 2021, p. 22). Tier-1 contractors and suppliers are large, local and international companies. Tier-1 contractors and suppliers are important actors within the supply chain, as they deliver large infrastructure projects (Hatch, 2021), and they work directly with operators on offshore oil development projects. Some notable contractors working in Newfoundland and Labrador are SNC-Lavalin, Aker Solutions, Halliburton, Hatch, TechnipFMC and Wood (Hatch, 2021; Hibernia, n.d.). Regarding clean tech activities, Hatch (2021) has produced a detailed study, which includes a summary table of the primary products and services that Tier-1 companies offer in the offshore oil and gas industry. Finally, it should be noted that since these companies are suppliers to the offshore oil and gas industry, many of them do not just operate with that industry. Indeed, many of these suppliers and contractors would provide services to the mining industry as well, and work on other types of development projects outside of offshore activities.

6.1.3 OilCo

OilCo is a provincial Crown corporation, a public corporation owned by the Government of Newfoundland and Labrador. Its role is to lead oil and gas activities in the industry on behalf of the provincial government. What this means is that they are responsible for the management and exploration of offshore assets (OilCo, n.d.) and notably of offshore developments that are not

already covered by the major operators. As seen previously in Table 8, they also invest in offshore development projects to safeguard government interests.

The following sections will present the main system-level actors: industry associations, regulators, funding agencies, R&D facilitators and other related stakeholders important for the industry.

6.1.4 Main industrial associations

CAPP is an industry association representing Canada's oil and gas producers. This means that the association represents onshore and offshore oil and gas producers. CAPP's core objective is to promote the responsible growth of the oil and gas industry in Canada. The organization holds various policy groups and working groups that include employees, members and specific experts and actors depending on the topic at hand (CAPP, n.d.-d). The goal of those policy groups is to help CAPP better advocate and promote the interest of its members to governments, communities and stakeholders, to ensure *"economic competitiveness and safe, environmentally and socially responsible performance*" (CAPP, n.d.-d).

Another major industrial association in the industry is **Energy NL**. Previously called NOIA, the association underwent a significant rebranding in March 2022, emerging as Energy NL. This transformation was motivated by the association's decision to expand its focus to include various energy sectors such as hydro and wind, alongside its traditional involvement in the oil and gas industry (CBC News, 2022). Founded in 1977, Energy NL serves as a representative body for both the supply and services sectors within the energy industry. One of its primary missions is to promote responsible and sustainable development in the energy sector along the coasts of Eastern Canada. Participant E corroborated the main strategies and mandates of the association, by regrouping them into five main categories (notes from interview with Participant E):

1) Policy and advocacy
2) Energy development opportunities: search opportunities for members, whether it be in Newfoundland and Labrador or internationally
3) Industry promotion: promoting members capabilities, capacity and expertise
4) Work on emissions reduction
5) A more general corporate mandate, promoting Energy NL's role and increasing membership

Additionally, the association actively facilitates its members' engagement in the local energy transition (Energy NL, n.d.). Energy NL boasts a substantial global presence, with over 460 members hailing from diverse sectors, including businesses, trade associations, educational institutions, as well as municipal, provincial, and federal government agencies. These members encompass various segments of the energy industry.

Participant E provided more insight into the diverse landscape of Energy NL's membership. According to Participant E (notes from interview with Participant E), membership includes various categories of companies as follows:

- A core group of local companies that have expanded in the industry over the years.
- National companies that may have a presence in Newfoundland and Labrador.
- International companies, a majority of which have a local presence, although some do not.

In terms of activities, members cover a broad spectrum with involvement in direct offshore supply companies (including those owning vessels and engineering firms engaged in offshore operations), hotel chains, and various other companies with diverse activities in the energy business within Newfoundland and Labrador (notes from interview with Participant E). Energy NL operates as a small nonprofit organization with an elected board chosen by its members on an annual basis (notes from interview with Participant E). The organization is led by their CEO, supported by seven staff members. For promotional activities, such as trade shows, events, and networking opportunities, Energy NL has dedicated employees responsible for organizing and managing these events in collaboration with its members (Energy NL, n.d.).

Econext, formerly named NEIA, is a non-profit association promoting the growth and development of the clean economy in Newfoundland and Labrador. Its overarching mission is to ensure that economic development in the province is conducted in an environmentally sustainable manner (Econext, n.d.). The association provides support to startups and entrepreneurs, and tools to foster innovation. Econext also facilitates networks among members to help improve productivity and competitiveness. It also offers training and opportunities to build capacity. Lastly, one of their key roles is to provide leadership on policy and advocacy issues (Econext, n.d.).

Econext has over 200 members spanning various industries, related to clean energy sectors and activities.

techNL is a non-profit industry association dedicated to representing the technology and innovation sector in Newfoundland and Labrador. This organization collaborates with industry and government partners to actively participate in shaping policies and advocating for important challenges and issues affecting the tech and innovation industry in the region (techNL, n.d.-a). Its primary mission is to encourage the growth of technology and innovation within Newfoundland and Labrador by creating new opportunities for the sector. In partnership with Energy NL, techNL co-leads the Digital Oil and Gas project (DOI), which is aimed at fostering innovation and advancement in the oil and gas sector (techNL, n.d.-a).

6.1.5 Regulators

C-NLOPB (also 'the Board') serves as a joint agency established between both federal and provincial governments. It operates with the requirement that both levels of government must reach a consensus on regulations. The Board functions as the regulatory authority overseeing the management of petroleum resources within Newfoundland and Labrador, acting on behalf of the Government of Canada and the Government of Newfoundland and Labrador. It is responsible for applying the *Accord Acts*, which are pivotal legislative instruments. One of its main roles is to enforce the regulatory compliance within the industry, by overseeing and assessing offshore activities. One of C-NLOPB's core responsibilities is also to attribute and manage lands and exploration zones within its jurisdiction, granting authorizations and issuing rights through Call for Bids. The Board will open Call for Bids to individuals and companies, so they can bid on parcels to obtain exploration licenses (C-NLOPB, n.d.-a). C-NLOPB's Environmental Affairs department plays a critical role as a valuable source of information and advice related to environmental assessment and monitoring. Their expertise is accessible to a wide range of stakeholders, including civil society, governments, and industry, fostering a collaborative approach towards environmental stewardship. One of the key responsibilities of C-NLOPB is to ensure environment protection as offshore activities are operated, and this is facilitated through this department (C-NLOPB, n.d.-b).

ECC, or the Department of Environment and Climate Change in the Government of Newfoundland and Labrador, is another provincial regulator. This Department focuses on environmental protection, through the implementation and monitoring of water resource and pollution prevention regulations and policies (ECC, n.d.). Regarding the offshore oil and gas industry, they focus primarily on GHG emissions reduction, so they would set targets and regulations that are aligned with federal regulations and ensure that operators respect them. They also coordinate environmental impact assessments. In fact, Participant B specified that ECC and other regulators solely deal with their point of regulation, and that ECC's *"point of regulation is emissions at a large industrial facility."*, that their *"point of regulation is the installation itself."* (Participant B).

CER is an independent federal agency regulating Canada's energy industry. Since offshore oil and gas in Newfoundland and Labrador is already regulated through C-NLOPB, there is a memorandum of agreement between CER and C-NLOPB to ensure that the latter is the one regulating operator activities (CER, 2023b), as stated above. Regarding offshore activities in the province, CER is solely responsible for regulating interprovincial constructions, international pipelines and international energy trade (CER, 2023b). For now, the Memorandum states that offshore renewable energy is regulated by the CER. Additionally, CER provides information and produces reports readily available to the public, to promote transparency and public understanding of the energy sector. The agency also conducts research and analysis to better understand the energy sector and its impacts. This research helps inform policy decisions and supports the regulator's mission to ensure a sustainable and responsible energy industry in Canada.

The Government of Newfoundland and Labrador, through its **Department of Industry, Energy & Technology (IET)**, is also a regulator, as the C-NLOPB reports to them regarding the provincial side of the joint-management regime around offshore oil and gas (Participant B). Notably, IET oversees the management and implementation of the Offshore Oil Royalty Regime, which establishes progressive royalty rates for each offshore oil project. IET also provides funding and encourages competitiveness, innovation, product development and export market development (Hatch, 2021). IET funds commercial and non-commercial projects, although the majority of funds were allocated to non-commercial projects led by Memorial University. The other funding agencies in the

industry are the following.

6.1.6 Funding agencies

Funding agencies is another important category of actors within the industry. Indeed, these agencies aims to foster regional economic development and innovation, by supporting and encouraging companies. Funding agencies primarily support SMEs, though they do interact with MNEs. They can also indirectly support MNEs by funding research centres and institutes.

One of the most prominent and important funding agencies in the industry and the province is **ACOA**, which is the federal, governmental economic development agency in Atlantic Canada. Its mission is focused on helping startups and companies' expansion, and innovation, and products and services commercialization. The agency also acts as an intermediary between industry and federal government representing and advocating for regional interests regarding policies, rules and regulations.

Although ACOA is a key funding agency, that is not its only role. Participant A and Participant F have corroborated and provided further information on the agency's structure and mandates. Both participants have stated that there are two arms to ACOA. Participant A stated that there is the *"policy arm" "and then next to that we have our regional operations"*, while Participant F declared that they're "not really a policy analyst or program delivery person, which is kind of how ACOA is divided. Traditionally, these two sides have been apart".

> ***"[A]nd under regional operations we have community development and then we'd have enterprise development. So, our enterprise development will be looking at commercial projects, whereas the community development projects will be looking at things like working with the communities, working with universities and you know, different associations."*** (Participant A).

Based on our interview with Participants A and F and our analysis of official documents from ACOA's website, we have mapped out the internal structure of ACOA and the main roles:

Table 9: Internal structure of ACOA

<table>
<tr><th rowspan="2">POLICY ARM</th><th colspan="2">REGIONAL OPERATIONS</th></tr>
<tr><th colspan="2">Funding</th></tr>
<tr><td rowspan="3">Policy advocacy role
(ACOA, 2023a):
• Collecting information to help decision-making
• Coordinating with other departments and actors to inform policy</td><td rowspan="2">Community development</td><td>Projects working with:
• Communities
• Universities
• Different other associations</td></tr>
<tr><td>Field operations: individuals working in specific regions (e.g., towns in Newfoundland and Labrador</td></tr>
<tr><td rowspan="2">Enterprise development: Commercial projects</td><td>Commercial
employees working on different sectors</td></tr>
<tr><td>International business development</td></tr>
<tr><td colspan="3">Pathfinding & convening roles (ACOA, 2019)
(called “convening aspect” of ACOA’s role by Participant F)

This is a more transversal role:
• For programs, the goal is to seek and convene other funding partners (ACOA, 2019) to find other funding solutions for SMEs
• For policy, the convening role is quite important, as ACOA develops strong relationships with industry actors, and when necessary, can leverage that role to “bring them all together with federal governments to the table” (Participant F)</td></tr>
</table>

Compilation from interviews with Participants A and F.

NSERC is a federal agency that provides scholarships and also partnership funds (private, public, non-profit) to universities, to support research efforts. NSERC matches 2:1 contributions from small organizations and 1:1 contributions from large organizations (Hatch, 2021, p. 33).

NRC-IRAP is another important agency within the industry as it provides funding and networking support for SMEs, and focuses on funding the development of disruptive technologies, meaning that these projects usually are at the early stages of TRL (Hatch, 2021). The goal is to help those SMEs bring their technologies to commercialization. This has been corroborated by the Industrial Technology Advisor we interviewed (Participant D):

> *“So traditionally, IRAP will be working not necessarily TRL 1 or 2, but we can start pretty early but at the low TRL's up to maybe 6 or 7. Once it hits 8 or 9 then that's more into the commercialization trying to get it out into the market.*

> *We do support them to a degree there, but that's where someone like ACOA would come in and really help get them across the line. We do help them with all the research, all the development, the high cost, high risk areas and then we would traditionally hand them off to somebody like ACOA regionally to help them commercialize it and pay for some of the heavier, maybe manufacturing or prototype costs and that sort of thing."* (Participant D)

Regarding the structure of NRC-IRAP, IRAP is a subdivision of the NRC (National Research Council). The agency has provincial teams across the country. According to Participant D, one of the key characteristics and strengths of NRC-IRAP is their technical expertise, as they have *"about 270 industrial technology advisors"* (Participant D). Indeed, these advisors must have extensive prior experience as an entrepreneur or in senior leadership in the private sector. They are apparently often contacted by other agencies for technical assessments. Moreover, NRC-IRAP apparently focuses on supporting labour, as in "creating jobs and creating revenue" (Participant D). They have latitude and a quick turnaround time, as they can fund small projects easily without oversight, which is a significant advantage for the agency. However, for major projects, notably projects with capital expenditure, NRC-IRAP cannot cover that, but they would accompany their clients to find other funding from larger funding agencies (Participant D). For instance, Participant D stated that they have helped their clients transfer projects to ACOA and other larger funding agencies, to cover heavier costs (e.g., manufacturing or prototype costs) and reach the final stages to full commercialization of technologies.

NRCan is another major federal funding agency. NRCan allocates significant funds to support R&D and demonstration efforts, notably for cleantech projects (Hatch, 2021). There are two major programs for the offshore oil and gas industry: the offshore Deployment program (42 million dollars), and the Offshore RD&D Program (33 million dollars) (NRCan, 2023a). These programs are part of a larger fund, the Emissions Reduction Fund, which is a direct result of Canada's commitment to net zero by 2050 (Hatch, 2021).

The **Ocean Supercluster** is an industry-led organization composed of private and public members. The Supercluster supports and invests in collaborative development projects currently focused on ocean technologies, offshore energy, marine renewables, aquaculture, fisheries, defence,

bioresources and shipping (Doloreux & Frigon, 2021, p. 149). Funding is provided by industry members, but also by ISED, which is a federal agency (Ocean Supercluster, 2022). The Ocean Supercluster adopts a cluster model, as it fosters more cross-sectoral collaboration within the ocean economy. This initiative is actually part of national efforts to position Canada as a world leader in high-value industries. Indeed, in 2017, the Government of Canada launched *The Innovation and Skills Plan,* which presented a revised innovation policy restructured into five regionally focused Superclusters, each focusing on key sectors (Shearmur et al., 2023). Each supercluster aims to connect a wide variety of actors, organizations and businesses operating in similar and related industries (Doloreux & Frigon, 2021). The overarching goal of the Ocean supercluster is to grow the ocean economy and encourage the development of ocean technologies in maritime sectors (Doloreux & Frigon, 2021, p. 149). More specifically, the Ocean supercluster as an organization aims to build an ecosystem between ocean sectors and facilitate partnerships (Ocean Supercluster, 2022). In that sense, the Ocean Supercluster is also an R&D facilitator (see next section *6.1.7*). Regarding the membership profile, there were approximately 500 members in 2021, and nearly half of them are from the private sector (Ocean Supercluster, 2022, p. 9). There are also non-profit organizations, post-secondary institutions, Indigenous organizations and governments that are members of the supercluster.

Other notable funding organizations in the industry are:

- Business Development Bank of Canada is a financial institution, a Crown Corporation actually, providing financing and advisory services. It has allocated significant funds for service SMEs in the industry (Hatch, 2021)
- Export Development Corporation is another Crown Corporation that provides many financial services to companies, ranging from credit insurance, financing, access to working capital and partnership with bank offering guarantees (Hatch, 2021)
- SDTC, which is funded by the Government of Canada, invests in pre-commercial technologies for positive impact on climate change, air, water and soil. SDTC also works closely with local incubators, such as the Ocean Startup Project and Genesis in St. John's (Hatch, 2021)

6.1.7 Postsecondary institutions

Postsecondary institutions are also a key category of actors when talking about innovation and change processes, which is particularly relevant in energy transition discussions. These institutions can be universities, colleges and institutes, and their role is to provide training to develop skilled labour and thus local expertise. They foster innovation, research and development and technological advancement within the industry through collaborative efforts with other key industry actors, and through pre-commercial research to encourage further innovation (Hatch, 2021). Postsecondary institutions can also receive funds in the form of grants and fellowships from companies and governmental agencies. In Newfoundland and Labrador, Memorial University is the only university in the province, and it is an important actor regionally and for the offshore industry specifically. Indeed, Memorial University focuses immensely on the ocean economy, with 40% of its research being ocean-related (Memorial University, n.d.), and has direct networks with the offshore oil and gas industry (Hatch, 2021). In fact, within the university, there are multiple facilities dedicated to different areas of the ocean economy and related to offshore oil and gas activities (e.g., Harsh Environment Research Facility, Hibernia Enhanced Oil Recovery Laboratory). Some of these facilities are even partially funded by MNEs, notably operators (Hatch, 2021). As one of many examples of collaboration and partnerships, Memorial University works directly and closely with the private sector through C-CORE, a separately incorporated corporation that focuses on developing solutions to address offshore oil and gas development challenges and contribute to capability building (remote sensing and geotechnical and ice engineering) (Memorial University, 2020, p. 40). Another interesting example is Ocean Frontier Institute, which is actually a transnational hub that focuses on research for the ocean economy, born from a partnership between Memorial University, Dalhousie University (Nova Scotia) and University of Prince Edwaard Island. Ocean Frontier Institute helps connect governments and researchers (Hatch, 2021). Although the main focus is not on offshore oil and gas, this institute has received sizable funding agencies and other universities to conduct research on related technologies such as oil spills genetic monitoring technology (Hatch, 2021).

6.1.8 R&D organizations

ERI is a non-profit organization that plays a pivotal role in facilitating and identifying research and development opportunities for the offshore oil and gas industry in Newfoundland and

Labrador. The organization ERI actually represents the interests of most operators, with its membership comprising companies such as Cenovus Energy Inc., Chevron Canada Resources, Equinor Canada, ExxonMobil Canada Ltd., Oil & Gas Corporation of Newfoundland and Labrador (OilCo), and Suncor Energy. Indeed, since provincial regulation requires for operators to reinvest part of their revenues into R&D, education, and training (Hatch, 2021), ERI's mission is to provide funding support for these efforts and enable R&D and technology development in the industry (ERI, n.d.-a).

Incubators and clusters are another type of R&D facilitators. These organizations enable innovation by encouraging collaboration between industry actors but also across sectors, by creating networks, providing support and also pooling resources. For instance, OceanAdvance is an innovation cluster that focuses on ocean and marine technology for cross-sectoral application in the ocean economy, whether it be offshore, fisheries, climate change adaptation, marine tourism, or defence, etc. (OceanAdvance, n.d.). Its mission is to encourage collaboration among ocean leaders by building an ocean technology innovation ecosystem in the province and increasing Atlantic Canada's visibility. Its activities are located on Memorial University Campus. The Ocean Supercluster mentioned previously is also partially an example of a cluster in the way it functions. Incubators focus on early-stage innovations. The major ones for the province are Memorial Centre for Entrepreneurship (MCE), Genesis and Ocean Startup Project. MCE mainly supports Memorial University students in their research projects and receives funds from governments and the private sector. Genesis is another incubator that is actually fully owned by Memorial University (Hatch, 2021). It is an important innovation hub for the region, and it helps entrepreneurs launch their companies through its programs and support.

6.1.9 Other related stakeholders

While these actors are not necessarily directly involved in the offshore oil and gas industry, they remain important stakeholders worth mentioning as they influence industry dynamics and change.

The **fishing industry** and other industries that pool from the same natural resource areas is important to mention, as operating in the same areas can create friction due to contradictory objectives. For example, important fishing zones can be disrupted by offshore oil activities,

notably by potential oil spills (Kapoor et al., 2021). This is an issue regionally as fisheries is also a key sector for the province.

Indigenous communities and governments are also noteworthy stakeholders. These communities live within the same space and utilize local resources, so they are fully dependent on ocean ecosystems. Therefore, their reserves and livelihood are directly affected by the offshore oil and gas industry.

Lastly, **NGOs and environmental organizations** are essential stakeholders, especially regarding environmental protection and impact. A few examples are Ecojustice, which is Canada's largest environmental law charity, Sierra Club Canada, WWF Canada, Ecology Action Centre and Équiterre. Some of these NGOs have been very vocal in their criticism and concerns about the environmental impact of the development of the offshore oil and gas industry. For instance, Sierra Club Canada and Équiterre have manifested and strongly advocated against the major offshore development project Bay du Nord, and Ecojustice actually filed a lawsuit against that project (Singh, 2022, Ecojustice, 2022).

6.2 Institutions

Formal institutions in this industry are quite rigid. As seen in the evolution of public policies, regulations and requirements were quite old up until early 2022, and policy change takes a lot of time (e.g., FORRI) Canada–Newfoundland and Labrador Offshore Area Petroleum Operations Framework Regulations (2022). Additionally, the regulatory framework is greatly political (Cooper, Caron Hawco Group Inc. & Rystad Energy, 2021, p. 66), due to the way the monitoring of the industry has been structured with the joint-management regime and the C-NLOPB. This affects the industry's ability to innovate and the pace of innovation and technology advancements.

Regarding informal institutions, since the offshore oil and gas industry is an integral part of the regional economy, it is nearly impossible to dissociate it from energy transition discussions. Indeed, the industry generates many jobs locally, so mentions of phasing out such an industry can feel quite threatening, even if governments mention renewable energy developments as a counterweight. Also, innovation and technology efforts within the region are heavily influenced by the omnipresence of the offshore oil and gas industry regionally, as new products, services and

technology development is in large part to be utilized to better serve that industry. This manifests through the development of the innovation and support ecosystem and the clean tech sector, as these are highly reliant on offshore oil and gas activities and the ocean economy in general. As an example, Participant F highlighted that *"they have expertise in cold and hot weather engineering that no one has. They understand ice better than anybody. So that's all because of the offshore because the offshore needs ice management."*

In contrast to the rigidity of regulations and requirements, the geographical proximity of actors favors more interaction and sense of community within the industry (Coenen et al., 2012). These elements actually foster collaboration and knowledge-sharing within and across sectors (Coenen et al., 2012), which brings us to the last element of regional preconditions: networks.

6.3 Networks

As previously mentioned, our study and the data collected focused primarily on public actors and organizations and industrial associations, as these were the actors we had access to during our study. Indeed, the main private sector actors within the offshore oil and gas industry are MNEs, which are quite difficult to contact and reluctant to participate in such studies. Therefore, given the practical limitations of the context of our study, our assessment of existing networks is based on our understanding of the dynamics described by the actors interviewed and analyzed within our scope. Specifically, our analysis of networks was conducted through the point of view of public and not-for-profit support organizations and focused on the networks among companies and support organizations that actors leverage.

Our analysis of primary data, corroborated by secondary material analysis, emphasizes that there are strong networks within the offshore oil and gas industry. As many participants noted, due to the small size of the industry, networks and relationships are strong and an integral part of functioning of the industry:

Participant B	*"So it's a small sector. We know the guys at the board and ladies at the board, we know the people to deal with at the facilities. So you know we do have quite a lot of interaction sometimes directly with them sometimes through the board"*
Participant C	*"We have client engagement advisors and their job is more to do those presentations about our program, networking with petroleum boards,*

	mining boards, go to the various smaller more remote potentially locations in these two topics of mining and you know minerals exploration, those tend to be not in urban centres, right. *So they go out to those to meet stakeholders, get involved in these associations, make sure that people are leveraging us where they should, having those conversations and it's usually through those people that companies get referred. So, we can't know everybody directly, but we can know the people that tend to know the people. And once people realize what we do, we typically are obvious to reach out to if there's a fit."*
Participant D	*"typically we are working hand in glove with industry associations. So here in Newfoundland, we have what used to be the industry, the NEIA, the Newfoundland Environmental Industry Association that is now called Econext." "I'm a working colleague with the CEO. I meet with them every couple of months to see what's going on. We work together on different panels and programs that are going on."* *"Just through having conversations and meeting on a semi regular basis with these different industry associations or government or government associations, as the case may be. So I think just maintaining that communication, maintaining that contact."*
Participant E	*"EnergyNL interacts with groups, such as government, developers or operators, or even some of the supply and service member companies. EnergyNL leads some of those groups. The association may have committees on various aspects related to development of the energy business."* *"Energy industry is a pretty small and tight-knit community in Newfoundland and Labrador. Most people in the business know each other. This means that they have quite frequent contact with individual operators. For example, on a day-to-day basis with Exxon and Suncor, which are members."*
Participant F	*"Talk to them all the time, basically."* Participant F talks to *"all the actors, which is the key to it all. There must be a good dialogue with the operators. ACOA has to understand what their challenges are."* *"ACOA has a lot of projects with EnergyNL and also with Econext and TechNL. Those are associations that in some way, primarily EnergyNL is the number one, represent the offshore. All three of them have ties to the offshore. ACOA works with them incredibly closely. Participant F has meetings with all three of them on a weekly basis."*

In an evaluation of ACOA's Communities and Inclusive Growth Programming ACOA (2019), it was highlighted that ACOA leverages national programs in a proactive manner to facilitate project funding. What this means is that the economic development agency uses its convening and

pathfinding roles (ACOA, 2019), to match projects with adequate funding opportunities. This has been corroborated by our research Participants as well: *"it's all about kind of pathfinding and helping find the right opportunity for the companies that we're working with in order to for them to grow."* (Participant A); *"A company has a projects or idea or require some form of funding, and it is beyond ACOA's means or the means of the province. So ACOA can try and find other avenues to help fund that project. Usually at the federal level, but there are other avenues as well they have utilized."* (Participant F). The implications are that networks are quite powerful tools within the industry to push towards change and innovation and counteract the rigidity of the regulatory framework.

The concentration of activities in the St. John's also facilitates and strengthens local networks, as many key local actors, including major companies have their offices in the St. John's metropolitan area. Assessing industry dynamics, we thus note that networks are multidirectional and quite dense. Specifically, we observe three main types of networks: **(1) formal local networks, (2) informal local networks; (3) global networks**.

6.3.1 Formal local networks

When examining the offshore oil and gas industry in Newfoundland and Labrador, it is necessary to include the support ecosystems and understand their role. The main support ecosystems within the industry are innovation support and cleantech ecosystems. These two ecosystems are not mutually exclusive, on the contrary. While actors within these ecosystems are, by definition, not directly in the offshore oil and gas industry, they are integral to its functioning. Companies and actors in these ecosystems will encourage more innovation that will have spillovers in the offshore oil and gas industry. As previously mentioned, R&D organizations and postsecondary institutions will push for R&D and technology development that will be transferred to offshore through supply and services companies. The role of the clean tech ecosystem is central in discussions on energy transition processes (Hatch, 2021; Cooper, Caron Hawco Group Inc. & Rystad Energy, 2021), as actors in that ecosystem can provide clean tech services to offshore oil and gas industries, but they also work cross-sectors by encouraging the development of renewable energy and processes. This transversal presence could become pivotal for a seamless transition. In addition, participants have noted that given governmental targets and pressures to limit environmental impact and encourage

sustainable development, new projects coming in would be looked at 'from a green lens' (Participant A), to assess how to 'green' offshore oil and gas activities. Participant A mentioned examples of local projects*: "There have been a lot of different equipment purchases and like I said, when it comes to specialized equipment, we would look at it with the green lens and how it would for example reduce electricity requirements or provide greener solutions."* (Participant A).

Formal networks can happen through organizations. Industrial associations and R&D organizations also serve as formal networks, as members of these organizations have the opportunity space to meet and discuss with other members. Industrial associations would organize networking events, conferences and workshops to encourage more interaction but also knowledge sharing. Besides, Participant E mentioned that in terms of formal interactions, there are *"formal committees and structures within the energy business in Newfoundland, either led by government or by developers"* (e.g., Exxon, Equinor, Cenovus). These *"formal committees can be everything from arranging conferences to technical committees that are involved in advising on regulatory or health and safety."* (Participant E). Energy NL has also led some of those groups, and *"may have committees on various aspects related to development of the energy business."* (Participant E). Furthermore, some actors leverage their formal networks in their day-to-day activities, as it is integral to their mandate. For instance, ACOA works with SMEs and provides them with support for funding and pathfinding, so they would 'naturally' develop those networks. Given the position of ACOA in those networks, they have not only direct contacts at the provincial with actors such as IET, industry associations (e.g., CAPP, Energy NL, Econext, techNL), but they would also have direct ongoing contact with federal agencies such as ECCC, NRCan, ISED and even Transport Canada (Participant F). Another example mentioned by Participant C about NRC-IRAP: *"So I mentioned the Petroleum Board. So we have people that go to those meetings and get involved in those networks and talk to people."*

6.3.2 Informal local networks

Informal local networks seem to be particularly prominent in the offshore oil and gas industry. Although formal networks do help create a base relationship between actors, the adaptability and responsiveness of actors seem to emerge from their ability to leverage informal networks. Indeed, as mentioned before, the size of the industry and the concentration of actors in St. John's facilitates

interactions. Additionally, ACOA's pathfinding and convening role is greatly facilitated by their informal networks and regional influence, because it has strong relationships with the offshore oil and gas industry Thus, it can *"bring people together, the right people around the table, which is something not everybody can do. For example, ACOA can bring the province industry associations and bring them all together with federal governments to the table, when it is necessary to discuss whatever the issue of the day should be."* (Participant F). This not only leverages formal networks but their informal network of influence. Likewise, our interview with Participant C shows an example of how formal networks help develop informal networks and encourage more business development and professional interactions:

> *"We have client engagement advisors and their job is more to do those presentations about our program, networking with petroleum boards, mining boards, go to the various smaller more remote potentially locations in these two topics of mining and you know minerals exploration, those tend to be not in urban centres, right.*
> *So they go out to those to meet stakeholders, get involved in these associations, make sure that people are leveraging us where they should, having those conversations and it's usually through those people that companies get referred. So, we can't know everybody directly but we can know the people that tend to know the people. And once people realize what we do, we typically are obvious to reach out to if there's a fit."*
> (Participant C)

Participant D also stated that while working with MNEs is not part of their mandate, in the sense that they do not fund those projects, NRC-IRAP leverages its ties to MNEs and notably operators to better support and opportunities in supply chains for local companies: *"that's where our expertise and our connections with the big MNEs, the big offshore players helps get those companies through the front door and gives us confidence in providing the funding they need to get that technology to full commercialization."* (Participant D).

6.3.3 Global networks

As a leading pole for Arctic and cold ocean technology, Newfoundland and Labrador, and the city of St. John's specifically, are renowned globally for their local expertise. Due to their similar industrial set-ups, offshore oil and gas jurisdictions across the world maintain their ties and exchange their expertise, as these are all potential markets and business opportunities for their respective local companies. In fact, all participants have mentioned the presence of global ties and how they can help local companies find business opportunities, and in the case of governmental agencies and industrial associations, these global connections help them find international market opportunities for local companies.

Participant A	*"But then there's also a team that's responsible for international business development. So they would work with companies that are identified for market growth elsewhere and I guess sometimes they would go to different locations outside of Canada in order to expand their markets. Again, it's all about kind of pathfinding and helping find the right opportunity for the companies that we're working with in order to for them to grow."*
Participant B	*"Second piece is we're not alone here. If you look at the North Sea, Gulf of Mexico, offshore Brazil, offshore West Africa, offshore Australia we're all dealing with the same thing."* *"[…]there may be some lessons learned from North Sea, like I said, in other parts of the world.*
Participant C	*"It's a huge industry with many needs and we seek to have companies in Canada that help fulfill those needs. And optimally, potentially through co-innovation with international partners or just directly through Canada, try to embed those companies in the global ecosystems for oil and gas in this particular case."* *"We would be interested in that happening in Newfoundland, but probably as much or more, helping that company position and sell their product into the Middle East or down into Texas or whatever you know up into the North Sea or whatever that may be. So those are usually the projects we're most interested in as we look at what's the overall market potential for these products and then how do Canadian companies position themselves for that."* *"Internationally, being specific, the last addition to that is to get very involved in the Indo-Pacific strategy for Canada and look for a broader number of countries with which we're actively seeking research development partners."*

Participant D	*"We also have within IRAP an international group, and this is focused obviously outside of Canada. So, they work with other countries that are partnered with Canada economically or otherwise, politically, to find solutions and to find partnerships or create partnerships that will help Canadian companies develop and export their technology to other areas that have a need for it."* *"We have ITAs that work as partnership developers. They go to major conferences and trade fairs and these sorts of things, and they work as experts to vet partners that are trying to come in and work with Canadians. They look at new technologies that could be applied in different ways within Canada and whatnot. So we have people that go over to Europe on a regular basis, go into the Indo-Pacific region, South America. The United States of course is an easy and quick one, and they work around to try and develop some of those relationships with even foreign government partners."*
Participant E	Energy NL's *"flagship event is every May, the last week of May every year."* *"There are quite a few attendees from the US, from the Houston area and from Norway. These are companies that are working in the energy business in Newfoundland and Labrador."*
Participant F	Participant F talks a lot with Global Affairs Canada. They have a standing call with the office of Norway, so that they know what Norway is doing. Participant F declares they know everything Norway is doing from a policy perspective, what the companies are doing there, the companies that have partnerships with firms in NL. Participant F tracks it very closely. They are trying to do the same thing on the hydrogen side, as hydrogen emerges now.

Furthermore, since major MNEs operate locally in the offshore oil and gas industry, their global networks also influence industry dynamics. Indeed, technologies developed elsewhere, and skilled labour can move through those internal networks and benefit Newfoundland and Labrador. Participant F mentions that ACOA has collaborated with ExxonMobil to find opportunities in their supply chain. As an example, Participant F mentioned that ExxonMobil would set up partnerships in other markets such as Guyana, and since there would be major infrastructure needs there, Newfoundland and Labrador companies could benefit from those global networks and work for operators in those other markets.

6.4 Actor composition and power relations

As can be assessed from our analysis, *actor composition* is quite differentiated. Indeed, there are multiple firms of various sizes in the private sector, with very different structures, networks and access to knowledge (Nilsen et al., 2022). There is also a wide range of R&D organizations and governmental agencies involved at multiple levels of governance, but also of different sizes. Indeed, even in terms of public actors, the main agencies and government bodies have different capacity, not only in terms of the funding they can provide to the industry, but also in the size of their team and thus process flexibility (Nilsen et al., 2022). Furthermore, as each actor leverages their own networks, they have access to different opportunities (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022).

Power relations are highly skewed towards operators and MNEs. Indeed, operators are the main actors in the offshore oil and gas industry, and they are the ones bidding for exploration licences. These MNEs own the major platforms and development projects, which means that ultimately, operators have the final say in deciding what they will implement or not. This shows how power relations are highly skewed in their favor (Nilsen et al., 2022). Participants have corroborated that fact in their interviews: *"it is critical to have relationships with those companies and operators so that ACOA knows where they're going, and then can prepare a supply chain for that."* (Participant F). Participant F actually added that *"The expertise is kind of dictated by the operators. If they need expertise in ice management, expertise in remote operations, expertise in deep water drilling, etc. And ACOA helps fund all that."*, which shows how operators exert their influence in the industry through their position in supply chain networks (Sotarauta, 2009). Participant E also stated that since developers own and invest in projects, *"any infrastructure, or other investment required, at the end of the day, it's the developers that have to decide what works best for their offshore installation."*

Participants also discussed how the government is 'technology agnostic' in that they do not dictate nor advise local companies on which technology or innovations to push, however what they do is remain aware of MNEs needs, to find development opportunities in operators' supply chains. The example of Bay du Nord highlights how reliant the industry is on operators. This project was a key project in the industry recovery and development, as it would generate employment and

infrastructure development for the region, but Equinor's decision to put the project on hold for up to three years for now has significantly affected offshore activities. This further proves how power relations are highly skewed within the industry towards operators. On the other hand, Participant D nuanced this by declaring that governments are *"the ones that usually set the requirements for [operators] to produce that will either make them say yes or no." "They're the ultimate deciders of this, just based on what requirements they have for responsible production offshore."* (Participant D). Indeed, the firmness of the regulatory framework in the province, and the way the government applies those regulations, somewhat balances out power relations with operators to some extent, as they can greatly facilitate or hinder project development. Nonetheless, power relations remain highly skewed.

Based on our analysis of the offshore oil and gas industry, we theorize that Newfoundland and Labrador possesses the characteristics of a locked-in specialized region, as per Nilsen et al.'s framework (2022), since actor composition is differentiated, but power relations seem highly skewed in favor of MNEs, specifically operators.

Chapter 7: Analysis of the policy mix around the offshore oil and gas industry in Newfoundland and Labrador

This chapter includes our analysis of the existing policy mix for the offshore oil and gas industry in Newfoundland and Labrador. This analysis answers our research sub-question: *"What are the main components and characteristics of the policy mix around the offshore oil and gas industry in Newfoundland and Labrador?*

7.1 Policy dimensions

For the purpose of this study, it is important to specify the dimensions we want to consider. Based on our conceptual framework, we delineate our analysis of the policy mix as follows:

Dimensions	**Analysis considerations**
Policy field	Policies related to the regulation, monitoring and support of offshore oil and gas activities
Governance level	For feasibility purposes (see Chapter 4), the analysis focuses on federal and provincial governments and industrial association
Geography	Newfoundland and Labrador province
Time	Policy mix, until 2022-2023

For our policy mix analysis, we consulted the websites of the main governmental agencies and departments present in the policy mix of the offshore oil and gas industry, and we analyzed the legislation and regulations documents, as well as the programs and initiatives documents and reports publicly available. We enhanced our analysis with qualitative data from our six interviews.

Focusing on the main governmental bodies, departments and agencies that are directly responsible for the regulation and support of the industry, we have identified and compiled the main policy instruments used in the offshore oil and gas policy mix, and their corresponding strategies and policy processes.

7.2 Policy strategies

In order to synthesize our analysis of the policy framework, we have distinguished federal policy strategies from provincial policy strategies.

7.2.1 Federal policy strategy

As a reminder, from our context overview, Canada committed to reduce emissions by 40-45% from 2005 levels by 2030, and to achieve net zero by 2050, constituting specific national targets. The overarching federal policy strategies are thus to reduce GHG emissions and to reach carbon neutrality by 2050. In order to implement that strategy and guide provinces and industries towards those targets, the Government of Canada has issued a roadmap in its *2030 Emissions Reduction Plan* (Government of Canada, 2023). We will focus on the sections of the roadmap that are related to the offshore oil and gas industry in Newfoundland and Labrador.

Carbon pollution pricing is one of the key tools that the Government of Canada pushes for achieving its policy strategy (ECCC, 2022). In the case of Newfoundland and Labrador, carbon pricing fell under the responsibilities of the provincial system, through the provincial carbon tax and output-based pricing system (ECCC, 2022). However, as of July 1st, 2023, the Federal Carbon Pricing System will be applied (NRCan, 2023b).

The Government of Canada specifically targets oil and gas sectors, as it believes that changes in those activities will significantly contribute to reaching national policy objectives. As such, the roadmap proposed by the federal government regarding oil and gas sectors is articulated as follows:

Capping emissions	In concertation with provinces, key industry actors, Indigenous communities and civil society, define appropriate cap on oil and gas sectors emissions to help achieve policy objectives of emissions reduction Manage associated competitiveness challenges with stakeholders
CCUS advancements	Support development of CCUS technology Ensure policy certainty to facilitate technology development and deployment CCUS investment tax credit (yet to be determined) Eliminate regulatory barriers
Reduction of methane emissions	Improve methane measurements in oil and gas sectors Develop new measures to reduce oil and gas methane emissions by at least 75% below 2012 levels by 2030 Propose new regulations

Elimination of subsidies for fossil fuels	Develop a plan to phase-out public financing of fossil fuel industries
Sustained employment through energy transition	In concertation with provinces and companies, ensure sustainable jobs, skills and communities

Compiled from ECCC (2022, p. 50-51).

In addition to this section of the federal roadmap, it is worth mentioning the section on cleantech and climate innovation as well. Although it is not directly related to offshore activities, from what we have seen in our industrial analysis, the support ecosystems are key in the industry, as actors in those ecosystems provide supply and services to operators. The main steps provided in the roadmap for Clean Tech and Climate innovation are (ECCC, 2022, p. 73):

- Innovation support: funding for pre-commercial clean technologies trial and de-risk large-scale pilot projects; improve climate innovation ecosystems to promote clean tech companies scale-up, and better orient efforts towards significant emissions reduction.
- Investments in technology deployment: improve infrastructure to facilitate clean electrification, transition to clean fuels and renewable energy, etc.; better coordinate federal funding
- Clarification of regulations: ensure certainty of regulations direction for industries
- Tax incentives: leverage private capital to increase investments in clean tech; develop an investment tax credit for CCUS – yet to be developed

7.2.2 Provincial policy strategy

The Way Forward on Oil and Gas – Advance 2030 is the provincial plan that was announced and launched in 2018 by the provincial government for the future of the offshore oil and gas industry. (Government of Newfoundland and Labrador, 2019). This plan presented the provincial government's visions and policy strategies with objectives for the industry, as well as the strategic action plan to achieve those objectives by 2030 (Rogge & Reichardt, 2016).

The overarching policy objectives are to position the province globally as a preferred location for offshore oil and gas exploration and development (Government of Newfoundland and Labrador, 2020). The province also aims to position the offshore oil and gas industry as an innovative, sustainable, competitive, and environmentally responsible industry. Ultimately, the objective is to maximize the positive spillovers to the regional economy and population. As part of the policy strategy, the targets associated with those objectives are to achieve the following by 2030 (Government of Newfoundland and Labrador, 2020):

- More than 100 new exploration wells drilled
- Increase the number of barrels of oil produced in multiple basins (approximately more than 650,000 barrels of oil per day)
- Shorten the turnaround time from prospection to production
- Employ more than 7,500 people in offshore operations
- Commercialize gas production
- Integrate renewables and oil and gas into world-leading energy cluster

In order to accomplish its policy strategy, the provincial government presented an action plan (Rogge & Reichardt, 2016) to guide industry actors and governmental bodies. This action plan was divided into three sections to provide milestones in the execution: immediate priorities, mid-term priorities (2022) and long-term priorities 2030. Each of those phases focus on specific areas:

2020-2022	• Encourage exploration drilling to grow the industry (incentives, improve regulatory regime, find best practices) • Modernize existing governance structure by proposing a new approach that expands beyond regulatory requirements • Ensure global competitiveness: streamline processes • Improve local supply chain through more collaboration, capability development and diversification • Accelerate development through more innovation and collaboration • Support innovation through investments • Better promote the industry by highlighting local expertise and education, supply and service capabilities, R&D efforts and innovation environment • Prepare and train the future workforce by communicating the evolving education and training requirements, facilitate the development of skills and competencies, align education and training programs with priority areas and market needs

Mid-term (2022)	• Develop region-specific and basin-specific plans to better support offshore activities and elaborate development plans • Expand integrated operations: to build local capacity and improve supply chain coverage. This can be done by collaborating with operations and post-secondary institutions, and encouraging local private sector diversification • Elaborate natural gas development plan: improve provincial capacity for gas commercialization through regulations, identification of market opportunities and requirements, attract foreign investments • Diversify supply and service sector
Long-term (2030)	• Commercialize natural gas production • Ensure long-term sustainability of oil and gas and renewable energy production for economic growth and employment • Grow supply and service industry • Position the region as a world renowned energy cluster

Compiled from Government of Newfoundland and Labrador (2020, p. 12-18).

7.2.3 Analysis of the policy mix in the offshore oil and gas industry in Newfoundland and Labrador

Main actor	*Policy instruments & instrument mix*	*Policy goals*	*Policy processes*	*Other actors involved in processes*
FEDERAL GOVERNMENT				
ACOA	Thematic meetings with other federal agencies	Match SMEs with the right funding opportunities to encourage innovation and economic development	Leverage pathfinding and convening roles to gather potential funding agencies and orient SMEs towards them	SMEs, other federal funding agencies, operators, industry associations
	REGI program (primary program currently: provides funding specifically for:		Policy advocacy role: discuss with clients and industry actors to identify projects worth pushing, then advocates for those projects with Ottawa office, which has an advocacy mandate in policy making processes Implementation: ACOA reviews project applications and discusses with SME. Sometimes through project development, ACOA can reach out to industrial technology advisors for technical assessments of certain projects, or to field operations teams if they need more information on a specific region	SMEs, Ottawa office, other federal agencies
	• Business Scale-up and Productivity	Speed up business growth and productivity and help them reach new markets		
	• Regional Innovation Ecosystems: funds for non-profit organizations (e.g., strategic clusters, incubators) supporting businesses in their development	Create regional networks to encourage growth and innovation		
	Business development program: fund new business ideas, business expansion, non-profit organizations helping SMEs grow	Support the creation of new businesses and expansion of SMEs		SMEs, Industrial technology advisors (when needed, for technical assessments)
	Innovative Communities Fund	Help communities develop successful industry sectors, improve infrastructure in rural areas, and help them build capacity for themselves to invest in community development		

	Atlantic Innovation Fund: provide funding to encourage	Help SMEs succeed in the commercialization of new products and services that meet demands and quality standards Help SMEs adapt new technology to meet opportunities		
	Net Zero Project: in part funded by ACOA • Industry partners produce through this initiative various research and reports to identify clean growth opportunities • workshops and conferences	Help develop clean growth strategies and projects to achieve carbon neutrality in the offshore energy industry	Working groups with the key industry actors and partners to discuss new avenues for clean growth and decarbonization.Organize delegations to other jurisdictions to learn how some cleantech solutions are implemented (e.g., CCUS in Norway)These learnings will help future policy making processes	Project lead by a partnership between Energy NL and Econext. Other actors participating: Government of Newfoundland, ERI, OilCo
	Digital Oil and Gas Initiative (DOI): in part funded by ACOA • Working groups with key actors • Trade missions to identify best practices and opportunities for the region	Support the innovation and the digitalization of the oil and gas industry	Working groups with key stakeholders to find value producing opportunities in the digitalization of offshore activities	Project led by techNL, in partnership with Energy NL.
NRC-IRAP	Financial assistance of early-stage innovations (lower TRL), through Funding agreements Advisory services and connections R&D expertise	Provide funding and technical expertise to SMEs, to support their technologies commercialization, and build innovation capacity. Focus on early-stage innovations	NRC-IRAP collaborates with other federal and provincial agencies, but also industry associations and companies (notably operators), to stay informed on funding opportunities, technology advancements, and supply chain needs, to better support SMEs NRC-IRAP will soon be integrated into the new Canada Innovation Corporation, which will operate as an independent organization fully dedicated to support business R&D	Federal (e.g., ISED, MITACS, SDTC, ACOA) and provincial government (IET), operators, SMEs, industry associations

NRCan	Offshore Deployment Program: offers funding for capital projects focusing on offshore GHG reduction, or environmental performance improvement through better oil spill detection, monitoring, and response	Support offshore oil and gas industry in efforts to reduce GHG emissions or improve environmental performance	Implementation: NRCan opened a call for proposals in 2020, then the review and selection happened in 2021-2022. Contribution Agreements started in 2022. In 2023, all Funding was allocated	
	Offshore RD&D program: offers funding for research, development and demonstrating projects focusing on advanced solutions for industry decarbonization	Support the development of advanced technologies to decarbonize offshore activities	Implementation: NRCan opened a request for proposals in 2020, then the assessment and selection happened in 2021. Contract negotiations was done in 2021, and by October 2022, the program was concluded	in partnership with ERI
ECCC	GHG Reporting program: collect information on annual GHG emissions from facilities	Monitor GHG emissions to assess and national environmental performance	Information collected can then be used for other related policy processes and strategies	
	Federal Carbon Pricing System under the Greenhouse Gas Pollution Pricing Act: since 2023, the price will increase by $15/t each year, up to $170/t in 2030	Discourage carbon pollution and help reduce emissions	Implementation started July 2023 in Newfoundland and Labrador.	
ISED through Ocean Supercluster	Ocean Supercluster initiative (overall): ISED provides funds and matches industry members funds	Increase funding to develop world leading ocean expertise	Policy learning and adaptation: economic review of Supercluster activities, interviews with stakeholders to identify key growth opportunities in ocean technology, then revise priorities in investment strategy accordingly. Revision of Supercluster strategy executed through meetings with key organizations, from governmental departments and agencies, to major corporate investors, and research networks Implementation and management of Ocean Supercluster through the creation of a non-profit organization that is industry-led and	Industry members: supply and services companies, postsecondary institutions, industry associations, Indigenous organizations

			funded by industry members and ISED (through the Ocean Supercluster initiative)	
	Thematic meetings for: Innovation Ecosystem activities	Increase cross-sectoral innovation and collaboration for ocean economy growth and development of leading expertise, build cross-sectoral innovation ecosystem, improve resource and knowledge sharing	Working group meetings held by the Supercluster for each of these programs, to define new priorities, (re)design programs, and gather feedback on future Supercluster strategies	
	Thematic meetings for: Technology Leadership projects	Develop and commercialize innovative products and services, strengthen capabilities and expand supply chain coverage and international opportunities		
PROVINCIAL GOVERMENT				
C-NLOPB	Exploration regulation: Call for Bids for offshore exploration licences	Manage offshore resources through a joint-management regime between federal and provincial governments, through: management of land rights and exploration licences, authorization of seismic and drilling programs, declaring major discoveries in offshore areas	Land rights issuance process: every year, C-NLOPB identifies areas for potential licensing through Call for Bids, which are then approved by federal and provincial Ministers	Federal and provincial Ministers
	Legislation on safety of persons in offshore areas: • Safety assessments of work authorizations • Monitoring through investigations, reporting and complaints coordination	Ensure occupational safety of persons working in offshore areas	C-NLOPB monitors operators risk management and ensures risk minimization to persons working in offshore areasImplementation: to ensure compliance, C-NLOPB has a specific department dedicated to enforcement, which is done through inspections, audits, and work refusals	Operators

	Environmental regulation and compliance: environmental protection laws, environmental assessments	Promote environmental protection and safety, and conservation on industrial operations	In collaboration with another department of the C-NLOPB, the Environmental Affairs department conducts environmental assessments to identify the potential effects of environmental conditions on offshore operations, the safety of those operations and facilities They also review operators plans and offshore activities proposals	Operations and Safety department of C-NLOPB, federal and provincial environmental advisory agencies
	Specific provisions of plan: • Requirements for offshore operators to invest in R&D within the province, and in education and training in the province • Requirements of full and fair opportunity given to goods manufactured and services offered locally	Ensure positive local spillovers of offshore activities and investments	Implementation: ERI was created to manage operators' R&D interests and investments Apparently, there is no clear definition agreement on "education and training" in the regulations, so many operators have donated to charities instead of universities or training programs Participant F from ACOA sees this as a challenge and an area to improve	Operators, ERI
IET	Generic Offshore Oil Royalty Regime (GORR): progressive royalty rates	Project cost recovery and profitability	IET handles the negotiation and determination of royalty regimes for offshore oil and gas resources. There is a specific royalty regime for each exploration project	
ECC	GHG Reduction Fund: funds received from operators buying credits and from enforcement of regulations GHG reduction credits	Ensure the achievement of GHG emissions reductions targets	There is an advisory council responsible for reviewing applications for payments and advising the Minister on payments from fund. The Council is composed of industry experts, climate change and GHG experts and a deputy minister	C-NLOPB: is responsible for monitoring large facilities offshore
	GHG Credit Registry - provide information to general public on GHG reduction credit holdings	Maintain a registry for all industrial facilities	People can apply for an investigation if there is a doubt of infringement of regulations. Inspectors can be sent to assess facilities	

Own elaboration - sources: Interviews with participants, Nilsen et al. (2022); NRCan (2023a; 2023b); C-NLOPB (n.d.-c; n.d.-d), CAPP (n.d.-b); ACOA (2023a; 2023b); Ocean Supercluster (2022; 2023), techNL (n.d.-b); *Canada–Newfoundland and Labrador Atlantic Accord Implementation Act; Management of Greenhouse Gas Act;* ERI (n.d.-b).

7.2.4 Assessing overall policy characteristics and processes

From our analysis of the policy mix around the offshore oil and gas industry in Newfoundland and Labrador presented in section 7.2.2, we do observe some inconsistencies and incoherence within the instrument mix, notably between federal and provincial governance levels (Rogge & Reichardt, 2016). While federal policies are quite ambitious and stringent, notably towards GHG emissions reduction, the provincial government remains lenient towards the offshore oil and gas industry, as it still is a prominent industry regionally. This is accentuated by the fact that the financial crisis brought by the COVID-19 pandemic set the economy back and forced the province to look for more aggressive recovery plans (*The Big Reset – The Report of PERT,* 2021). Thus, given the regional economic outlook, offshore oil and gas development remains one of the most viable options to 'relaunch' the economy. As participants have also indicated, fuel needs are nowhere near decreasing, regionally and globally, so there is still a high demand and development opportunities for offshore oil and gas. Therefore, there is lack of consistency between federal ambitions and local reality (Rogge & Reichardt, 2016). Power relations also play an important role in those dynamics. Governments and local supply and services companies are highly reliant on operators (Nilsen et al., 2022). The implications of those highly skewed power relations are that it is quite difficult for actors to impose drastic measures in the short to medium term since the province would greatly suffer from the departure of an operator. Major changes in the regulatory framework need to be thought out in terms of global competitiveness as well (ECCC, 2022; Government of Newfoundland and Labrador, 2020). NGOs and environmental organizations such as WWF have also deplored the lack of consistency with national agreements (Rogge & Reichardt, 2016), as the outsider perspective sees a contradiction in advocating for net zero and Canada's commitment to the Paris Agreement, while also actively encouraging and facilitating further offshore development projects and new oil field explorations (Brooks, 2022).

In addition, industry actors seem to have linked the lack of adequacy between national and local context to the lack of distinction between onshore and offshore oil and gas industries. Indeed, the industry association we interviewed (Energy NL) have stated that onshore and offshore oil and gas sectors are quite different in their operations and "should be considered separately" (Participant E), also given that offshore must consider ocean conditions and biodiversity. This is corroborated in secondary data, as the CAPP as well mentions that offshore extraction has a unique process that

is quite different from onshore oil extraction, given geological and geophysical data and geographical conditions (CAPP, n.d.-c). The offshore oil and gas industry in Newfoundland and Labrador specifically is stated to be one of the 'cleanest' oil and gas industries, as it also benefits from the clean local power mix, which is 95% generated by hydroelectric power (Cooper, Caron Hawco Group Inc. & Rystad Energy, 2021, p. 17). What this means is that local actors feel unfairly compared to highly polluting oil sands industries. Relating to the policy mix, the emerging issue seems to be that local industry actors think the stringency of the federal regulatory framework and overarching policy strategy does not fit with the way offshore oil and gas activities are operated in Newfoundland and Labrador.

> *"The industry has such low emissions to start with. When regulations come in, they want reductions percentage wise. But automatically, the last steps are always the hardest to get. So when the industry is already at such a low level of emission to begin with, it makes it really challenging to get to make huge gain percentage wise."* (Participant E)

While there is an important inconsistency between federal and provincial policy instruments, it is important to nuance that regionally, policy instruments seem to be well integrated and consistent on certain aspects (Rogge & Reichardt, 2016). This can be specifically observed regarding the support to SMEs, as there are many efforts directed at supporting the creation and development of ecosystems. Many of the relevant governmental agencies in the region have a mandate focused on SMEs, notably in the supply and services sectors, as offshore oil and gas operators are not part of their scope. While the overall framework limits policy intervention directly on the offshore oil and gas activities, governmental agencies leverage programs and their networks to orient policy processes and find appropriate funding solutions to support SMEs (Nilsen et al., 2022; Rogge & Reichardt, 2016). Moreover, our analysis also highlights the consistency of local policy instruments when it comes to funding instruments for SMEs (Rogge & Reichardt, 2016). For instance, ACOA has a team focusing on commercialization projects, while NRC-IRAP focuses on more disruptive technologies, so technologies still at TRL 4-6, maybe sometimes at earlier levels of TRL, if needed. If possible, NRC-IRAP can help to full commercialization, but due to their limited scope and funding available, they work closely with other funding agencies like ACOA or SDTC to collaborate and help clients in their technology commercialization. Therefore, efforts

seem to be well aligned and complementary when it comes to TRLs, to properly accompany SMEs in their commercialization.

Regulations being a *"blunt tool"* (Participant B), it is coupled with more flexible instruments in their implementation processes, to allow for more adaptability to the reality of industry actors, specifically supply and services companies. While the regulatory framework can maintain reliable targets and ensure policy certainty for companies so that they can appropriately plan their long-term strategies, the framework can also hinder the industry's ability to innovate. Furthermore, Participant D has noted a lack of coherence in implementation processes, as larger governmental agencies tend to have much slower processes that are quite detailed and lengthy.

> *"[T]he bigger federal agencies that are focused on funding large projects and actually don't do very well with the smaller projects because their application process is fairly onerous. It's very lengthy, it's very detailed. With IRAP the way that we work and it's very different compared to anyone else."* (Participant D).

Regarding the coherence of processes, we observed that some agencies have different policy implementation processes (Rogge & Reichardt, 2016), which affects the speed of innovation commercialization. While some of the larger funding agencies have slower policy processes, others such as NRC-IRAP have more focused and technical mandates, which allows for better integration of policy efforts and support to SMEs in the supply and services sectors. The lack of coherence in processes is echoed by the federal policy strategy, which includes in its roadmap the need to clarify regulations around cleantech and climate innovation, but also improve federal funding coordination (ECCC, 2022).

When assessing comprehensiveness, the policy mix is 'technology agnostic' as a couple of actors iterated. In that sense, they do not necessarily push specific technology advancements or local capability-building. This is mainly due to the skewed power relations with operators (Nilsen et al., 2022), as these companies are ultimately viewed as the main actors deciding which technologies and R&D activities they need to pursue locally. This highlights a major dilemma in the comprehensiveness of the policy mix. The latest changes in the regulatory framework that was implemented in 2022, with the Canada–Newfoundland and Labrador Offshore Area Petroleum Operations Framework Regulations (2022), expand to give latitude to technology advancements and

not restrict innovation efforts in the industry. However, as can be seen from federal and provincial policy strategies (ECCC, 2022, Government of Newfoundland and Labrador, 2020), there is a will to orient industry efforts towards energy transition, showcased by the desire to center on policies for specific technologies and provide more targeted incentives and improve the regulatory framework to encourage such innovations and path developments. This can be observed in the federal action plan, with efforts to regulate CCUS and clean fuels to push the policy mix towards energy transition (ECCC, 2022). Lastly, the comprehensiveness of the policy instrument mix remains limited, as most of these programs and initiatives cover SMEs by design. Many of the governmental agencies analyzed do not have the mandate to target operators directly in their efforts for energy transition and technology development.

Nonetheless, there seems to be an effort to reach more coherence of processes and better align instrument mix (Rogge & Reichardt, 2016), for instance with the application of the Federal Carbon Pricing System to Newfoundland and Labrador and other provinces that previously applied their own provincial system.

7.3 Regional change agency in the policy mix

Chapters 6 and 7 have presented so far, our in-depth analysis of the offshore oil and gas industry and its policy mix in Newfoundland and Labrador. Based on that information, we have applied the trinity of change agency (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022), which is part of our research framework, in order to assess the role of actors within the policy mix for energy transition in peripheries. Based on the limited data, we chose to focus on the main actions and strategies observed by the actors we interviewed (**ECC, ACOA, NRC-IRAP and Energy NL**) and the ones identified in our previous analysis of the industry and the policy mix. Typically, Schumpeterian innovative entrepreneurship is associated with economic actions and thus to firm-level actors (Grillitsch & Sotarauta, 2020). While we have focused on governmental agencies and an industrial association, our interviews with participants provided insights on firm-level actors and their role within the policy mix. Therefore, our analysis of innovative entrepreneurship emphasizes more on its influence and its role within the policy mix specifically. Table 10 presents our compilation and interpretation of the main actions and strategies observed related to different types of agency.

Table 10: Local change agency observations in the industry and the policy mix

Type of change agency	Observed actions and strategies from actors
Schumpeterian innovative entrepreneurship	• Using marine expertise and technologies to improve environmental assessments (e.g., eDNAtec collecting biodiversity data to assess the environmental impact of commercial activities on biodiversity) (Participant A) • Operators looking into cleaner energy solutions (e.g., offshore wind, renewables) to reduce facilities emissions, or investigate negative emissions technologies (e.g., CCUS) (Participant B, Participant E) • Operators repurposing capabilities and expertise to develop new and more efficient logistical systems, monitoring systems etc. (Participant C) • Automation and Digitalization of offshore oil and gas activities – for example with digital twinning, to allow for the remote monitoring of certain hazardous operations (Participant C, Participant D) • Development and exploration of advanced technologies to respond and adapt to the extreme conditions and optimize processes. For example, some companies are exploring AI solutions to better manage supply vessels route planning to improve efficiency and reduce emissions, as supply vessels are a big portion of facilities emissions. (Participant D)
Institutional entrepreneurship	• Creation of Ocean Supercluster to provide a new structure that encourages and facilitates cross-sectoral collaboration and partnerships around ocean expertise and solutions in a new way • Governmental agencies' support of initiatives such as Net Zero Project and DOI, through funding but also active participation in workshops and work sessions to find new pathways and opportunities to reach net zero • Changes and evolution in operators needs towards more carbon emissions efficiency influence their supply chain and orient innovations and R&D efforts of local supply and services companies, as these companies want to remain competitive and access new opportunities • Local initiatives such as Net Zero Project providing a roadmap around CCUS to guide industry efforts, but also to advocate for regulatory and policy changes that would encourage more investments in those technologies (Participant E) • DOI: techNL and Energy NL, along with other industry actors (also funded by governments) create an initiative that connects expertise from tech and offshore oil and gas sectors in a new way to encourage the transformation and evolution towards digitalization of offshore oil and gas activities

	• Trade missions to and collaboration with other jurisdictions (e.g., Norway) to identify new solutions and best practices to facilitate and advocate for local changes. These missions have been observed at industry level with operators and industrial associations (e.g., ERI), but also with governmental agencies like ACOA • Rebranding of NOIA to Energy NL to broaden the mandate of Energy NL. This means expanding to renewable energy initiatives to support the development of those energy sectors. While the association already had members that do not solely operate with offshore oil and gas (i.e., also operates in mining), it seems that the rebranding aims to send a message to the industry that the association will officially support efforts in different energy sectors, not just offshore oil and gas. • Research Innovation Office (RIO) at Memorial University gathers industry, Econext, actors from different governmental agencies, and researchers to discuss and elaborate different programs, funding opportunities and develop new knowledge centres to support those research needs (Participant D). • Formal technical committees, led by governments or developers, with different key actors on different themes, and that can advise on regulations (Participant E)
Place-based leadership	• Local industry associations broadening mandate to officially support different energy sectors, including renewables, and help companies explore new development opportunities • Net Zero Project: regional initiative gathering key local actors from energy and environmental industries to pool resources and efforts locally, create local knowledge to promote and support efforts towards energy transition and carbon neutrality • DOI: regional initiative initiated by techNL and Energy NL, to gather expertise from tech and offshore supply and services sectors to support new capacity building of local companies, and encourage technology development and digitalization of the offshore • Cluster-like initiatives such as Genesis or even the Ocean Supercluster encourages the development of local ocean expertise and cross-sectoral collaboration and technology development. These are also spaces where some governmental actors can provide funding or technical expertise as well (Participant C)

Own elaboration – compilation of data from interviews, based on Nilsen et al. (2022) framework.

It is worth noting that because of the scope of our study (see Chapter 4), Schumpeterian innovative entrepreneurship has been mainly observed through the perspective of actors outside of the private sector. Lastly, as part of our qualitative data collection, a question was asked about participants' perceived vision of where energy transition is at regionally. According to participants, it is not realistic to envision the energy transition without the involvement of the offshore energy industries and other non-renewable energy industries, as the economy needs them to subsist, if only in the short term. There is no viable renewable energy substitute yet that is ready for usage. While actors agree that the energy transition needs to happen, it will require a lot of investments and support for technological innovation.

Participant A	*"I think right now it is still at an earlier phase where there's more of a planning process that would be ongoing to figure out where the needs are and where the challenges are, and how we can support the companies."* *"I feel like there's an understanding that the transition is not something that can happen immediately. It's not something that can happen quickly. It is a slow and steady transition towards a greener economy. But right now, I think we're still at that planning stage to figure out where we would need to be to support that"*
Participant B	*"I think regulation and global financial markets combined are going to push towards that outcome."* *"There's no way around these companies not adapting and being a key participant in the green economy."*
Participant C	*"I think you see major investments in upgrades already starting to wane."* *"We'd like to see industry grow from an economic development perspective, even when it's shrinking over the long term, there's plenty of opportunities there. And then of course the opposite is happening on the other end of the offshore wind and such, there's new opportunities coming up."*
Participant D	*"Well, frankly it's not anywhere in Newfoundland. It's not happening in Canada, it's not happening."*
Participant E	*"But in terms of forcing, it or walking a long ways down the road to a transition, they haven't done it because there is no solution yet. And I think that's what most people miss and even our federal government is missing is we don't actually have a solution to replace oil and gas yet."*
Participant F	Participant F doesn't think everyone realizes that, *"whether it's the offshore oil and gas or any other form of energy, it changes fundamentally how we're going to live. And not everyone is aware of that. What does this mean to an individual? What does it mean for a business? What does it mean for how you live your life?"* *"We're at the beginning. At day one, meaning as a country, as a nation, as a world. We're just figuring this out."*

Chapter 8: Discussion and conclusion

This chapter will present our answers to the three research sub-questions identified for this thesis, drawing from our analysis of secondary material and our interpretation of data results from our interviews with participants presented in Chapter 6 and 7. Since our sample was small, we do rely on systematic triangulation to ensure the verification and corroboration of data and insights, as much as possible. As per our framework, our discussion focuses on change agency to assess how actors influence the policy mix and whether they facilitate energy transition processes (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022; Rogge & Reichardt, 2016). To structure this chapter, each section of our discussion will answer a specific research sub-question and each of those answers will bring out the key insights that highlight the role of actors within the offshore oil and gas policy mix, and that are the most recurring themes across our data.

8.1 Clarifying the policy mix and fostering innovation towards energy transition

The first research sub-question was: *What are the main components and characteristics of the policy mix around the offshore oil and gas industry in Newfoundland and Labrador?*

To examine the policy mix and its components, we applied the definition and framework by Rogge and Reichardt (2016). Chapter 7 presented in depth the main components and characteristics of the policy mix for the offshore oil and gas industry, including both federal and provincial components. The key takeaways of our analysis are that there are some inconsistencies and incoherence observed within the instrument mix regulating the offshore oil and gas industry (Rogge & Reichardt, 2016). Indeed, there is a noticeable gap between federal and provincial policies and agendas, as federal policies are quite stringent due to national commitments to GHG emissions reductions, while provincial policies are seemingly more cautious to include the offshore oil and gas industry in regional development strategies. Furthermore, industry actors have noted the lack of adequacy of certain federal policies, advocating that the offshore oil and gas industry does not operate in the same manner as other oil industries in Canada, which means that they cannot be compared against the same targets and framework.

Our assessment of the policy mix brings out important implications for the role of actors in energy transition processes. Our analysis showcases specific examples of how actors shape the local opportunity space for energy transition to push for institutional and technological change (Nilsen et al., 2022). The first way is through clarifying local policies. Within the province, the presence of collaboration and strong networks (Nilsen et al., 2022) helps push the policy mix towards institutional change and shape the opportunity space for innovation. Also, the geographical context of St. John's and Newfoundland and Labrador, along with the close networks among industry and policy actors, facilitate the development of place-based leadership in the region (Nilsen et al., 2022). This manifests in the policy mix as well as within the industry, through the creation of clusters dedicated to ocean expertise and cross-sectoral collaboration and R&D efforts. From a policy mix perspective, which this study focuses on, local policy actors and government entities overall have the ability to better adapt to the regional context, opportunities, and challenges. This allows local actors to understand and stay aware of local needs, so that they can provide adequate industry support (e.g., funding, advisory services, technical support).

However, when assessing the policy mix for energy transition, policy processes are not clear. Indeed, while federal and provincial governments somewhat communicate their overarching strategies and action plans, there seems to be a gap between those plans and their implementation. Regarding energy transition, there is not a clear roadmap of how the province plans to contribute to carbon neutrality. Of course, it is important to nuance that many of those action plans are relatively recent, and that implementation processes can take time. The issues observed in the policy mix are the lack of consistency of instruments and the lack of coherence in processes, which greatly hinders governments' ability to shape the opportunity space in a way that would favor energy transition (Nilsen et al., 2022). For instance, some governmental agencies perform well in providing support to local companies in the early stages of innovation, but the performance seems to decrease, and policy processes are much slower as companies get closer to commercialization and market deployment. Besides, regional governmental entities are 'industry agnostic' and 'technology agnostic', but as much as this allows for flexibility in letting the industry – operators specifically – decide which technologies to push, this also means that the policy mix in place does not indicate a clear direction or vision regarding local energy transition efforts. In those instances, local actors need to clarify policy strategies and provide a clear roadmap (e.g., investments incentives, technical requirements) locally not only to align to the federal framework, but also to

provide clear guidance to industry actors and define the local opportunity space for energy transition innovation (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022; Rogge & Reichardt, 2016). A great example that appeared in our policy mix analysis is that current local provisions do require companies investing locally to reinvest part of their revenues into R&D within the province and in education and training for the province. However, one of the participants noted that the implementation is not as straightforward, as the regulation remains vague as to what qualifies as "education and training". Thus, by clarifying the policy mix, policy actors can help foster innovation and better funnel investments in R&D and technology advancements towards energy transition. This can also ensure local spillovers. More specifically, governments can specify R&D priorities and requirements for companies so that they can plan and invest accordingly.

One of the key ways that local actors can shape the policy mix for energy transition is through institutional entrepreneurship (Nilsen et al., 2022). Within the policy mix, this means that policy actors must improve policy implementation processes (Rogge & Reichardt, 2016), by updating their mandates and transforming their internal structures to better tackle those mandates and support industry transition. Moreover, actors can leverage networks and policymaking processes to advocate for changes in regulatory frameworks and programs offered (Nilsen et al., 2022; Rogge & Reichardt, 2016). Local networks are key to ensure that the energy transition and associated processes are properly implemented. These local networks facilitate institutional entrepreneurship (Nilsen et al., 2022), as system-level actors and firm-level actors are in constant communication, giving local governments a clear vision of industry needs but also of opportunities for change. For example, formal committees or initiatives such as the Net Zero Project can identify gaps in the regulatory framework or needs for incentives and institutional structures and bring them up to activate policy processes for local change.

While there is limited institutional entrepreneurship for regulators in changing the regulatory framework in the short term, strong regional networks can be leveraged so that the province remains in those important policy discussions. Nonetheless, it is still important to also maintain policy certainty for operators and other industry actors so they can plan their strategies towards energy transition.

8.2 Coordinating industry efforts

The second research sub-question was: *Who are the main actors of the offshore oil and gas industry and what are the key dynamics and networks among them?*

To answer this question, we analyzed in Chapter 6 the offshore oil and gas ecosystem, following the framework by Nilsen et al. (2022), looking at existing regional preconditions (actors, institutions, networks) and then assessing actor composition and power relations. First, we identified key categories of actors, and the most important actors for each category. The main actors within the offshore oil and gas industry can be regrouped into seven principal categories of actors: (1) MNE operators, (2) the supplier industry, (3) industry associations, (4) regulators, (5) funding agencies, (6) postsecondary institutions and (7) R&D organizations. Each of those actors play specific roles within the industry, although actors can have multiple roles. For example, certain governmental agencies can have both a regulator and funding role within the industry. Additionally, other important stakeholders that are worth mentioning are the fishing industry, Indigenous communities and governments, NGOs and environmental organizations. Together, all those actors within and related to the offshore oil and gas ecosystem contribute to framing the industry and the policy mix around it. We observed from our analysis that actor composition is quite differentiated, as actors have different levels of expertise and access to different knowledge, networks and resources (Nilsen et al., 2022). High differentiation in actor composition implies that there is a propensity to leverage a wide range of networks and knowledge, and thus opportunities for different actors to utilize change agency within the industry and the region.

In order to understand the key dynamics and networks among actors, we assessed formal and informal institutions at play within the industry, and linkages observed among system-level and firm-level actors (Nilsen et al., 2022). As mentioned in Chapter 6, due to the difficulty of access to private sector companies, our assessment of dynamics and linkages within the ecosystem was done through the point of view of public and not-for-profit industrial organizations, since our scope of study focused on those actors specifically. Therefore, the main networks that we analyzed are the ones that those public and not-for-profit industrial organizations are involved in or have been exposed to and aware of. Nonetheless, while MNEs and private sector companies were not within our scope of study and feasibility, since the industry is relatively small and has a tight-knit community, we can infer that the organizations we analyzed and those we interviewed have a

comprehensive understanding of the key dynamics at play. Based on our analysis, we observed that relationships are highly skewed in favor of operators, as they are the ones owning offshore operations and platforms, thus dictating the rules of the game within the offshore oil and gas industry (Nilsen et al., 2022). For instance, operators would ultimately decide the technologies and processes they would implement on their platforms and within their operations. What this means for other actors is that operators have a strong influence on favoring certain innovations and encouraging specific R&D efforts (Participant B, Participant E).

Our assessment of the main actors, dynamics and networks within the offshore oil and gas ecosystem brought forth important implications for the role of actors in energy transition processes. While there are many efforts to facilitate innovation and new technology development, and many key actors are mobilized, we notice a lack of synergy among all the different industry initiatives. Indeed, these multiple initiatives, such as the Net Zero Project or DOI, the Ocean Supercluster, OceanAdvance, do not seem to be integrated in a complementary and comprehensive way, whether through the policy mix or industry dynamics. In fact, there seems to be an overlap between many of the cluster-like and ecosystem-building organizations, which brings more confusion than support. As mentioned previously, there is a high differentiation in actor composition, which allows in theory for various actors to have change agency in regional development processes. However, for this high differentiation to be properly leveraged for energy transition, there needs to be a great coordination of efforts (Nilsen et al., 2022).

Moreover, the region is still at the planning phase of the energy transition or ‘stage zero’, which means that for now, there is no viable solution yet to replace fossil fuels, so R&D and technology advancements are key to finding new groundbreaking pathways. In its roadmap, the Government of Canada has emphasized the importance of looking into CCUS as a potential solution to reach carbon neutrality (ECCC, 2022). What this means is that by better coordinating industry efforts and eliminating redundancies, the policy mix and the industry could collaborate to explore new solutions more efficiently.

Regarding the coordination of industry efforts, place-based leadership is utilized by local actors to create and build regional partnerships, fund R&D to develop specific locational expertise around Newfoundland and Labrador strengths, and new technologies oriented towards energy transition

(Grillitsch & Sotarauta, 2020; Nilsen et al., 2022). Those mechanisms are particularly well leveraged by local actors so that policy implementation processes are optimized to support local companies, especially local supply and services companies. This is a crucial asset for the region when it comes to its policy mix and the local opportunity space for change. Indeed, while we assessed that coherence of policy processes is limited (Rogge & Reichardt, 2016), especially between federal and provincial processes, local actors draw from regional preconditions that allow them to be more flexible and adaptable in their execution of policy implementation processes (Nilsen et al., 2022; Rogge & Reichardt, 2016). Therefore, in addition to clarifying the policy mix, policy actors can orient the industry towards energy transition by facilitating better coordination of local industry efforts. The policy implications are that governments can consolidate the initiatives and programs they specifically promote and invest in within the industry, while local policy actors can utilize their network to create more complementarity and synergies between local initiatives.

8.3 Addressing the regional lock-in dilemma

This section addresses our last sub-question: *How does the specific context of Newfoundland and Labrador influence the policy mix and the energy transition of the offshore oil and gas industry?*

Newfoundland and Labrador has a unique geographical context that presents many constraints for development but also interesting opportunities for innovation, which has greatly contributed to the development of a regional expertise that is recognized globally. St. John's is a demographic hub but also an economic hub in the province in general, but also globally specifically for ocean expertise. As the offshore oil and gas industry has a more limited impact on the environment and has lower GHG emissions compared to other non-renewable energy industries, there may be a development opportunity to further encourage the energy transition in not only the province but potentially in Canada and globally by sharing and potentially exporting local expertise, technologies and even energy. Regarding local characteristics, the power mix presents an interesting way to expand the opportunity space. The policy implication is that governments would need to invest in and support regional infrastructure development. Some examples would be developing local offshore wind operations or infrastructure to allow the export of clean energy to other international markets. This would take advantage of local specificities to unlock new

opportunities and pathways for energy transition and support industrial and regional ambitions to lower emissions and transition to a more sustainable economy.

Thus, the need to adapt to local specificities leads us to answer our third sub-question: *How does the specific context of Newfoundland and Labrador influence the policy mix and the energy transition of the offshore oil and gas industry?* We assessed first that the unique geography and environmental context of Newfoundland and Labrador 'forced' the region to adapt its economy to exploit local resources and adapt to the environmental context. Based on those local characteristics, Newfoundland and Labrador specialized in ocean economy and specifically Arctic and cold-water expertise, and has become a globally renowned hub for that, through St. John's specifically.
Also, the geographical proximity favors frequent interactions and thus the creation of strong networks. This allows actors to leverage institutional entrepreneurship and place-based leadership to instigate change in the policy mix.

Newfoundland and Labrador possesses the characteristics of a lock-in region, in that regional actor composition is differentiated, and power relations are highly skewed (Nilsen et al., 2022), in this case in favor of MNEs and specifically operators. The central challenge for energy transition in this type of region is that the local economy is highly dependent on the offshore oil and gas industry, which creates tensions when discussing phase-out policies or stringent GHG emissions reduction regulations. Indeed, the local socio-economic context is mostly favorable towards offshore oil and gas activities due to its important contribution to the regional economy, and for local actors, phasing out is not a realistic option in the mid-term. Consequently, the local opportunity space for energy transition remains narrow (Grillitsch & Sotarauta, 2020; Nilsen et al., 2022). So, how do such peripheral regions push towards carbon neutrality and energy transition?

From this lock-in dilemma emerges the imperative to collaborate directly with MNEs and specifically operators to ensure that efforts towards energy transition are sustained while meeting local short-term energy needs and preserving global competitiveness. The policy implications of our research project are that governments must develop a clear policy mix at the provincial level, but also specify the federal policy strategy to better collaborate with the province and elaborate a

roadmap that is applicable to and considers the regional specificities of the offshore oil and gas industry in Newfoundland and Labrador, separately from other oil and gas industries.

8.3 Conclusion

This study revolved around our main research question: ***How can actors shape the policy mix for energy transition in peripheral regions?*** To answer this question, we analyzed the offshore oil and gas industry in Newfoundland and Labrador to identify the main actors and dynamics present locally. From this analysis, we observed that there is a great diversity of actors locally however, operators dominate industry networks, which narrows the opportunity space for change, as the region is highly dependent on their strategies and decisions.

The second element of our study was to analyze the policy mix of the offshore oil and gas industry to assess policy processes and instrument mixes and identify the different roles that local actors can leverage to shape the policy mix for change, specifically energy transition. Our analysis highlighted a lack of consistency in instruments and of coherence of policy processes in some areas of the policy mix, especially between federal and provincial levels. It also uncovered how local policy actors remain flexible and adapt to local specificities to better implement policies. Still, it underlined how actors leverage regional preconditions to instigate change.

Since our case study focused on the unique context of a peripheral region, the third element of our analysis was to assess how the specific local context of Newfoundland and Labrador influences the policy mix and the energy transition of the offshore oil and gas industry. The key takeaways from our analysis are first that the complex geographical and environmental context has allowed Newfoundland and Labrador to become a leading hub in ocean expertise, especially in Arctic and cold-water expertise, so much so that the Government of Canada identified the ocean economy as a key high-value sector to assert Canada's global competitiveness. In addition, the geographic proximity between actors has created strong local networks, which are a key asset for the region, especially for change agency. Thus, the local context orients the opportunity space, as new solutions would build on those regional preconditions.

Our answer to the main research question is that actors can shape the policy mix in peripheral regions toward energy transition, first by clarifying the policy mix through more specific roadmaps to guide system-level actors and firm-level actors' actions. This contributes to fostering innovation and funneling R&D and technology advancement efforts towards energy transition. In addition, actors can better coordinate industry efforts to avoid redundancy and enhance complementarity, to improve the efficiency of programs and cross-sectoral partnerships. Actors can also shape the policy mix towards energy transition by ensuring an adequate fit between policy mixes at different governance levels but also within regional policies, through better considerations of and adaptation to the local context and specificities.

Lastly, it is important to keep in mind that those efforts do not happen in silos, on the contrary. In shaping the policy mix for energy transition, actors' roles are inherently interdependent and should leverage different change agency strategies to push not only for technological change, but institutional change.

8.4 Limitations and future research

This section addresses the limitations of this research study and identifies future research opportunities to investigate. The methodology design on this research project has inherent limitations. The methodological purpose of this research project was to apply and provide a new case study to illustrate the trinity of change agency in peripheral regions, and to contribute to existing literature. In that sense, our unique case study, although not necessarily an extreme case, limits the generalizability of our findings and theory building (Yin, 1994). Future research could provide additional case study examples for the application of this framework in peripheral regions with different settings, and adopt a multiple case study approach to allow for theoretical and analytical generalizations (Yin, 1994). Although our data has been corroborated and triangulated with secondary material analysis, the small size of our sample does limit our findings. Thus, conducting similar research with a large sample of participants would improve the validity of our study. For feasibility purposes and due to the limited available resources for this research, the scope of the study has been on public actors and industrial associations. While this study is conceptually adopting a policy-oriented perspective, it is critical to discuss the limits. Efficient

governments and policies are essential for development; however, they are not enough, since other institutions such as the market (North, 1991), and other stakeholders such as firm-level actors (Nilsen et al., 2022) also play a crucial role in transitions. While the policy-oriented perspective provides important insights to understand change processes through energy transitions, it would be relevant to also explore the role of other system-level actors and firm-level actors, notably private sector actors and firms, including multinationals. Also, this study takes on a more high-level and comprehensive approach to understand the overall policy mix, so it could be pertinent to further explore interactions between specific policy processes (e.g., focusing on policy-making processes versus policy-implementation processes), to identify potential blind spots and areas of interventions.

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Appendix

Appendix 1: Interview Guide

SECTION 1 - PRESENTATION OF THE ORGANIZATION

1. To start off, could you please tell me a little bit about the main mandates and strategies of [your organization] in general? And talk about your role within [your organization]?
2. Could you please describe the internal structure of your organization? *(E.g., departments, teams)*
3. What are the main strategies of [your organization] (and your department) regarding the development of the offshore oil and gas industry?

   3a. What types of projects does your organization support and finance in the offshore oil and gas industry?

   3b. Which other governmental agencies do you interact with the most? In what ways? *Could be federal, provincial or local*
4. From your perspective, what are the main challenges that [your organization] is facing regarding the energy transition of the offshore energy industry?

SECTION 2 – UNDERSTANDING THE OFFSHORE OIL & GAS ECOSYSTEM & NETWORKS IN ST. JOHN'S

5. What are the different ways you interact with local actors within the offshore oil and gas industry? *(e.g., support, collaboration, consultation, etc.) (e.g., local cross-sectoral or international inter-firm)*

   5a. How do you integrate local communities and stakeholders in energy transition processes?

   5b. Is there anything that you believe should be improved regarding those interactions?
6. How has your organization aided/helped (if any) building regional partnerships? for the energy transition? *(e.g., **local cross-sectoral** or international inter-firm, academia?*
7. **In what ways specifically** does [your organization] facilitate or participate to the development of local assets and capabilities?
8. What are the assets and capabilities that [your organization] emphasizes on in Newfoundland and Labrador?
   8a. in its programs and initiatives
   8b. for the energy transition
9. [To your knowledge] How has your organization's structure and processes (internal and external) changed (if anything) to facilitate the energy transition?
   Reformulation: How are governments' targets included by your organization to facilitate the energy transition?

SECTION 3 – ENERGY TRANSITION PROCESSES & LOCAL SPECIFICITIES

10. How does [your organization] **encourage and incentivize the energy transition** of the offshore oil and gas industry? (e.g. types of projects, support to actors, other roles)

    10a. From your perspective, have these strategies been successful?

    10b. In your opinion, how well does your organization consider the locational context and local specificities of St. John's and Newfoundland and Labrador in your strategies and initiatives?

    10c. In what ways do you integrate those local characteristics? Could you please provide examples?

11. According to you, what are some local advantages specific to St. John's and Newfoundland and Labrador that can facilitate and create opportunities for energy transition?

12. From your perspective, how are energy transition concerns integrated to the existing policy framework and legislation in the offshore energy industry?
    12a. What are the strengths of the current policy mix in St. John's and NL regarding the energy transition?

13. Do you believe the implementation of the policy mix in St. John's is successful regarding the energy transition?
    According to you, to what extent is the policy mix process underway towards the energy transition?

14. **What are the areas of improvement you foresee?**

15. What are the barriers and constraints to the energy transition in Newfoundland and Labrador? In St. John's?

16. Is there anything else you'd like to add?

- Are there any relevant documents, reports that you would be able to share with me?
- Do you know other actors or stakeholders that you think would be relevant for me to include and interview in my research?

Appendix 2: NVIVO Initial Codes

POLICY MIX	
Policy processes	Policy making and policy implementation processes. In the context of energy transition, it is important to consider policy adaptation and learning in policy making processes.
Policy characteristics	Consistency of elements, coherence of processes, credibility and comprehensiveness of processes
Policy strategies	Specific objectives/targets and visions
Instrument mix	Specific instruments and their corresponding goal
REGIONAL PRECONDITIONS Elements that are present in or specific to NL and St. John's	
Actors	Entities that actively participate in institutional processes and can influence them
Networks	Relationships and linkages among actors (formal or informal)
Institutions	Set of rules that determine and structure the actions and interactions within the industry.
Actor composition	How differentiated the landscape of actors is within a given region, in terms of roles and goals, but also structures.
Access to pre-existing structures	Knowledge, networks and institutionalized relations used by actors to access human and financial resources
Power relations	Power balance between actors of the industry
TRINITY OF CHANGE AGENCY	
Schumpeterian innovative entrepreneurship	Economic actions to combine knowledge and resources in new ways, to develop new potential.
Institutional entrepreneurship	All actions influencing the creation or transformation of institutions, which then transform the preconditions and rules around innovative entrepreneurship
Place-based leadership	Actions that aim to transform specific places by structuring resources, competencies and powers to benefit individual agents and regions

Appendix 3: NVIVO Final List of Codes

Codes

Name	Files	References
Actors change agency	6	182
Institutional entrepreneurship	6	77
Place-based leadership	5	65
Schumpeterian innovative entrepreneurship	6	40
Awareness and training	1	5
Challenges and barriers to energy transition	6	53
Distinction between oil and gas industries	1	2
Energy transition stage	6	14
Global interactions	5	15
Human resources	2	10
Indigenous communities involvement	2	2
Local specificities	5	25
Location or dispersion of activities	5	11
MNEs and Operators	2	12
Opportunities for energy transition	5	45
Organizational structure	6	24
Physical infrastructure	3	11
Policy intervention opportunities	4	7
Policy Mix	6	299
Instrument mix	6	106
Policy characteristics	6	35
Policy processes	6	114
Policy strategies	6	44
Potential spillovers	1	2
Regional context	6	340
Actor composition	6	62
Actors	6	41
Institutions	6	64
Networks	6	140
Power relations	5	18
Research and studies	1	4
Supply chain	2	7
Technology development	3	14

Emerging codes