Master's degree program in

Territorial, Urban, Environmental and Landscape Planning

Curriculum: Planning for the Global Urban Agenda

Master Thesis

Towards a just and green transition. The making and implementation of Just Transition Plans in Sweden and what can we learn from it.

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Academic Year 2022/2023

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Abstract

A Just Transition Plan is a framework for ensuring that the shift to a more sustainable, low-carbon economy is carried out in a fair and equitable way. However, the design and implementation of Just Transition plans can be complex and challenging, requiring close collaboration between diverse stakeholders and careful consideration of trade-offs and potential unintended consequences. The research aimed to investigate the Just Transition planning process in Sweden and extract the transferable lessons to Italy. The research delves into the value and the consequences of the Territorial Just Transition Plans and examines how the governance dynamics can play a significant role in the Just Green Transition planning processes. The ESPON TANGO project provided an appropriate ground to investigate the planning process and stakeholder involvement procedures leading to Just Green Transition Plans in three counties of Sweden - Gotland, Norrbotten, and Västerbotten - as well as one county of Italy, Sardinia. The analysis is primarily based on a desk review of policy documents, governance impact analysis, and semi-structured interviews with key stakeholders. The thematic interpretation technique is implemented to evaluate to what extent Territorial Governance indicators contribute to the Territorial Just Transition planning process. Findings reveal that Just Transition Plans seek to extend the discourse of sustainability beyond the environmental and economic concepts towards social and equity concerns, though they face serious challenges like partially exclusivity, uncertainty, slow progress, and a top-down approach. Furthermore, the study underscores the relevance of Territorial Governance's place-based approach to evaluate the power dynamics at different levels, competing interests among involved actors, the manner of coordination of actors, and the potential obstacles that might hinder the implementation.

Keywords: Just Transition, Green Transition, Climate Transition, Territorial Governance, Territorial Just Transition Plans, Just Transition Fund program

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Acknowledgements

I would like to express my deepest gratitude to Professors Giancarlo Cotella and Maurizio Tiepolo, my thesis supervisors, for their unwavering support and guidance throughout my studies. Their vast knowledge and experience have been a source of inspiration and have played a crucial role in my academic success. I would also like to extend my sincere thanks to my co-supervisors in Sweden, Carlos Tapia and Alberto Giacometti, for their technical assistance and for making my time in Stockholm a truly enriching experience.

I am grateful to the Faculty of DIST at Politecnico di University for providing me with the financial and educational resources as well as EDISU Piemonte for financial resources needed to pursue my graduate studies. Their investment in my education is greatly appreciated.

Finally, I would like to acknowledge the contributions of my colleagues and friends who have supported me throughout my journey. Their encouragement and support have been invaluable in keeping me motivated and focused. I would also like to thank the stakeholders who have participated in my research for their insights and perspectives, which have greatly enhanced my understanding of the just transition process and the role of territorial governance in facilitating it.

It is my hope that this work will contribute to a more sustainable and just future for all.

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List of Acronyms and Abbreviations

ACT	Agency for Territorial Cohesion
AdI	Acciaierie d'Italia
ERDF	European regional development fund
EU	European Union
ITUC	International Trade Union Confederation
JT	Just Transition
JTF	Just Transition Fund
JTM	Just Transition Mechanism
JTPs	Just Transition Plans
MA	Manager Authority
MC	Management Committee
MLG	Multi-Level Governance
NP JTF	The National Program Just Transition Fund
NRRP	National Recovery and Resilience Plan
OECD	Organization for Economic Co-operation and Development
PN	National Program
PT	Territorial Plans
PwC	PricewaterhouseCoopers
SDGs	Sustainable Development Goals
TG	Territorial Governance
TJTPs	Territorial Just Transition Plans
UN	United Nations
UNEP	The United Nations Environmental Programme

Glossary

Carbon dioxide (CO2)

“A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas, and coal, of burning biomass, of land use changes, and of industrial processes (e.g., cement production). It is the principal anthropogenic greenhouse gas that affects the Earth’s radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1.” (IPCC, 2018)

Carbon dioxide capture and storage (CCS)

“A process in which a relatively pure stream of carbon dioxide (CO2) from industrial and energy-related sources is separated (captured), conditioned, compressed and transported to a storage location for long-term isolation from the atmosphere. Sometimes referred to as Carbon capture and storage. See also Carbon dioxide capture and utilization (CCU), Bioenergy with carbon dioxide capture and storage (BECCS) and Uptake.” (IPCC, 2018)

Climate change

“Climate change refers to a change in the state of the *climate* that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external *forcings* such as modulations of the solar cycles, volcanic eruptions, and persistent *anthropogenic* changes in the composition of the *atmosphere* or in *land use*.” (IPCC, 2018)

Climate justice

“Justice that links development and *human rights* to achieve a human-centred approach to addressing *climate change*, safeguarding the rights of the most vulnerable people and sharing the burdens and benefits of climate change and its impacts *equitably* and *fairly*. This definition builds upon the one used by the Mary Robinson Foundation – Climate Justice (MRFCJ, 2018)”. (IPCC, 2018)

Climate neutrality

“Concept of a state in which human activities result in no net effect on the *climate system*. Achieving such a state would require balancing of residual emissions with emission *(carbon dioxide)* removal as well as accounting for regional or local biogeophysical effects of human activities that, for example, affect surface *albedo* or local *climate*.” (IPCC, 2018)

Decarbonization

“The process by which countries, individuals or other entities aim to achieve zero fossil carbon existence. Typically refers to a reduction of the carbon emissions associated with electricity, industry and transport.” (IPCC, 2018)

Energy efficiency

“The ratio of output or useful energy or energy services or other useful physical outputs obtained from a system, conversion process, transmission or storage activity to the input of energy (measured as kWh kWh-1, tonnes kWh-1 or any other physical measure of useful output like tonne-km transported). Energy efficiency is often described by energy intensity. In economics, energy intensity describes the ratio of economic output to energy input. Most commonly energy efficiency is measured as input energy over a physical or economic unit, i.e., kWh USD-1 (energy intensity), kWh tonne-1.” (IPCC, 2018)

Equity

“A principle that ascribes equal worth to all human beings, including equal opportunities, rights, and obligations, irrespective of origins. Inequality Uneven opportunities and social positions, and processes of discrimination within a group or society, based on gender, class, ethnicity, age, and (dis) ability, often produced by uneven development. Income inequality refers to gaps between highest and lowest income earners within a country and between countries.” (IPCC, 2018)

Global warming

“The estimated increase in *global mean surface temperature (GMST)* averaged over a 30-year period, or the 30-year period centered on a particular year or decade, expressed relative to *pre-industrial* levels unless otherwise specified. For 30-year periods that span past and future years, the current multi-decadal warming trend is assumed to continue.” (IPCC, 2018)

Governance

"A comprehensive and inclusive concept of the full range of means for deciding, managing, implementing, and monitoring policies and measures. Whereas government is defined strictly in terms of the nation-state, the more inclusive concept of governance recognizes the contributions of various levels of government (global, international, regional, sub-national and local) and the contributing roles of the private sector, of nongovernmental actors, and of civil society to addressing the many types of issues facing the global community." (IPCC, 2018)

Greenhouse gas (GHG)

"Greenhouse gases are those gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself and by clouds. This property causes the greenhouse effect. Water vapour (H_2O), *carbon dioxide (CO_2)*, *nitrous oxide (N_2O)*, *methane (CH_4)* and *ozone (O_3)* are the primary GHGs in the Earth's atmosphere. Moreover, there are a number of entirely human-made GHGs in the atmosphere, such as the *halocarbons* and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol." (IPCC, 2018)

Justice

"Justice is concerned with ensuring that people get what is due to them, setting out the moral or legal principles of *fairness* and *equity* in the way people are treated, often based on the *ethics* and values of society." (IPCC, 2018)

Just transition

"A set of principles, processes and practices that aim to ensure that no people, workers, places, sectors, countries or regions are left behind in the transition from a high-carbon to a low-carbon economy. It stresses the need for targeted and proactive measures from governments, agencies and authorities to ensure that any negative social, environmental or economic impacts of economy-wide transitions are minimized, while benefits are maximized for those disproportionally affected. Key principles of Just Transitions include: respect and dignity for vulnerable groups; fairness in energy access and use, social dialogue and democratic

consultation with relevant stakeholders; the creation of decent jobs; social protection; and rights at work. Just Transitions could include fairness in energy, land use and climate planning and decision-making processes; economic diversification based on low-carbon investments; realistic training/ retraining programs that lead to decent work; gender-specific policies that promote equitable outcomes; the fostering of international cooperation and coordinated multilateral actions; and the eradication of poverty." (IPCC, 2018)

Net zero CO2 emissions

"Net zero carbon dioxide (CO2) emissions are achieved when anthropogenic CO2 emissions are balanced globally by anthropogenic CO2 removals over a specified period. Net zero CO2 emissions are also referred to as carbon neutrality. See also Net zero emissions and Net negative emissions." (IPCC, 2018)

Paris Agreement

"The Paris Agreement under the *United Nations Framework Convention on Climate Change (UNFCCC)* was adopted on December 2015 in Paris, France, at the 21st session of the *Conference of the Parties (COP)* to the UNFCCC. The agreement, adopted by 196 Parties to the UNFCCC, entered into force on 4 November 2016 and as of May 2018 had 195 Signatories and was ratified by 177 Parties. One of the goals of the Paris Agreement is 'Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels', recognising that this would significantly reduce the risks and impacts of climate change. Additionally, the Agreement aims to strengthen the ability of countries to deal with the impacts of climate change. The Paris Agreement is intended to become fully effective in 2020." (IPCC, 2018)

Social justice

"Just or fair relations within society that seek to address the distribution of wealth, access to resources, opportunity, and support according to principles of justice and *fairness*." (IPCC, 2018)

Socio-economic scenario

“A scenario that describes a possible future in terms of population, gross domestic product (GDP), and other socio-economic factors relevant to understanding the implications of climate change.” (IPCC, 2018)

Sustainability

“A dynamic process that guarantees the persistence of natural and human systems in an equitable manner.” (IPCC, 2018)

Sustainable development (SD)

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987) and balances social, economic and environmental concerns.” (IPCC, 2018)

Sustainable Development Goals (SDGs)

“The 17 global goals for development for all countries established by the United Nations through a participatory process and elaborated in the 2030 Agenda for Sustainable Development, including ending poverty and hunger; ensuring health and well-being, education, gender equality, clean water and energy, and decent work; building and ensuring resilient and sustainable infrastructure, cities and consumption; reducing inequalities; protecting land and water ecosystems; promoting peace, justice and partnerships; and taking urgent action on climate change.” (IPCC, 2018)

Transition

“The process of changing from one state or condition to another in a given period of time. Transition can be in individuals, firms, cities, regions and nations, and can be based on incremental or transformative change.” (IPCC, 2018)

1. Introduction

1.1. Introduction to the context

One of the most urgent global concerns of the contemporary era, climate change, poses an extraordinary threat to the society. Moreover, climate change demands rapid and structural transformations with strong effects on certain sectors, including economic and social sectors that are associated with an impact on the competence of workforces and society.

“Looking at climate change from a justice perspective means placing the emphasis on a) the protection of vulnerable populations from the impacts of climate change; b) mitigating the effects of the transformations themselves, including easing the transition for those whose livelihoods currently rely on fossil fuel-based sectors; and c) envisaging an equitable decarbonized world. Neglecting issues of justice risks a backlash against climate action generally, particularly from those who stand to lose from such actions.” (IPCC, 2020)

In recent years to reduce the negative impacts of climate change, a focus has been intensified by many organizations and governments (e.g., United Nations) around the world to achieve a low-carbon economy by 2050 and to avoid leaving no one behind since the world transitions toward a greener and more sustainable future must be fair. In addition to the United Nations, many national and local governments, as well as private sector organizations and civil society groups, are working to transition to a low-carbon economy and address the impacts of climate change. However, the process of transition towards a climate-neutral economy is quite slow and needs to be accelerated by inclusivity.

With careful planning, the benefits of transition can outweigh the costs, new jobs can be created, and inequality can be decreased. Therefore, it is vital to sustain decent job, provide better workplace condition in low-carbon economy, and thriving societies in the upcoming future.

The labor and environmental justice movements sought to ensure that the transition to a low-carbon economy benefited everyone and was more equitable rather than supposing that winners and losers were inevitable in such

transformation, and this effort provided credence to the emergence of the “Just Transition”. It involves a focus on a healthy environment and communities as well as sustainable jobs.

Just Transition is an amorphous concept that is defined and interpreted differently by multiple actors. Additionally, a review of the literature on the topic reveals the demand for a balance of three core conceptual elements including “technical dimension”, “social justice dimension”, and “spatial planning”. Moreover, the term of Just Transition has the potential to develop a more inclusive and equal society since the low-carbon transition provides opportunities for job creation, fair access to resources, and will inherently ensure that the environment and biodiversity are protected.

The concept of Just Transition outlines a comprehensive strategy to Green Transitions which depends on justice and equity. The “Green Transition” is currently the focus of controversies and is developing rapidly. In meanwhile, the European Green deal as a set of policy actions aims to develop the Green Transition in Europe by 2050. The Green Transition refers to the social transition strategy and provides a broad range of opportunities for innovation, human health, economic and social development and simultaneously it will affect the industry, mining, and the energy sectors. Therefore, it strives to ameliorate the living condition and well-being for all citizens by considering various elements such as climate strategies, clean energy, competitive and sustainable industry, air quality, and many other relevant actions. In this light, the Green Transition provide the permission to transform the current global environmental crisis into a new sustainable framework.

More importantly, it would be critical the just and green transition be planned and governed in a timely manner to minimize the job losses and provide more economic security for affected people.

To sum up, Just Transition involves ensuring that policies related to addressing climate change through mitigation and adaptation are efficient, well-coordinated, and minimize negative effects on the labor market while providing support to workers and businesses affected by the transition to a low-carbon economy.

1.2. Thesis objectives, research questions and hypotheses

Within the framework of a master thesis, the research aims to evaluate a more in-depth planning process of Just Transition Plans in Sweden and Italy. Sweden, a Nordic country, is being studied for its focus on transitioning to climate neutrality while maintaining competitiveness, economic, and employment levels in the three identified counties by EU Commission. Italy, a southern European nation, is being analyzed due to its efforts to transition to a carbon-free economy by 2050. The just transition plan of Sweden was approved in the early stages of research, while Italy submitted its final version of the plan towards the end of the research period.

In this regard, the thesis is an attempt to highlight best practices and lessons that can be applied to the Italian context. The research will explore the actions to reduce GHG emissions to reach a net-zero carbon economy in each country. The research will also delve into the potential challenges such as shortage of financial and energy resources that might hinder the implementation of the Just Transition in Italy. It will also examine the social, economic, and environmental impacts of the Just Transition plans, as well as the strategies in different sectors. Furthermore, the thesis will analyze the capacity and effectiveness of the existing dimensions and indicators of Territorial Governance (TG) regarding stakeholders' engagement, cross-sectoral aspects, training and skills, and territorial impact awareness in the literature. This is crucial since the concept of Just Transition Plans is place-based.

The main research objective and challenges are in further details as following:

Main aim of thesis:

- To explore the process of development and implementation of the Just Transition Plan in Sweden, and to identify best practices and lessons that can be useful for the Italian context.

Specific objectives:

- To analyze the contents of Just Transition Plans of Sweden and Italy.

- To analyze the development process of Just Transition Plans in Sweden and Italy.
- To investigate how just and green transition and, more in particular, the Just Transition Plans, have been incorporated in the country spatial governance and planning system.
- To identify best practices and lessons that may be useful to drive a Just and Green Transition in the Italian context in terms of contents, development process, integration in the spatial governance and planning system.

Research questions

Three key research questions guide the study:

- What are the challenges and best practices in the planning process of Just Green Transition in Sweden that might prevent or proceed up the implementation of just transition in Italy?
- What could be the consequences of providing Just Transition plans and strategies in target sectors of Sweden?
- Are the findings of the research regarding the planning process of Just Green Transition in Sweden meet all the available indicators of Territorial Governance?

1.3. Structure of the study

To address the abovementioned research questions, the thesis is structured as follows in eight chapters. After the introductory chapter regarding the concept of the subject with the primary objectives and issues, the research will commence by giving an overview of Just and Green Transition concepts, Just Transition Plans (JTPs), and relevant territorial governance measurements in more detail. It also provides the theoretical framework that guides the structure and development of the thesis (chapter 2). Chapter three will express the methodology used in the data collection, and the research design used to address the research questions will be laid out. This chapter will outline which countries have been selected as the case studies and for which reasons and types of methods were used to interpret the thematic data in more detail. Chapter four will outline the context of the Just and Green transition and governance of Just Transition Plans in the framework of

Sweden through the three case studies which were most affected and provide a synoptic overview of the plans of three relevant counties and the strategy of their governance. Chapter five will explore the governance of Just Transition Plans in the context of Italy. The following chapter, chapter six, will interpret the findings of the research according to the conducted interviews in Sweden and Italy. The thesis will end with the concluding part, chapter seven will provide a conclusion relevant to the policy-making and theoretical discussion as well as the limitations of the thesis and perspectives for upcoming research. Finally, all the literatures are cited in the last chapter.

2. Literature review

2.1. Introduction

To face climate change, societies require to transit toward greener, sustainable, and climate-neutral economies. Therefore, there is required to green the economies along Just Transition which is fair and inclusive as well as to provide decent job opportunities for all to manage natural resources properly, increase energy efficiency, promote social justice, control inequality, and gender gaps.

“A Just Transition at different scales including national, regional, and local scales can aid to ensure that workers, communities, frontline communities, and the energy-poor are not left behind in the transition. Moreover, a Just Transition necessity that rapid decarbonization does not perpetuate asymmetries between richer and poorer states and people” (UNHRC, 2020).

Govern Just Transition and developing innovation require the active engagement of all involved stakeholders, inhabitants, governments, and employees which safeguard the environment for current and next generations.

This chapter, to provide the theoretical support of the research, will employ the literature review on fundamental concepts and prior studies including the concepts of Just and Green Transition, Territorial Governance, and its dimensions as well as how the good territorial governance can be transferred will be investigated in more detail.

2.2. Overview over the conceptual aspects of Just Transition

To provide a comprehensive knowledge of the concept based on previous studies, this section will especially discuss the fundamental and key aspects of Just Transition, including sustainability, Just and Green Transition, and Territorial Just Transition Plans (TJTPs).

2.2.1. Sustainability

Sustainability or sustainable development is a long-term vision that encourages all sectors to make decisions to consider the next generation more than the profit or loss in the short run. There are several different viewpoints on this concept, and it has evolved greatly in various scientific research including environmental concerns, industrial, transportation, population, agricultural productions, and much other relevant research.

High-level international recognition of the significance of sustainability has led to sustainable development becoming an ongoing political mission for the European Union (EU) (Diefenbacher, 1997). Several strategies developed regarding sustainable development and environmental aspects in Europe in the beginning of the 21st century (e.g., Lisbon strategy, Gothenburg Summit) entitled “Sustainable development in Europe for a better world: a European Union strategy for sustainable development” (Vitols, 2011). The 27 European countries are committed to support the sustainable strategy and have elaborated in various action plans.

The United Nations (UN) world Commission on Environment and Development (1987 Brundtland report) outlined its viewpoint about the concept of the sustainability and sustainable development as “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

The EU had a critical role in developing the global 2030 Agenda which is completely compiled with vision of Europe. The Agenda contains 17 Sustainable Development Goals (SDGs) with 169 targets (adopted on 25th of September 2015 by heads of state and government). In order to ensure that no one is left behind, the Agenda commits to overcome poverty and achieve sustainable development globally by 2030. Moreover, the EU Sustainable Development Strategy was seeking mainly to achieve a long-term improvement in quality of life through the development of sustainable communities with the ability to manage resources efficiently, to touch the different aspects such as economic potential, social

innovation, ensure prosperity, and many other aspects (European Commission (EU), n.d).

Portney (2015) specified that sustainability is a broad concept and natural resources, in particular, water and soil refer to the concept of sustainability and it has not been restricted to reduction of the carbon fuels emissions and resilience on fossil fuels. While Bachmann (2010) stated that “The concept of sustainability will always have its relevance. Sustainability has become the subject for a contemporary assessment of progress and responsibility, freedom, and culture”. Consequently, linguists and researchers can declare that the sustainability concept has acquired widespread acceptance in the world's politics, economies, and societies (Reidel, 2010).

The concept of the sustainability has expressed in the report of the Brundtland, in 1987, that support the concept of sustainability to disaggregate and elaborate with its three overlapping elements or pillars including Environment, Economy, and Equity (Portney, 2015: 6).

Portney in Sustainability (2015) expressed (Figure 2.1) that a Sustainable society and sustainable economy concentrate on a broad effort to keep social conditions and human prosperity (economic). The idea is mainly on the social conditions compared to environmental aspects and it provides several issues, for example, in terms of the effect of higher economic growth on quality of life. Equity and Justice are the foremost concerns regarding the gap between rich and poor. This difference may imply environmental equality, which would allow the wealthy to experience a level of prosperity that the poor are unable to. Sustainable development perhaps overlaps with a sustainable economy and concentrates on whether is there or to what extent there is a tradeoff between economic growth and environmental protection. According to the theory behind sustainable development, the environment and its services provide essential and possible irreplaceable factors of economic production. Economic growth is hindered if the environment and those services are endangered.

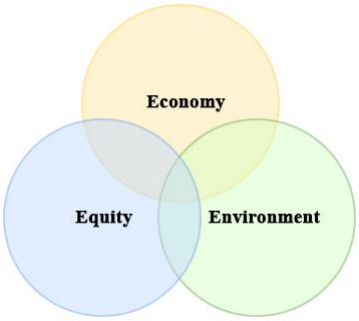


Figure 2.1 – Adopted figure of the three overlapping pillars of sustainability[1]

In fact, these principles constitute the core of what this concept represents. Moreover, the critical concept is that the sustainability can be the result of all three pillars or can be accomplished by the collaboration of only two of the elements. Therefore, a compromising between the economic and the environment or between the economic and the equity might lead to the sustainability (Portney, 2015: p.7).

Therefore, due to the abovementioned definitions, there is no united agreed definition of sustainability, and the definitions are not inclusive by all aspects and elements of sustainability.

2.2.2. Transition

In Collins dictionary the term “transition” is defined as “the process in which something changes from one state to another”. Geels, in 2002, published a paper and introduced the idea of “sociotechnical transitions”. His main argument was that sociotechnical transitions, such as the transition from a dependence on fossil fuels to climate neutrality, ultimately result from continuous innovation and technology substitution processes. As it has been shown in Figure 2.2, the technical transitions emerge from connections between advancements at multi-level perspective. He also makes a distinction between "sociotechnical regimes," which refers to the main players (the stakeholder of the industry sector), and “sociotechnical landscape” which refers to the heterogeneity of different factors at play (e.g., economic growth, conflicts, etc.). In just transition, industry stakeholders

[1] Portney, K. E. (2015). Sustainability. MIT Press.

have been under pressure to change due to sociotechnical changes or climate changes.

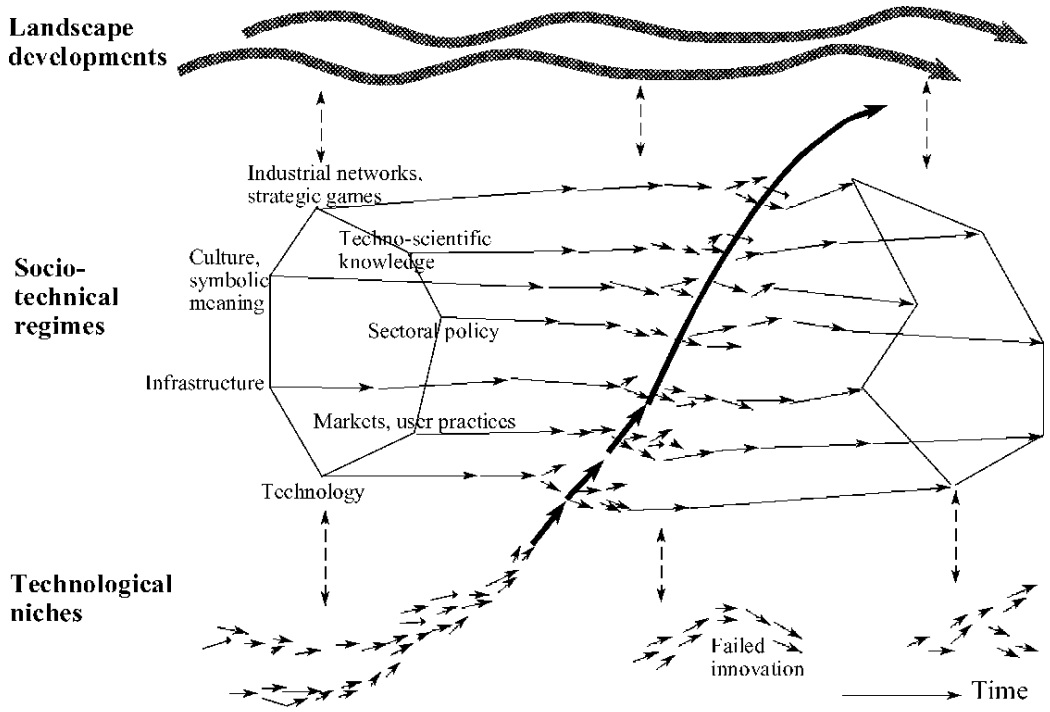


Figure 2.2 – A dynamic multi-level perspective on technological transitions[2]

In the coming years, climate transitions will cause difficulties for economies and societies. Moodie, Tapia, Löfving, Sánchez Gassen, & Cedergren outlined in 2021 that the transformations will present a great opportunity to prevent climate hazards, identify long-term sustainable development routes, and establish a solid economic foundation for a wave of innovation and growth called the "green wave" at the global level. However, societies will have to cope with the short-term effects of climatic transitions before realizing the benefits of such systemic transformation.

The term “Just” in the concept of Just Transition refers to the concept of social justice and justice. Justice should be regarded as fairness, according to Rawl's "the theory of Justice."

[2] Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy*, *31*(8-9), 1257-1274.

The two components of social justice are distributional (i.e., fair distribution of goods, services, and opportunities, burdens; Liljenfeldt & Pettersson, 2017) and procedural (i.e., with a greater emphasis on just transition, procedures, the extent to which stakeholders and individual can participate in the decision-making process; Ryder, 2018) are not opposing but are both are needed to safeguard justice.

Additional elements such as recognitional aspects (Preston and Carr, 2019) should be considered in the main components of social justice. For example, the vulnerable groups and social minorities, such as the Sami people in Sweden, who have limited representation in the political decision and are particularly vulnerable to climate change in terms of worsening conditions for reindeer hardening (e.g., changing food supply for reindeer), should also be taken into consideration (Moodie et al., 2021).

2.2.3. Just Transition

In the 1970s, the labor market movement in the United States established the concept of the Just Transition (JT) in response to the rise in the regulation of polluting industries under environmental laws such as the National Environmental Policy Act. Following that, in the 1990s, the labor organizations embarked to build a variety of partnerships with environmental justice groups that involved collaboration on sustainable development and green jobs.

The Just Transition Alliance (i.e., a coalition of environmental justice and labor groups established in 1997) and Climate Justice Alliance (i.e., a coalition of grassroots environmental justice organizations launched in 2012) are two groups that have contributed significantly to forming the Just Transition movement for the forthcoming. Afterward, in the late 1990s, the European Union embarked to deploy the Just Transition principles in its policies. The Just Transition language and principles are incorporated into the Paris Climate Agreement and the Green New Deal which was offered by Democratic lawmakers in the United States in 2015.

The term "Just Transition" refers to the "just" process that occurs when societies shift to a free Carbon Dioxide economy. Because often the rhetoric of governments, companies, organizations, and researchers discusses "a transition

to a low-carbon economy," there is no mention of "Just". Nevertheless, the plurality of various societies conducts their conceptions as independent structures within Climate, Energy, and Environmental (CEE) research fields, despite time and space being in a constant state of evolution with the same purpose of a low-carbon economy (Heffron & McCauley, 2018).

There could be a certain number of benefits and issues for the just transition. For instance, the concentration of CEE research and the economic concentration of the transition is one of the transition difficulties while the purpose of JT to make a reduction of inequality achieved by conducting justice in the CEE area in modern communities could be considered a benefit. To tackle the concerns of 'inequality,' all three CEE justice forms are required to have a clear result.

Today there has been some research to merge these three forms of justice (CEE). Stakeholders of all forms are involved in the transition process using the just transition approach. However, it is important to mention that a more united approach by all these three justice forms could have more influence. Also, spatial law is another approach that captures research on people, space, time, and law (Blacksell et al., 1986; Delaney, 2003; Blomley, 1994).

Since a Just Transition is a societal purpose, all three communities of CEE justice scholars must collaborate and have the goal of a Just Transition as their common goal. The role of public acceptance and understanding in moving society towards a Just Transition is critical in ensuring that people act in support of it. Furthermore, a Just Transition idea that brings together the CEE justice fields can lead to significant increases in public acceptance and understanding.

The concept of Just Transition provides an inclusive approach and recapitulates all three forms of justice as a framework. Furthermore, rather than having to comprehend all three elements of CEE justice, just transition is a notion that all stakeholders can participate in (Heffron, McCauley, 2018).

To deal with three aspects of the Just Transition including the technical dimension, social justice dimension, and spatial dimension, it must also identify the most affected regions. The Just Transition Fund (JTF) provided by European Union (EU), which went into force on July 1, 2021, will invest €17.5 billion in the most

affected European areas of the transition to a climate-neutral economy from 2021 to 2027 is the primary instrument of the Just Transition Mechanism (JTM). In addition, it seeks to promote socio-economic diversity in areas most affected by climate transition (Moodie et al., 2021).

Gunduzeyli and Moore (2002) outlined that the JTF could be a critical tool to mitigate the social, economic, and environmental implications of this rapid energy transition in the most vulnerable territories.

The “International Trade Union Confederation (ITUC)” has used the just transition concept as a framework to strike a balance between meeting climate and environmental objectives while also protecting and equipping workers whose jobs, livelihoods, and communities are most threatened by climate change or climate interventions. The JT "can be understood as the conceptual framework in which the labor movement captures the complexities of the transition towards a low-carbon and climate-resilient economy, highlighting public policy needs and aiming to maximize benefits and minimize hardships for workers and their communities in this transformation" (Rosemberg, 2010).

Social justice and socio-technical transitions are two linked concepts that the concept of just transition builds on. Frank Geels coined the term "transition" in his 2002 work, which he expanded on. He claims that sociotechnical transitions are the result of recurring innovation and technology substitution processes, such as those needed to transition from fossil dependency to climate neutrality, and that technical transitions are the result of linkages between development at multiple levels (Geels, 2002).

Just transitions use the term 'just' to refer to the notion of social justice developed by philosophers and theorists such as Rawls, Locke, Rousseau, and Kant. The tension between two significant paradigms of social justice, the distributional and procedural components of justice, is identified in the literature. Moreover, these two paradigms are not opposed, but both are needed to preserve justice.

The local and regional ramifications of climate change emphasize the significance of a spatial dimension to justice. Spatial justice stresses how macro pressures can lead to local injustices, which resonates with how the climate transition would affect

some regions or municipalities that rely on high-emission sectors disproportionately.

European Commission (EC) highlights the significant social elements of the just transition: “This transition must be just and inclusive. It must put people first, and pay attention to the regions, industries, and workers who will face the greatest challenges. Since it will bring substantial change, active public participation, and confidence in the transition are paramount if policies are to work and be accepted. A new pact is needed to bring together citizens in all their diversity, with national, regional, local authorities, civil society, and industry working closely with the EU’s institutions and consultative bodies.”

“A Just Transition is an economy-wide process that produces the plans, policies, and investments that lead to a future where all jobs are green and decent, emissions are at net zero, poverty is eradicated, and communities are thriving and resilient” (ITUC, 2017).

Since the adoption of the Paris Agreement in 2015, a significant debate has erupted about how to manage the ecological transition in a fair and orderly manner with the preamble which explicitly is referring to the Just Transition (Bergamaschi, 2020). Also, he has depicted about the essence of Just Transition which has always been at the heart of prior industrial revolutions, and one of the driving impulses for the development of modern welfare systems. It is impossible to preserve a state's economic and political stability without ensuring social stability (through rights, sustainable working conditions, and social protection). Therefore, the concept of Just Transition is not a newly born debate.

To enhance social justice through a Just Transition in Europe and around the world, SOLIDAR, a European and worldwide network of Civil Society Organizations (CSOs), outlined details regarding the Just Transition concept:

“To be just, the green transition must have a strong social dimension, and social and environmental goals must be recognized as equal and mutually reinforcing. Measures for a just transition must be seen as integral to the success of climate policy and implemented through a broad range of initiatives by multiple actors, across different sectors and mainstreamed into all policy areas”.

Based on the above definition, SOLIDAR admits that the concept of the Just Transition refers to numerous policy areas including economy, agriculture, transport, education, energy, etc.

The United Nations adopted the Sustainable Development Goals in 2015 (UNDP), which collectively illustrate the agenda of just transition (Figure 2.3), encompassing mainly the goals of decent work for all (goal 8), and climate action (goal 13). Then Industry, Innovation, and Infrastructure or all (goal 9), clean energy for all (goal 7), Reduced inequality (goal 10), and poverty eradication (goal 1). In this light, a definitive model for just transition was developed by the UN's International Labor Organization in 2015 which was "Guidelines for a just transition towards environmentally sustainable economies and societies for all." The guidelines are the result of a tripartite multilateral negotiation between unions, employers of the organizations, and government, and this negotiation leads up to the Paris agreement.

Samantha Smith (2017) stated that the process, its participants, and its goals are important. Some of the actors are active and collaborative partners (e.g., employers and government) in developing plans for transition but some others such as community organizations, investors and civil society may participate but they are not always partners in the formal process.

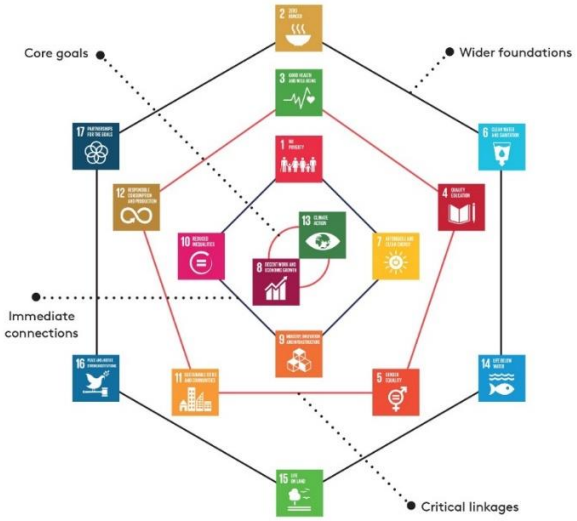


Figure 2.3 – The Just Transition and Sustainable Development Goals[3]

[3] Robins, N., Brunsting, V., & Wood, D. (2018). Climate Change and the Just Transition: A guide for investor action. Grantham Research Institute on Climate Change and the Environment, London School of Economics.

The social partners including unions and employers play a vital role in the social discussion of Just Transition, nevertheless, they have various roles depending on the scale and level such as play an active role in the formulation of the Just Transition, labor market, public investments in green jobs, and many other roles. Sharan Burrow, general secretary ITUC has debated about the involved actors and levels in 2013: “Just Transition Plans are a first step to generate the confidence that people need for backing structural change. These plans need to be constructed through social dialogue with relevant stakeholders at the national level, at the municipal level, and with workers and enterprise-level.”

The “Just Transition Imitative” report indicated that the methodologies to achieve the Just Transitions are ambiguous and that the outcome is determined by the scale, context, and time. It moreover emphasizes the significance of comprehending the key concepts of the Just Transition while acknowledging the diversity of meanings used by stakeholders. While different actors (e.g., international organizations) describe Just Transition differently, its implementation involves more equitable and inclusive governance processes, strategies, and investments.

A united Just Transition concept is required for many reasons. In terms of time and space, the world is experiencing an acceleration of occurrences in many parts of the globe that suggest that there are far too many harmful events occurring - such as the seven climate records broken in 2016.

The JT concept incorporates a variety of equity issues at the global level, such as reducing GHG emissions quickly, which implies actively promoting a low-carbon transition to protect millions of people in regions and territories who are more vulnerable to or able to adapt to the impacts of climate change (Pilsner, de Pous, Reitzenstein, & Gaventa., 2018). The other benefit of JT is to identify the most affected countries or regions to decarbonize. To manage these challenges, it is necessary to mobilize international financial assistance to support regions with lower financial resources for investments in diversification and transition, and other conditions (Muttitt & Kartha 2020).

In general, the Just Transition can accelerate the decarbonization process and enhance huge socio-economic opportunities that come along with it. The concept refers to managing the cycles of production and consumption as well as the waste-free. Moreover, it strives to get control the positive and negative impacts of social and employment due to climate action. Therefore, Just Transition as a vision and framework consists of principles and practices to build economic and political power to shift from an extractive economy to a regenerative economy.

However, the concept is employed by different stakeholders to bring attention to various equity problems (Table 2.1). Sometimes, such interpretations may appear to conflict with one another. It is necessary to have a guiding framework that reflects these many viewpoints to properly support just transitions. Additionally, society must learn from the historical lessons regarding industrial downfalls (Atteridge & Strambo, 2021).

Table 2.1 - Just Transition definitions by theorists

Phrase	Theorists	Definition	Year	Source
Just Transition (JT)	Anabella Rosemberg	- JT constituted an attempt to reconcile the union movement s efforts to provide workers with decent jobs and the need to protect the environment. - JT is a supporting mechanism of climate action, and not inaction. - JT is not in opposition to but complements environmental policies. This comforts the idea that environmental and social policies are not contradictory but, on the contrary, can reinforce each other.	2010	Building a Just Transition: The linkages between climate change and employment (International Journal of labor Research
	Peter Newell, Dustin Mulvaney	- In policy terms the call for a 'just transition' is often directed to states. Governments will have to play a key enabling and steering role in improving levels of support and access to clean energy and mediating the competing powerful interests at stake in any effort to transition to lower carbon forms of energy production and consumption.	February 2013	The political economy of the 'just transition'
	UN Conference of the Parties to the climate change convention in Cancún, 2010	- Interpreted as how to ensure moves towards a low carbon economy are equitable, sustainable and legitimate in the eyes of their citizens	February 2013	The political economy of the 'just transition'
	Healy and Barry, 2017	- JT advocates have emphasized the need to ensure that new jobs created in low-carbon sectors provide decent working conditions, pay a living wage, and are accessible to people with a range of skills,	September 2017	Politicizing energy justice and energy system transitions: Fossil fuel divestment and a "just transition"

		while providing clear career progression opportunities.		
	Darren McCauley, Raphael Heffron	- JT is a new framework of analysis that brings together climate, energy and environmental justice scholarships.	August 2018	Just transition: Integrating climate, energy, and environmental justice

2.2.4. Green Transition

The concept of “Green Transition” or “Transition to a Green Economy” has several different meanings and interpretations. In general, the concept refers to a transformation or transit to a low-carbon economy and more sustainable future so-called “Green Transition” which has different consequences such as economic consequences (Cedergren, Tapia, Sánchez Gassen, & Lundgren, 2021).

There are some commonalities across all the definitions, including quality of life, preservation of biodiversity, etc. However, the Just Green Transition emerged with an emphasis on some elements which are well-being, an inclusive transition, and justice. In more detail, this concept increases the concentration on the socio-economic and governmental aspects towards a more sustainable and inclusive society as well as transition to a low-carbon economy. As a consequence, there has been a greater emphasis on transition processes in different sectors regarding sustainable development (Cedergren et al., 2022).

The debate regarding the best way to make the transition to a greener economy has been generated by the demand to mitigate environmental degradation, biodiversity protection, and climate change mitigation and adaptation (OECD, 2021). According to (Potts, Niewiadomski, & Prager, 2019), “Green Transition” and “Green Economy Transition” are two terms used by academics, and policy or decision-makers to refer to the process.

The important element of green transition is regarding how it can proceed in a just way that preserves potential territories and social groups from effects of such policies (Cedergren et al., 2021). The primary aim of Green Transition is to meet a “Green Economy”. The term “Green Economy” was employed by (Hudson, Pearce, & Rogers, 1989) for the first time in their book titled, Blueprint for a Green Economy. The term was conceptualized more by Jacobs (1991) two years later. It was

employed to describe an economic context in which environmental damage influences the rise of social inequality (Denona Bogovic & Grdic, 2020). According to Merino-Saum, Clement, Wyss, & Baldi, 2020, the concept of a green economy lost its importance because of the momentum of the sustainable development concept at the Rio Summit in 1992. Afterward, it was reutilized widely during the global financial crisis and multiple global crises (Newton & Cantarello, 2014).

“Green Transition can be defined as a shift towards an environmentally sustainable economy centered on the transformation of markets, behaviors, products and processes, technological deployment and new skills” (EBRD, 2015, p.4).

Two concepts of the green economy and sustainable developments overlap and in theory, are compatible with one another (UNDESA, UNEP, & UNCTAD, 2011), and in between, there are any clear boundaries (Loiseau et al., 2016). UNEP (2011) argues that the concept of a green economy highlights the economic aspects of sustainability.

The United Nations Environmental Programme (UNEP) produced A Global Green New Deal and established a "Green Economy Imitative" in 2008 to provide analysis and policy support for the development of the green economy (Barbier, 2009, 2010). In 2009, Barbier outlined that the Green Economy was determined as the single method for a more sustainable global economic revival.

A greener economy has been generated by a demand to mitigate environmental degradation, protect biodiversity, and mitigate and adapt to climate change (OECD, 2021).

To transition to a green economy, academics and policymakers identified a number of fundamental changes in many sectors. The following are some of the most stated (UNEP, 2011; Gunashekar et al., 2021); Transition to a carbon neutral society which involves all sectors of economy from which mostly targets energy and transportation, industrial, and agricultural sectors. The second highlights a shift from a linear to a circular economy which suggests new manners of production, consumption, and lifestyle. The other change is to focus on social inclusiveness, and the consequences of green transition on income, employment, and welfare.

The emphasis on socially progressive efforts that ensure economic and environmental improvement for both current and future generations is a recurrent theme across pertinent publications and declarations. However, there is no evidence-based knowledge demonstrating how to implement this vision in an inclusive manner (Geoghegan & Wilford, 2014). Additionally, in 2014, they declared that to develop national strategy and transition pathways, an instruction of requirements that they should be integrate, justify, and achieve objectives of three pillars provided by global involved actors.

The European Green Deal was adopted by the European Commission in 2019 (European commission, n.d). According to this strategy, by 2050, the European Union should have no net greenhouse gas emissions to meet the Paris Agreement's target of keeping temperature "well below" 2 degrees Celsius and pursuing efforts to keep it below 1.5 degrees Celsius (European Commission, 2021).

Here are several policy recommendations, including fossil-free, conditional on coal phase-out, underpinned by quality National Energy and Climate Plans (NECPs), partnership principle, Paris compatible energy transition, deliver real impact in coal regions, integrated approach, etc. (Gunduzeyli & Moore, 2020: 3). However, they declared that Just Transition Mechanism proposed as one of the primary policies and principles by the European Commission which is required to achieve the European Green Deal. The Just Transition Mechanism will assist the world's most vulnerable territories and sectors in dealing with the social, economic, and environmental implications of the transition to climate neutrality.

The financial arm of the European Green Deal is the Sustainable Europe Investment Plan (SEIP) which is provided assistance in financing European economies’ transition to zero-carbon emissions.

Achieve climate neutrality is one of the primary purposes of the EU to do its fair share under the Paris Agreement, to reduce global warming to 1.5 degrees Celsius. Therefore, it should be phase-out by all member states by 2030. Due to the evidence form NECPs, many member states are not even on track to reach the European Green Deals 2050 climate neutrality aim or its new emission reduction

objectives by 2030, hardly in agreement with the just share of EU under the Paris Agreement (Gunduzeyli & Moore, 2020).

To sum up, green transition or the concept of transition to a Green Economy is widely employed which provides more characteristics of a green economy. Nevertheless, there is any single specific definition yet and still it remains vague (Merino-Saum et al., 2020; Bjerkesjö et al., 2020; Tanner Nygaard et al. 2019). Moreover, the term “green” contribute with different concepts and meanings. Referring to Allen and Clouth (2012) stated that the mobilization of "green" targets has been a major global priority, with nations negotiating on a variety of international forums. The definition of the "green" term is dynamic and depends on how it is utilized (Tanner Nygaard et al., 2019; Wøien Meijer & Peter, 2021).

2.2.5. Territorial Just Transition Plans (TJTPs)

Territorial Just Transition Plans outlines the territories which are most affected, and the Just Transition Fund will be used. The Just Transition Fund (JTF) is the first pillar of the Just Transition Mechanism (JTM) by EC which can be a critical principle to support the most affected territories by the transition towards climate neutrality.

The JTM under the European Green Deal was introduced on 11th of December 2019, then the Just Transition Fund was proposed on 14th of January 2020, and Just Transition platform was launched between 29th of June to 3rd of July 2020 to address the social, economic, and environmental impacts of transition towards climate neutral economy (See timeline). In this light, the Just Transition Mechanism was established to focus on most affected regions and sectors by transition to low carbon economy. The other aim was to achieve this objective and ensure that "no person or place is left behind" as a result of climate transitions (European commission). Its primary purpose is to guarantee that the transition is both effective and equitable.

The JTM is divided into three pillars including “The Just Transition Fund", the first pillar, provides financial assistance to those regions and industries that are most reliant on fossil fuels and, as a result, are most affected by the transition. The “InvestEU Just Transition Scheme”, the second pillar, provides fiscal support for

private-sector transition investments. Finally, the “Public Loan Facility”, which supports public sector transition investments, is pillar three (Moodie et al., 2021).

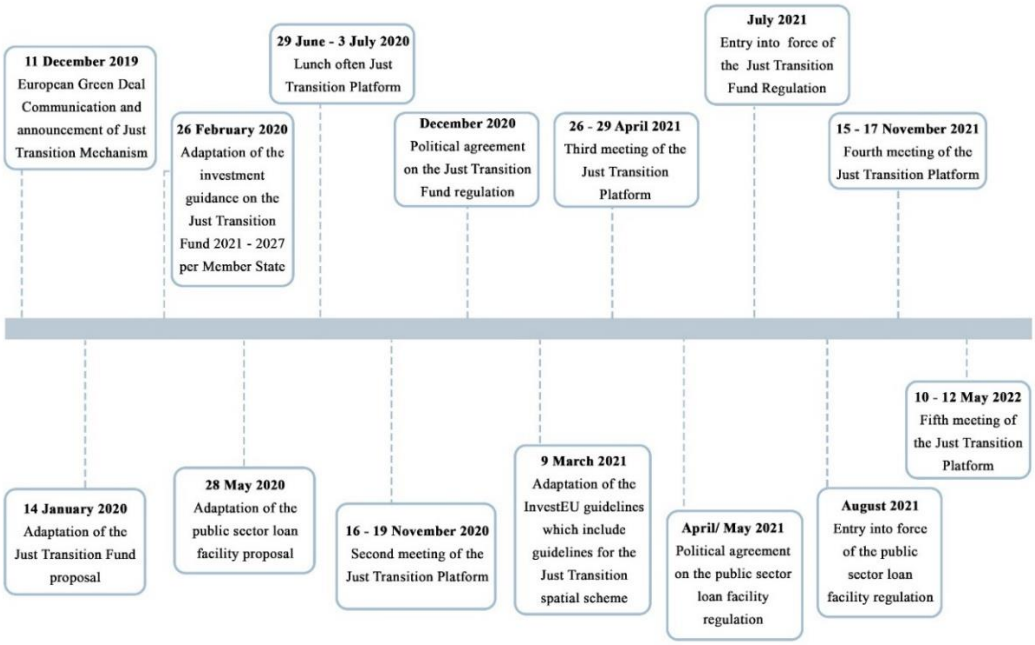


Figure 2.4 - Just Transition timeline[4]

The Just Transition Fund with an aim on the different economic sectors of the most affected territories by the climate transition, focuses on the reskilling and active engagement of their workforces and jobseekers. Under joint management, the just transition fund is carried out through Cohesion Policy. The approval of the Territorial Just Transition Plans (TJTPs) is the primary condition to be included in the support of Just Transition Funds (Moodie., 2021).

Territorial Just Transition Plans (TJTPs) define several important points including Processes of regional climate transition until 2030. To determine which EU member state territories should be supported, the main climate-related difficulties they confront, and the targeted socio-economic and environmental measures and governance systems required to help address the threats and opportunities of transitions are other points. The development and implementation of the TJTPs

[4] Adopted from European Commission website: https://ec.europa.eu/regional_policy/en/funding/jtf/just-transition-platform/about/

need to involve actively all the relevant stakeholders at different levels; local, regional, and national.

The regions and sectors which are eligible to receive support and fund (the amount of fund for each territory differs from others), must be recognized by the EU member states in the Territorial Just Transition Plans (TJTPs) which requires the involvement of the Commission through a dialogue.

In the initial steps of developing this research, TJTPs of a few countries approved by EU Commission (Figure 2.5) The other countries were in the queue of the approval of their TJTPs regarding the Figure 2.5 almost all the countries find their TJTPs approved.

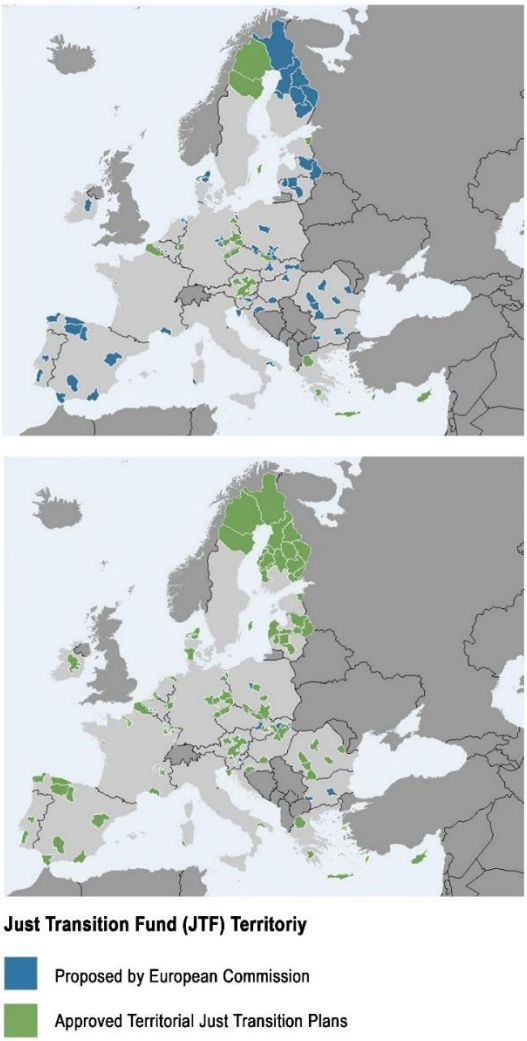


Figure 2.5 – Territorial Just Transition Fund[5]

[5] European Commission website: https://ec.europa.eu/regional_policy/funding/just-transition-fund/just-transition-platform_en

2.3. Overview over the theoretical concepts of Territorial Governance

The theoretical concepts of Territorial Governance will be discussed in this section, commencing with governance, moving on to Territorial Governance (TG) based on ESPON TANGO Project 2013, its dimensions, and concluding with the methods by which good territorial governance can be transferred.

2.3.1. Governance

Prior to discussing the constitution of governance at the regional level, the meaning of governance and dimensions of good governance should be clarified. Taylor (2016, p.3) stated that “Governance is a collective activity practiced by a wide range of organizational forms, including governments, business firms, not-or-profit organizations, voluntary associations, and tribal, religious, or familial groups”.

The term "governance" has become one of the more fashionable topics in the last fifty years. Furthermore, it is mostly connected to proposals aimed at enhancing the efficiency and effectiveness of government and society activities.

Kacowicz (2018, p.62) outlined that the term "governance" describes the various ways that businesses, governments, institutions, and other organizations control their affairs. Moreover, as the governing action, which is characterized by the fragmentation of political authority, not only it involves the application of regulations but also customs and practices beside the ethical standards and norms.

“Governance” is flexible and can cover many issues, on the contrary, is a complicated and vague concept in several fields, as evidenced by practical experiences. Therefore, there is not a narrow definition of governance, nonetheless, it can be mention that governments, as one actor in the interplay of actors, include the roles of subnational and transnational governments, as well as private organizations (non-profit organizations).

Moreover, Zach Taylor, in 2016, outlined the governance concept as a collective activity which is practiced by multiple organizational firms such as governments, business firms, voluntary associations, religious or familial groups, etc. However,

Fukuyama (2013: pp. 350-51, p.60) expressed the governance term that it does not refer to the purposes that principles set, rather, it refers to how agents perform in executing the intentions of principles.

Kaufmann, Kraay, & Mastruzzi (2004, p.253) defined the governance concept in terms of traditions and institutions that support the power in a nation:

“Governance is defined broadly as the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected and replaced, the capacity of the government to formulate and implement sound policies, and the respect of citizens and the state for the institutions that govern economic and social interactions among them.”

It is worth noting that there is an important difference between “governance” and “government” (Plumptre & Graham (1999, pp.2-5)). Meadowcroft (2009) expressed the differences between the governance and government; “Government” is not a synonym with “Governance”. “Government” is an institutional setting or group of organizations (e.g., government offices) that is rarely described as a process; however, “governance” involves interactions among processes and is about power, relationships, and accountability and it is more similar to the art of steering organizations and conflict management. Furthermore, governance refers to the interactions between governments and other social organizations, as well as how choices are taken. Therefore, it’s not about the government when it comes to governance. In addition, governments play a critical role in organizing and accelerating the transition to a low-carbon growth path.

In addition to the description of various scholars about the governance, several organizations outlined the governance definition from their point of view which demonstrates even more diversity in meanings. The definitions are as follows:

European Commission: “Governance refers to the rules, processes, and behavior by which interests are articulated, resources are managed, and power is exercised in society. The way public functions are carried out, public resources are managed, and public regulatory powers are exercised is the major issue to be addressed in that context. The real value of the concept of governance is that it provides a terminology that is more pragmatic than democracy, human rights, etc. Despite its open and broad character, governance is a meaningful and practical concept relating to the very basic aspects of the functioning of any society and political and social systems. It can be described as a basic measure of stability and performance of a society (Communication on Governance and Development, 2003)”.

Institute of Governance (IoG): “Governance involves the interactions among structures, processes and traditions that determine how power is exercised, how decisions are taken, and how citizens or other stakeholders have their say (Principles for Good Governance in the 21st Century, 2003)”.

World Bank: “Governance consists of the traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored, and replaced; (2) the capacity of the government to effectively formulate and implement sound policies; and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them (World Bank, Governance Matters 2007: The Worldwide Governance Indicators)”.

Asian Development Bank: “[Governance is] the manner in which power is exercised in the management of a country’s economic and social resources for development (Governance: Sound Development Management, 1995)”.

United Nations Development Programme (UNDP): “Governance is viewed by UNDP as the exercise of economic, political, and administrative authority to manage a country’s affairs at all levels and the means by which states promote social cohesion, integration, and ensure the well-being of their populations. It embraces all methods used to distribute power and manage public resources, and the organizations that shape government and the execution of policy. It encompasses the mechanisms, processes, and institutions through which citizens and groups articulate their interests, exercise their legal rights, meet their obligations, and resolve their differences (UNDP and Governance, Experience and Lessons Learned, 1997)”.

Canadian International development Agency (CIDA): “Governance […] is the manner in which power is exercised by governments in the management of a country's social and economic resources.”

2.3.2. Multi-level Territorial Governance

International organizations, the Organization for Economic Co-operation and Development (OECD) and the European Union (EU), have recently promoted the concept of Territorial Governance (TG) as a key mechanism for fostering place-based policymaking in European regions (European Commission, 2008; OECD, 2020).

The concept of "transnational governance" (TG) was initially used in the field of European planning studies (Schmitt & van Well, 2016; Stead, 2014), but it has gradually gained prominence in discussions of EU policy relating to the EU's territorial agenda and place-based policymaking (ESPON TANGO, 2013; European Commission, 2008). With a focus on how territorial specificities and place-based knowledge are identified, understood, and incorporated into policymaking processes, TG investigates the relation between governance and territory (Van Well & Schmitt, 2016).

Van Well and Schmitt (2015) argue that the primary goal of TG is to assess the relation between governance and territory, with a particular emphasis on how territorial specificities and place-based knowledge are recognized, understood, and included in the processes of making policy decisions.

TG is relatively novel concept that became a significant prerequisite among EU policymakers for implementation of policies such as the EU Territorial Agenda 2020 and EU Cohesion Policy, etc. (Böhme et al., 2015; Cotella, 2018).

Furthermore, a TG strategy for assisting in the achievement of the Sustainable Development Goals (SDGs) presented by the OECD (2020). Referring to Smas and Lidmo (2018), TG has been referred in the context of EU planning studies as a method to coordinate regional engagement in the planning process, also to improve regional resilience (Van Well et al., 2018), and other aims. Additionally, TG has commonly presented as a conceptual framework for practical research projects that the European Grouping on Territorial Cooperation (ESPON) has commissioned (Moodie et al., 2021). The core dimensions of the TG concept were developed through the 2013 ESPON TANGO project (ESPON TANGO, 2013).

TG is often conceptualized in various manners, however, there are similar characteristics of approach. First, TG is a bottom-up concept that emphasizes incorporating territorial specificities and place-based knowledge into policymaking processes (as opposed to a top-down, "one-size-fits-all" approach) (Schmitt & van Well, 2016). Second, TG focuses on bringing together local stakeholders in a collaborative, consensus-driven, open, and transparent policy-creation process (Davoudi et al., 2008) since relationship between sub-national authorities and public and private stakeholders are significantly important. Thirdly, according to Böhme et al. (2015), the goal of TG is to create practical strategies and address place-based and territorial problems.

The Multi-Level Governance (MLG) method is where the origins of idea are (Hooghe & Marks, 2001). However, Flaudi (2012) discusses that since MLG is inherently territorial, TG does not differ from its pioneer concept. Furthermore, as a possible instrument for analyzing recent changes in EU integration and policymaking, TG continues to be neglected and underutilized within the political sciences and EU studies fields.

The concept of MLG refers to governance systems where there is separation of authority and power across supranational, national, regional, and local levels (Daniell & Kay, 2017).

Marks (1993) outlined that MLG can be described as “systems of "continuous negotiation among nested governments at several territorial tiers" (a European viewpoint of MLG) where power is distributed not only vertically between levels of administration but also horizontally across various spheres of influence, including non-governmental actors, markets, and civil society (Bache & Flinders 2004).

MLG examines policymaking at various levels of governance, although the focus and scope of TG are primarily sub-national. TG emphasized the place-based knowledge as the fundamental dimension to understand policy formation and implementation (Moodie et al., 2021). Therefore, TG is conceptually different from MLG, however, it is still quite relevant for broader processes that MLG models covered. Although, in initial EU documents, the concept of TG was relatively vague (Rivolin, 2010), recent policy declarations have enhanced clarity, identified TG as

a bottom-up, placed-based approach with a sub-national focus (Böhme et al., 2015).

2.3.3. Good Territorial Governance

The term of “Territorial Governance” has expressed by TANGO (Territorial Approaches to New Governance) project which refers to develop and implement public policies and projects to develop a territory along five dimensions.

According to the European Commission, TG is a crucial component of EU regional policy, emphasizing the crucial function of the subnational level in incorporating local expertise and stakeholders into decision-making processes (Böhme et al., 2015).

Territorial governance has been conceptualized as a way to accomplish endogenous territorial growth through the construction of new "constellations of actors, institutions, and interests," spurred on by the political debate on territorial coherence (Gualini, 2008).

Davoudi et al., in 2008, outlined that territorial governance as the process of territorial governance of the municipality of relations among actors. Moreover, this process implies horizontal and vertical coordination, and it can be assessed by considering three categories of factors, including the structural context, the policies of the institutional realm, and the outcomes and procedures of actions, programs, and projects for territorial cohesion.

Territorial Governance deals with the establishment means of jurisdictional boundaries, patterns of collaboration between units of government and between governmental and non-governmental actors (Lidström, 2007). Also, as the transitions in territorial governance across Europe and other parts of globe brought changes in objectives, processes, scales, and scope of territorial governance, she highlighted four primary recent transitions in territorial governance including revise the definition of the nation-state roles, the second shifts was in expansion of the responsibilities of lower levels of government, the third change was in rise in acceptance of diversity and asymmetry, and the final shift occurred with raise in marketization of the public domain.

Therefore, compared to either of the types of multi-level governance described by Hooghe and Marks (2010), Territorial Governance provides a more comprehensive understanding of relationships and linkages among actors within a given territory or "nested territories".

In TANGO project, it is outlined that Territorial Governance could be defined as including both types of formal governance arrangements of many issues inside a given territory as well as informal governance processes between territories and with relation to specific issue as well as larger cross-sectoral issues.

The “holistic approach toward understanding territorial governance” are summarized in the following four conclusions which have been collected from available literature in TANGO project:

Territorial governance is a process that is influenced by structural contexts and institutions. Nevertheless, the study of territorial governance must be linked to how the process contributes to the achievement of a specific territorial goal.

Territorial governance is a way of helping to define or reify new types of “softer” or “functional” territories. Thus, it can potentially help to analytically “unravel the territory” much in the same way that the multi-level governance has helped to re-conceptualize and “unravel” the state.

Territorial governance (i.e., employing a territorial approach in the development of strategies and in decision-making) should be carefully distinguished from the governance of territories. The latter is inevitably always there, in particular in regard to multi-level governance. However, the former offers, according to our initial hypotheses (that have been confirmed later on in our empirical research, see chapter 6), a high degree of sensitivity in regard to ‘how’ territorial dynamics and challenges as well as prevailing perceptions and knowledge may feed into various processes within (multilevel) governance for achieving a certain territorial goal.

Territorial governance as a concept and a way of framing research is enriched by the additions of dimensions concerning adaptability and territorial specificities (see dimension 4 and 5 in Figure 1.3). Contrary to Faludi’s observation (2012), our research indicates that while the idea of territory may be implicit in studies of multi-level governance, it should be made very explicit and a central part of the policy making process.

2.3.3.1. Dimensions of good territorial governance

TANGO project highlighted the critical good practices of territorial governance which are five dimensions, twelve indicators, and twenty components with the focus on extraction of the commonalities in an evidence-informed synthesis of the dimensions of territorial governance as well as on a more integrated set of twenty elements that are reflective of the structural and process-oriented features of territorial governance. The five elements of territorial governance contributed to the achievement of territorial governance.

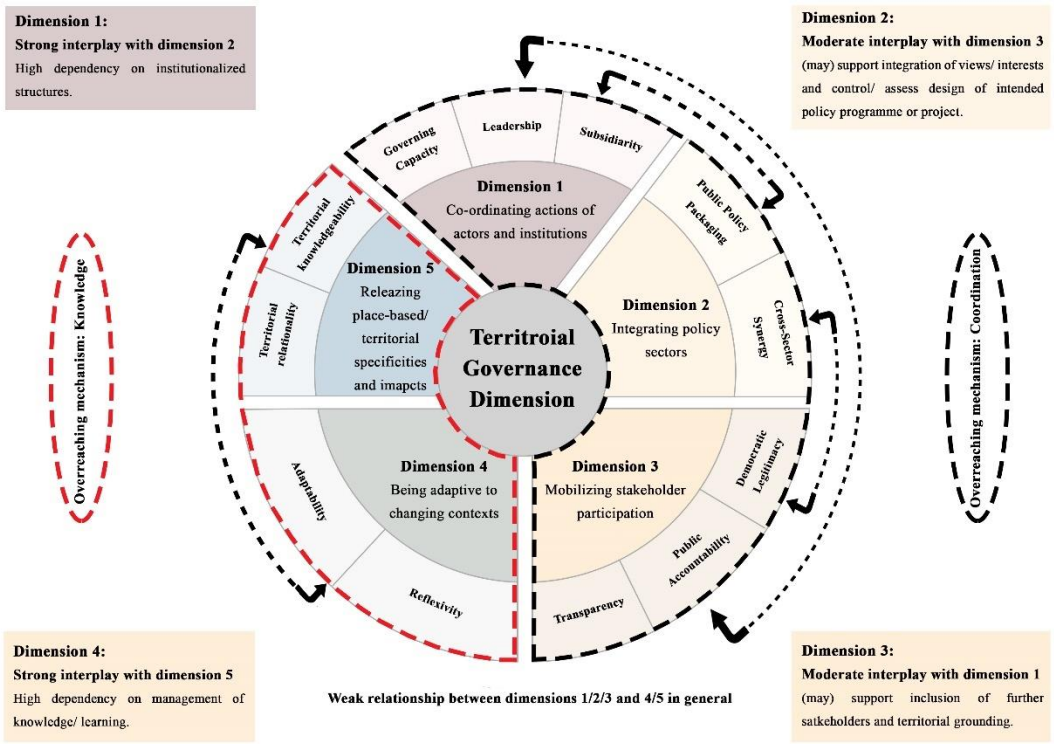


Figure 2.6 - Overview of the five dimensions and twelve indicators of territorial governance and inter-relations[6]

The core of regular or even multi-level governance can be compromised of linkage between dimension 1 which deals to coordination actions of actors and institutions and dimension 2 that refers to integrating policy sectors and both contain various means to integrate different actors. Coordination actions of actors often plays a

[6] Adapted figure from ESPON TANGO project: https://www.espon.eu/programme/projects/espon-2013/applied-research/tango territorial-approaches-new-governance.

role as foundation of Dimension 2 which is the involved actors in different levels to integrate policy sectors. Therefore, there is a strong interplay between these two dimensions which is critical to distribute different types of power, including formal, informal, regulatory, and normative, as well as approaches to manage the limitations and gaps within the prevailing institutional structures. Moreover, institutional structures are highly depended on to involve both actors and sectors in different policy decisions.

The third dimension which refers to Mobilizing participation of stakeholders, develops on the abovementioned dimensions with emphasize to a larger extent of integration of various stakeholders within a territorial context. There is a moderate interplay between dimension 1 and 3 since the coordination of actors and institutions may support inclusion of further stakeholders and territorial grounding. Similarity to dimension 2 and 3 which the mobilization of stakeholders may support the integration of views and interests to control or assess the inter-sectoral design of policy, program or project. As a consequence, there is strong or at least moderate interrelation between dimension 1, 2, and 3 and this interaction is characterized by coordination as the overarching mechanism. Dimension 3 is important to achieve coordination of actors and integration of policy sectors. Although, there is a disconnection in relations between mobilizing stakeholders' participation (dimension 3) and being adaptative to changing contexts (dimension 4) and realizing place-based/ territorial specificities and impacts (dimension 5).

Dimension 4 and dimension 5 also have a close connection and the conceptualization of both dimensions is centered on knowledge characteristics. Therefore, the interaction is characterized by knowledge as the overarching mechanism. As a result, it becomes clear from the assessment of dimensions 4 and 5 those various formations of territory-related "knowledge" act as key inspirations for the formulation of policies, programs, and projects. To look at it another way, the inclusion of dimensions 4 and 5 clarifies the issue of whether relevant knowledge is produced, preserved, and employed to comprehend, evaluate, or simply imagine the effects and outcomes that (optional) interventions (may) have.

2.3.4. Means of transfer of good territorial governance

According to the TANGO project, it is highly questionable that any territorial governance strategy can be presumed to be totally "good" or "bad" because territorial governance procedures are inherently complicated and comprise several critical elements. However, it is possible to consider that each territorial governance framework can contain both successful (possible to learn and transfer) and unsuccessful features (lessons from the failure).

Wolman and Page, in 2002, argue about the policies and outline policies are formulated by exchangeable different components which have a dependency on various interactive resources, that in turn may be more relevant for specific categories of stakeholders active in territorial development.

The interactive resources could be addressed as including, the first those who can be transferred by practices of implementation. Then those who require techniques and tools for policy-making methods, and those who assess the rules to formulate territorial governance should be addressed to decision-makers. Finally, the promoters should be addressed to all groups of stakeholders whose transfer is seen to be possible through ideas and principles (TANGO project, p.42).

Reducing the conceptual complexity in the territorial governance in Europe made a ground for the policy transfer in the institutional context which was a solution suggested for the complexity of TG transferability. It implied to identify of three modes to transfer features of good TG in the EU including dialogic, operational, and institutional modes (TANGO: p.126).

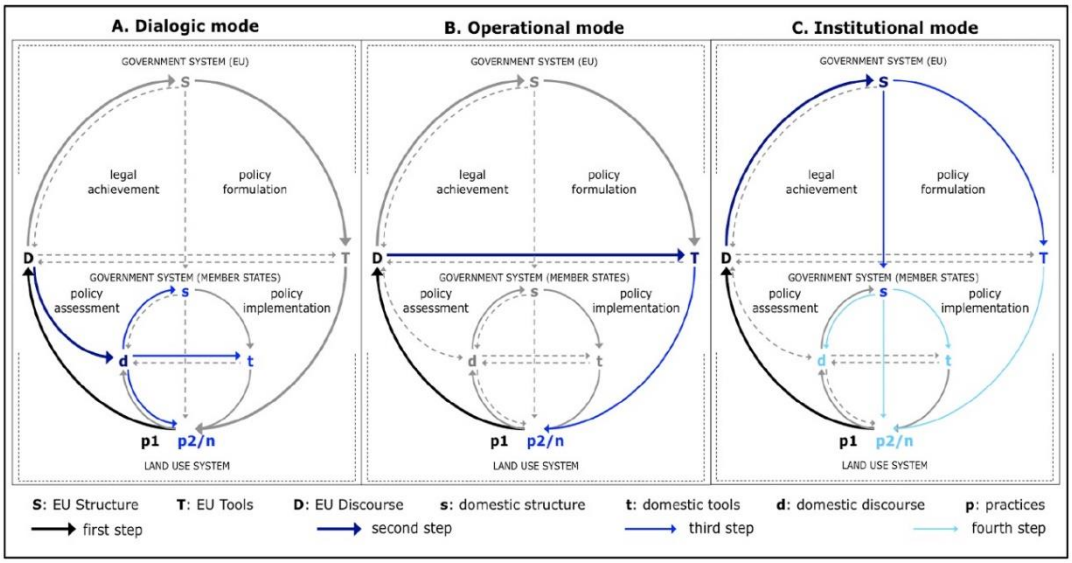


Figure 2.7 – Transfer modes of (good) territorial governance in Europe[7]

The first type of transferability, known as dialogue mode, begins with the ability of the EU discourse to impact one or multiple domestic discourses (D → d2/n) and, as a result, relevant practices either directly or indirectly (through domestic mechanisms or structures). This form of discursive integration is successful when there are strong policy-making communities operating at both the European and national levels, as well as direct connections between them (Böhme, 2002: III).

The second type of transferability, known as operational mode, involves the transfer of knowledge gained from the EU discourse into EU tools (D → T), which then have the capability to affect practices in different domestic settings. In this mode, the principles of good territorial governance are transformed into other elements such as methods, techniques, and know-how, and then directly transferred to new potential experiences in various domestic contexts (p2/n) through economic conditions. This mode is effective to the extent that European influence is limited to changing domestic opportunities and hence the distribution of power and resources between domestic actors (Knill & Lehmkuhl, 1999: p.1).

The third type of transfer is known as the institutional mode and occurs when the EU discourse is formalized within the EU structure (D → S). This leads to changes

[7] Cotella, G., & Rivolin, U. J. (2015). Transferring 'good' territorial governance across Europe: opportunities and barriers. In *Territorial governance across Europe* (pp. 256-271). Routledge.

in domestic structures and related practices, or in EU tools with outcomes similar to those of the operational mode. European policymaking can prompt domestic change by mandating specific institutional requirements for member states to follow, meaning EU policy outlines a desirable institutional model for domestic arrangements to adhere to (Knill & Lehmkuhl, 1999: p.1).

To sum up, the concept of territorial just transition has gained significant attention in recent years, particularly in the context of climate change and the need for a transition to a more sustainable and low-carbon economy. Territorial Just Transition Plans are the initiative of European Commission to offer more grant to social dimensions beside environmental and economic aspects in the discourse of sustainability. TJTPs aid to bridge equitable, inclusive, and sustainable transition for all communities and stakeholders.

3. Research Methodology

3.1. Introduction

This chapter expresses various methodologies that were utilized in data collection which are relevant to the research. The methodology will cover aspects such as the location of the case studies, research design, sample size, the technique of data collection, and data management.

The research is carried out in different counties of two countries, Norrbotten, Västerbotten, and Gotland in Sweden, and Sardinia in Italy. The rationale behind the selection of these counties is that they are included in the JTF program with the same investment to fulfill the major aim of the program.

There are two primary tools to establish the current qualitative research including the document and policy analysis as well as conduct interviews with involved stakeholders in the JTF program which will be discussed in further detail in the following parts.

3.2. Document and Policy analysis

Document analysis (document review) is a systematic method to review and evaluate printed and digital documents. The document and policy analysis requires the evaluation and interpretation of data to extract meaning, achieve understanding, and develop empirical knowledge (Corbin & Strauss, 2008; Rapley, 2007).

In the research, the prior literatures have been evaluated to incorporate the information into the research. In this light, in addition to scholarly work and working documents, the Just Transition Plans of Sweden and Italy have been interpreted precisely to achieve a comprehensive concept of the investments and innovations in each country. To effectively conduct the research in the planning process of each country in the JTF program, it was helpful to use both interviews and document analysis.

In the approved JGTPs of Sweden which is named Just Transition Fund National programme 2021-2027, three regions are covered by the program including

Gotland County, Västerbotten County, and Norrbotten County. Moreover, the approved JGTPs of Italy were offered for only Taranto and South Sardinia which are two potential regions of Italy. However, only the two Swedish counties - Norrbotten and Gotland - and one Italian case study - Sardinia - have been considered in this research. The primary purpose of the program for the two countries refers to investment for employment and growth only for the outermost regions to mitigate. The JTF program contains strategies, major challenges, and policy measures and how the program addresses the problems.

3.3. Interviews

There is a need to collect as much significant data as possible from the selected stakeholders and policymakers to be able to accomplish a deeper understanding of the planning process, best practices, and obstacles that hinder the implementation of the transition in the two counties of Sweden: Gotland and Norrbotten and Italy: Sardinia.

Interviews were expressed by Kvale as a type of conversation that is split into two types. According to the description of Kvale in 1996, the initial type of interview is a regular conversation that involves chatting, small talk, sharing news, disputes, and deep personal interactions. Typically, this kind of discussion is relaxed and does not require a specific topic to be initiated, unlike many research interviews. The primary purpose of such conversations is to maintain social connections between individuals or groups.

The second type of interview (2006) is a professional conversation that is to acquire particular information about a certain group of people or events in a specific period. In this kind of discussion, topic(s) is mostly negotiated so that participants engage in the discussion with mutual interest. The primary aim of the conversation is to build up necessary knowledge or information, therefore, it must be well prepared in advance.

In this research, the qualitative interview approach has been selected to collect the primary data. Comparing qualitative interviewing to interviewing for quantitative research, there are several significant differences. For instance, qualitative interviewing is generally much less structured. Moreover, qualitative interviewing

is frequently seen as being flexible and new questions may arise as a result of the replies of the respondent and the order of questions occasionally changing (Bryman & Bell, 2007).

In this research, among the different approaches to qualitative interviewing, a semi-structured interview has been selected as a method for data collection. The semi-structured interview contains peculiar features despite variances in styles. According to Mason (2002), all these interviews share the following crucial characteristics. First, since interviews are a form of internal dialogue exchange, they must include focus groups or one-to-one interactions. Additionally, it could occur in person, on the telephone, or over online platforms (e.g., WhatsApp, Instagram, etc.). Second, it has a relatively informal style which means the interview and interviewee(s) rather than using formal pre-defined questions, engage in personal conversational dialogue. Third, a thematic or topic-centered interview is another sort of semi-structured interview in which a researcher has themes and issues to explore. In this kind of interview, the questions are listed completely or in sequence. Fourth, it is the responsibility of an interviewer to make sure that pertinent settings are brought into focus because the majority of qualitative research proceeds from the concept that knowledge is situated and thus contextual.

In this regard, the list of questions and concerns has been provided according to the five dimensions of Territorial Governance (TG) including coordinating actions of actors and institutions (dimension 1), integrating policy sectors (dimension 2), mobilizing stakeholder participation (dimension 3), being adaptive to changing contexts (dimension 4), and realizing place-based/ territorial specificities and challenges (dimension 5). During the interviews, open-ended questions was conducted to encourage interviewees to freely express their opinion regarding the Territorial Just Green Transition planning process in the two counties of Sweden - Gotland and Norrbotten - and a county of Italy, Sardinia (Sulcis Iglesiente).

Each interview started with a brief introduction of the interviewee and researcher to help to create a relaxed atmosphere for the interview session. In the introduction, the researcher also made the key aspects of interview transparent including the

subjects of the interview, the primary aim to remain neutral in the investigation of the topic, and an openness to capture all possible details.

The part of the sample of this research is based on a non-probability approach which means that the sample has not been chosen by using a random selection method and it has started with the beneficiary and the main coordinator of the Just Transition Fund program, and stakeholders that they actively involved in the transition planning process in each region. The other part of the sample has been continued with the snowball technique which means that each coordinator, expert planner, or decision maker is recommended by other involved stakeholders in the process. Therefore, a number of the selected stakeholders are the results of contacts recommended by my supervisors in the involved research institute, Nordregio. It was particularly useful in identifying other relevant private sectors, civil society, and business sector interviewees.

In total, fifteen in-depth interviews were conducted in the two countries, ten of which were with Swedish stakeholders and the rest with Italian actors.

In the case of Sweden nine oral interviews and one written interview, have been taken place with ten interviewees at various levels with different roles. Interviews were conducted between Tuesday, 18th of October, and Tuesday 29th of November 2022. All interviews were through online meetings with different platforms such as google meet, skype, and Teams in the English language, and with different duration (Table 3.1).

Table 3.1 – Information of conducted interviews in Sweden

Interview	Region	Position	Date	Duration
1	**Tillväxtverket**	Coordinator/ National Agency	18.10.2022	49'
2	**Gotland**	Region Gotland-Economist	01.11.2022	60'
3	**Gotland**	County Administrative Board	02.11.2022	41'
4	**Gotland**	Region Gotland-Environmental strategist	10.11.2022	56'
5	**Norrbotten**	Region Norrbotten	14.11.2022	55'
6	**Gotland**	Civil sector-energycentrum	16.11.2022	30'
7	**Norrbotten**	County Administrative Board	16.11.2022	Written interview

8	**Norrbotten**	Luleå University of Technology	28.11.2022	45'
9	**Norrbotten**	Environmental Protection Agency (EPA)	29.11.2022	33'
10	**Norrbotten**	National Growth department	29.11.2023	41'

Moreover, there was a similar method to conduct the interview with Italian stakeholders; all five in-depth interviews were performed from the 22nd of November until the 15th of December 2022 through online platforms (e.g., google meet, skype, and Teams) in the English language, and with different duration (Table 3.2).

Table 3.2– Information of conducted interviews in Italy

Interview	Region	Position	Date	Duration
1	**Territorial Cohesion Agency**	Coordinator/ National Agency	22.11.2022	50’
2	**PriceWaterhouseCoopers (PwC)**	Project manager	30.11.2022	60’
3	**Joint Assistance to Support Projects in European Regions (JASPERS)**	European Investment Banks – Economist in energy sector	01.12.2022	48’
4	**Sardinia**	Autonomous region of Sardinia	05.12.2022	35’
5	**Sardinia**	Sotacarbo – Public research institute	15.12.2022	50’

3.4. Reliability and validity

When conducting qualitative research, the concepts of reliability and validity are essential to keep in mind since they determine how the objective of the research will be. Validity and reliability can be considered as two different measurement tools that reveal the level of credibility and trustworthiness of research.

To increase the reliability of the responses, all interviews have been recorded by using windows or skype recording and subsequently transcribed. Before manual transcription, the researcher extracted the raw text using the online platforms, Otter, and auto-transcript of teams for the interviews in teams and then double-

checked the outcomes. The interview transcripts were exported to Microsoft Word for further formatting to remove unnecessary information such as the time display, spacing, and fillers disfluencies.

The researcher verified the validity of the responses of interviewees by cross-checking them with the outcomes of TJTPs. The researcher then shared and discussed the results with experts from Nordregio who were involved in the development of the Just Transition Plan programming.

3.5. Thematic interpretation

This research with aim of evaluating the planning process of Just Green Transition Plans (JGTPs) and how the stakeholders have been involved in the program, was conducted through thematic analysis in a deductive manner.

Fereday and Muir-Cochrane (2006) define thematic analysis as a way of identifying patterns in the data, with emerging themes serving as the basis for analysis. The process involves a thorough and targeted review of the data, with the researcher closely examining the selected data to identify codes and categories that are relevant to the phenomenon under investigation. In some cases, predefined codes may be utilized, especially if the analysis of documents supplements other research methods used in the study. For instance, codes that are applied to interview transcripts can also be used to analyze the content of documents (Bowen, 2009).

According to the Braun (2006) and Clarke (2012) an inductive (bottom-up method and developing themes as data will be analyzed) or deductive approach (top-down method and finding the reflection of the predetermined themes in data) can be employed for the identification of themes. Moreover, they outlined in 2012 that in an attempt to understand a set of experiences, thoughts, and actions in a data set, the thematic analysis is a useful and effective technique.

The six-step procedure outlined in the most generally utilized framework for thematic analysis consists of familiarize yourself with the data, generate preliminary codes, seek for themes, review the themes, define, and label the themes, and create the report (Kiger & Varpio 2020).

The five dimensions of Territorial Governance (TG) which are expressed in the ESPON TANGO project (2013) have been considered the primary dimensions of the research and the concept to define the research questions. The preconceived themes of the analysis have been collected from the indicators of TG. Thereafter, all interviews in the two countries were analyzed in detail in accordance with the content analysis of the five dimensions. The significant points of interviews are highlighted, and codes are derived from the content of the interviews. Finally, the similar and common codes have been grouped into a theme and compared to the indicators of TG of the ESPON TANGO project (Table 6.1).

4. Just and Green Transition in Sweden

This chapter will undertake an analysis of the three Territorials Just transition Plans in Sweden. The primary objective of this analysis is to identify and examine the essential requirements, strategies, consequences, and investments in each of the three counties. This also involves the way of identifying and coordinating stakeholders in the planning process to provide the territorial plans in each county. Moreover, the competency of JTF program with national and other regional plans will be evaluated.

4.1. Introduction

Just Green Transitions should be planned adequately since they will open up significant economic opportunities for regional economies specialized in strategic sectors such as renewable energy production. Otherwise, a significant economic and social cost of the transformation be borne in territories with carbon-intensive economies and facilities (Nordregio, 2021).

Despite the fact that emissions in the industrial sector dropped by 19% after 1990, in 2018, industry released almost 17 million tons of greenhouse gas emissions (32 percent of total emissions of Sweden), is result of industrial greenhouse. The greatest amount of emissions came from iron, steel, and the mineral industries, and from refineries, with 34%, 19%, and 18% respectively (Ministry of the Environment, 2020).

Just Green Transition plans have been investigated in four sectors and regions of Sweden including the mineral non-metallic industry in “Gotland”, petrochemical industry in “Västra Götaland”, and steel and metal industry in “Norrbotten” and “Västerbotten”, however, mainly three of them are included in the Just Transition Fund.

In 2017, the Riksdag (Parliament of Sweden) adopted a climate policy framework which is a key component in Sweden to live up the Paris agreement and is the foundation of the program. This framework consists of a national climate goal which is no net emissions of greenhouse gases into the atmosphere by 2045, a climate law and a climate policy council. Also, partnership agreement provides a

framework. The Territorial Transition Plans describe the transition at the national level to a climate-neutral economy.

In 2019, the European council approved the goal of achieving a climate-neutral Union by 2050 in line with the goals of Paris Agreement. The purpose of JTF is to enable regions and people to deal with the social, economic, and environmental outcomes of the transition towards a climate neutral economy.

The EU Commission has provided a reason for directing funds from the FRO program to Upper Norrland, which consists of the counties of Norrbotten, Västerbotten, and the steel industry, in the 2020 country report for Sweden. The Swedish government agrees with the commission's assessments to allocate the FRO funds to Norrbotten and Västerbotten for the steel and metal industries and to Gotland for the mineral industry based on four factors: emissions from facilities included in the ETS, greenhouse gas emissions per BRP by county, greenhouse gas emissions per employed person per county, and islands with special challenges as specified in Article 6 of the FRO regulation.

Between 2017 and 2019, total carbon emissions in Sweden decreased by 26% while GDP per capita increased by 54%. In the government’s climate policy action plan 2019 highlighted that the residual emissions in industry are difficult to reduce as it means that production processes need to be replaces with new technologies which requires investments in innovations that can take many years to implement. So, the future of the industry depends on its ability to develop new processes and production methods and to adapt and innovate by investing in new technology. Many of the technical solutions such as job security.

The central aim of the territorial program is the industry transition while preserving competitiveness and economic and employment levels. Additionally, the program is aimed at meeting Sweden's national climate and energy goals by hastening the move to a state of carbon neutrality.

4.2. The governance of Just and Green Transition in Sweden

The governance of Just and Green Transition in Sweden refers to the system of policies, regulations, and institutions responsible for guiding the country towards a sustainable and equitable future. This includes measures to reduce greenhouse gas emissions, support clean energy, protect the environment, and ensure that the benefits of the transition are shared fairly among all citizens. The governance of a Just and Green Transition in Sweden involves multiple levels of government, as well as civil society organizations and the private sector. The goal is to create a sustainable and inclusive society that benefits both present and future generations.

Sweden is one of the countries that has the potential to showcase the feasibility of a society without fossil fuels. The country operates a decentralized governance system, where regional and local public entities play a vital role in delivering services and implementing policies to citizens.

According to the Swedish Environmental Protection Agency (2022), Greenhouse gas emissions in Sweden have decreased by about 33% since 1990. However, in 2021, there was a 3.4% rise in GHG emissions, amounting to 47.9 million tons of carbon dioxide (Figure 4.1).

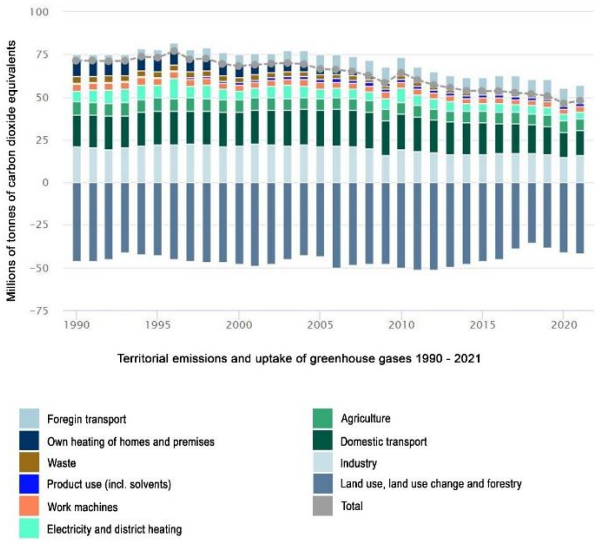


Figure 4.1 – Greenhouse gas emissions in Sweden[8]

[8] Naturvårdsverket website: www.naturvardsverket.se

The regional and local public bodies in the decentralized system of governance in Sweden play a crucial role in delivery and implement the public policies and service because of their close relationship with citizens. For instance, Moodie et al., (2021) in a paper analyzed the governance of Sweden in TJTPs and highlighted that the County Administrative Boards (CAB), a national government authority operating in 21 counties, are among the institutional stakeholders at the regional and local levels in the three counties. The CAB is given the responsibility to coordinate the climate transition work at these levels and ensure that decisions made by parliament and the government are carried out in the counties. Also, they have a shared task to coordinate the regional climate and energy strategies.

Regions, municipalities, and local authorities also have been evaluated by Moodie et al., as significant bodies in the climate transition; Regions and municipalities in regional development project, involvement of stakeholder, education, local climate and environmental action plan, etc., local authorities with important role in facilitating the coordination among stakeholders and improve the condition for collaboration between stakeholders (e.g., industries, NGOs, etc.).

A collaborative effort between public authorities, regional and local businesses, professional organizations, and key players in various industries is necessary to ensure a successful transition to a low-carbon economy while preserving the competitiveness and economic vitality of regions (Bonde et al., 2020).

According to Moodie et al., (2021), In the three regions in Sweden undergoing a just transition, there have been significant developments in cooperation and social capital through participation in various EU and national innovation initiatives. For instance, the Hybrit Initiative, Reemap Project, and Sustainable Underground Mining Project in Norrbotten have brought together major industries such as SSAB, LKAB, and Vattenfall to create carbon-free production methods and circular economy programs. In Gotland, Cementa AB is involved in various partnerships and R&D projects to support the shift towards fossil-free industrial processes. The Fossil-Free Sweden initiative has created a roadmap towards a climate-neutral cement industry in Sweden.

According to governance analysis in JTF program by Moodie et al., in 2021, in the three Swedish regions involved in the transition to a green and just society, there is close collaboration between public authorities and higher education institutes. Universities such as Gothenburg University, Chalmers University of Technology, Luleå University of Technology, and Uppsala University Campus Gotland carry out research and contribute to the development of regional energy and climate strategies. All levels of education, as well as companies and municipalities, play a crucial role in aligning the availability of a skilled workforce with employers' demands. In Gotland, public authorities work with educational institutions to ensure that education programs meet local industry needs. Norrbotten's Regional Competence Council works on skills development and governance in the region and involves various organizations, including municipalities, the Swedish public employment service, and Luleå University of Technology. The latter offers training programs for the steel industry value chain and conducts research in mining and process technology. The Mining and Steel Industry Research Institute, Swerim, serves as a bridge between academia and industry by providing process engineering and equipment in Luleå.

In summary, there was collaboration between various stakeholders, including public authorities, companies, and industries, to ensure a successful and valuable climate transition in Sweden.

4.3. The Territorial Just Transition Plans (TJTPs) of Sweden

The drafts of the Territorial Just Transition Plans (TJTPs) have been established in collaboration between national government representatives, national agencies, regional and municipal authorities, and key sectoral actors. The European commission and Swedish government identified four counties eligible to Just Transition Fund based to their dependence on carbon intensive industries (Moodie et al., 2021).

In the “territorial model plans for a justice transfer”, several primary features have been outlined which refer to the expected transition process to a climate-neutral economy and aid to identify the potential territories. The first feature refers to the

climate policy framework adopted by the Parliament of Sweden in 2017 which includes a broad majority of national climate goals, a climate law, and a climate policy council. Moreover, the framework is a key component in the efforts of Sweden to live up to the Paris Agreement. The climate policy framework aims to create order and stability in climate policy and establishes long-term conditions for business and society.

The national climate goals of Sweden consist of four primary parts. “An overall and untimed environmental quality target that is connected to a limitation on the rise in the global average temperature” is the first major segment that provides a clear structure for environmental concern in Sweden. Limited climate impact is one of the sixteen environmental quality goals adopted by the Riksdag which constitutes the basis for climate change mitigation strategies. Sweden will experience no net greenhouse gas emissions to achieve zero emissions which means that greenhouse gas emissions from the territory of Sweden must be at least 85 percent lower in 2045 than emissions in 1990. Therefore, the second part comes to a “long-term emissions goals for Sweden by 2045” and to achieve the target, in cases where there are no rational alternatives, the capture and storage of carbon dioxide of fossil origin and supplementary measures may be counted as a measure.

The third part pertains to “stage targets for Swedish emissions outside the EU’s emissions trading by 2020, 2030, 2040”. In this light, the ESR sector of Sweden will have greenhouse gas emissions by 2020 that are 40 percent lower than in 1990, which implies emissions should not exceed 28.6 million tons of carbon dioxide. While GHG emissions should be at least 63 percent lower by 2030 than in 1990, they must also be at least 70 percent lower by 2030 than in 2020 from domestic transport excluding domestic flights. Moreover, the GHG emissions should be at least 75 percent lower than emissions in 1990 by 2040; this means supplementary measures may reduce emissions by no more than 2 percentage points. to back this target, the last section refers to providing “a particular milestone for GHG emissions from domestic transport excluding domestic aviation which is included in the EU ETS by 2030”. The national energy and climate plan of Sweden is a compilation of scenarios based on the country's energy and climate policy, including a timeline of important milestones for energy and climate policy.

In accordance with Regulation (EU) 2018/842, the second attribute offers binding national targets for GHG emissions as well as the annual binding national limit values. Finally, the third characteristic is the transition of industry which is approximately a third of total greenhouse gas emissions in Sweden and most emissions are raw materials and process-related which means technological leaps are required. Several measures that have an impact on industry change including energy and carbon dioxide tax, the Planning and Building Act, Fossil-free Sweden which embarked by the government in 2015 intending to become the first fossil-free welfare state also establishes proposals for national strategies such as Bio strategy, regional energy, and Climate plans, etc. Therefore, to meet a climate-neutral economy by 2045 demands a social transformation, technological development, and leaps.

The territorial effects of Sweden’s transformation are the other concern on which the territorial model plan concentrates. The EU Commission's assessment to direct the Fund for a fair conversion to Upper Norrland and the steel industry's conversion specifically for Norrbotten County is confirmed by Sweden's territorial conversion plan, which is based on the Commission's assessment and the following criteria. Västerbotten County, Gotland County, and Västra Götaland are also included as recipients for initiatives in all pillars of the mechanism for a fair transition considering the fund's final budget. According to Sweden's plans territorial conversion, the regions most impacted by the transition to a climate-neutral economy are Norrbotten, Västerbotten, Gotland County, and Västra Götaland County. In 2018, 36% of all industrial greenhouse gas emissions in Sweden were produced by the iron and steel industry. The cement industry is a significant source of emissions in Gotland County. About 20% of the emissions from the Swedish industry in 2018 were related to the mineral industry.

Statistics Sweden (SCB) publishes regional air emissions and emissions are evaluated by using statistics on the labor market, population, and economy in connection to the number of inhabitants in a region and the economic contribution that businesses make. To back this assessment, in 2017, the three counties with the highest emission intensity were Gotland with the highest proportion of 116 tons of carbon dioxide per million SEK, Norrbotten with the proportion of 42 tons of

carbon dioxide per million SEK, and Södermanland with the lowest proportion of 24 tons of carbon dioxide per million SEK. In 2018, the national average for emission intensity was fourteen tons of carbon dioxide equivalents per million SEK, whereas the figures for the counties of Västerbotten and Västra Götaland were 13 and 14.4 tons, respectively.

Furthermore, regional GHG emissions to air per employee were reported by Sweden's statistics, the three counties with the highest levels including Gotland contributing an average of 89.9 tons of carbon dioxide per person employed in all industries, and with Norrbotten and Västra Götaland contributing 42.3 and 13.6, respectively. According to the statistics, emissions are in relation to the number of employed people in the region. The ratio for Västerbotten County in 2018 was eleven tons of carbon dioxide equivalents per employee, which was in line with the national average. Moreover, in terms of carbon dioxide intensity and productivity, Norrbotten is the most carbon dioxide-intensive county in Sweden after Gotland.

The communication strategy for the Just Transition Fund is updated annually through a communication plan that outlines the planned activities and follow-up indicators. The communication plan is decided by the Monitoring Committee and is designed to support the fund's aim of helping regions and people manage the social, employment, economic, and environmental impacts of climate change. The communication approach is based on the goal of the fund and focuses on communicating the benefits and outcomes of the transition to a low-carbon, climate-neutral economy.

The Just Transition Fund in Sweden aligns with the EU's energy and climate goals and the Paris Agreement's target of a climate-neutral economy by 2050. The annual communication plan is decided by the Monitoring Committee and is designed to reach various target groups, including existing and potential project owners, the public, politicians, industry and trade associations, universities, labor market partners, and regional and administrative authorities. The communication strategy aims to bring the EU closer to the people and highlight the strategic importance and outcomes of the projects.

4.3.1. Plan 1 – Model for territorial plans for a just transformation: Norrbotten County

Norrbotten is the biggest and northernmost county in Sweden. It covers almost a quarter of Sweden's total land area and has a population of only 2.5% of the country's population. Located in the Arctic, the temperature in the region rises faster than anywhere else in the world. The economy of the county is largely based on natural resources such as forests, minerals, and hydropower, with raw material-based industries playing a dominant role. The industry is formed of many small plants like sawmills and the engineering sector, as well as a small number of very large plants, mostly in the mining, steel, paper, and pulp industries.

In the county, the industrial sector accounts for about 80% of the GHG emissions. Due to efficiency improvements and the transition to renewable fuels, industrial emissions are declining, although they are still considerably high. The transition to climate neutrality is essential for all facilities. Due to a small number of facilities having a significant impact on employment and the economy, the county is extremely vulnerable.

The county administrative board on behalf of government was in charge of organizing and coordinating the work of government to produce the climate and energy strategy in Norrbotten which applies to the years 2020-2024 and it is against the background of the national long-term energy and climate policy goals.

Around 13% of the electricity of the county is generated by hydropower in the county, of Norrbotten while ranks third in terms of the density of wind turbines per county. key obstacles of Norrbotten to achieve its objective of 100% renewable electricity production in 2040 is access to renewable fuels, renewable energy, and secure electricity supply through expansion of the electricity networks. The current surplus of electricity production appears to decline significantly.

Climate change has played a role in facilitating transitions in several industries in Norrbotten, particularly the iron and steel, as well as other metal industries. The Sami people, who are the only officially recognized indigenous group in Europe and a cultural and ethnic minority residing primarily in the Sami region - Sápmi - are also impacted. This grants them the significant right to preserve their culture,

language, and industries. Additionally, the demand for new industrial facilities and energy investments may emerge from climate change. However, it's crucial to consider the need for land for reindeer herding and the potential for conflicting goals on migration paths.

The Sector in transformation: Iron, Steel, and other metal industry

Sweden is the largest producer of iron ore in the EU and the production of base and precious metals. Most of the mines are located in Norrbotten, Västerbotten, and Bergslagen (e.g., In Norrbotten, LKAB extracts iron ore from three mines and refines it into ore pellets in adjacent pellet mills).

A significant amount of industrial minerals is produced, some of which are directly related to the production of metal, in addition to metal mining. The 90 percent of the iron ore mined in Europe is supplied in Norrbotten. The foundation of the value chain of steel industry is heavily dependent on this production and minimized the requirement for transportation by refining the iron ore into steel nearby to the source. Due to the proximity of iron ore, significant amounts of water, and wind power, this geographic advantage is even more significant for fossil-free production into steel.

In Norrbotten, the steel industry specializes in high-performance steel and creates products that, when compared internationally, result in lower material consumption, longer life, less wear, and better energy efficiency, which leads to lower emissions. The durability of steel products and high demand of steel globally means the limited supply of recycled steel and it reflects the use of steel thirty to forty years lag. The steel industry is dependent on iron ore being mined and available for production to meet the needs of today.

Steel can be recycled quite easily, there is a market for scrap, and the industry uses almost all of the scrap that is available. The iron and steel sector created a climate roadmap in 2018 that demonstrates how the challenges can be addressed by technological advancement, financial investment, and work in the value chain. The mining and mineral sector also created a corresponding roadmap in 2019.

A sustainable society will continue to demand and produce high quality metals and minerals. In Norrbotten, there are four mines for the extraction of iron ore and one for the mining of other metals.

Social consequences of the transition

- **Job opportunities**

Access to skilled competence is a prerequisite for the county to develop business life of the county and climate transition of industries. Prior to the Covid-19 pandemic, it was estimated that Norrbotten will need to fill 51000 positions between the 2013 and 2030. The demographic trend, however, indicates a different tendency.

The labor market of the county is strongly gender segregated. The traditional commercial professions are dominated by men, whereas the service industry is dominated by women. The education level of women is higher than that of men. In Norrbotten County, women have a post-secondary education at a rate of 44.5% while men have a rate of 28.9 percent. The climate transition of the industries must be developed in parallel with large retirements and a negative demographic trend.

- **Demand for retraining and skills provision**

Along with a low population size and an aging population, the recruitment issues revolve around meeting the current and future skill requirements of companies. Additionally, it concerns the attractiveness of particular fields sectors and industries, the development of skills, further training, and validation.

Analysis of the region's recruitment requirements reveals a clear declining trend for process operators working in manufacturing and extraction, as well as an increase in the demand for specialized workers like engineers and technicians. The shift to climate neutrality for the value chain of the steel industry appears to entail technological changes along with ongoing digitalization, electrification, and automation. Currently, a significant portion of the population in the area has training in manufacturing, extraction, and technology. However, fewer people have education in the natural sciences, mathematics, or information technology, which are seen to be crucial for managing the transition of industry.

The accessibility of skills may encourage more women to pursue careers in sectors facing a transition to carbon neutrality. Higher education is typically more likely to be chosen by women, which would benefit the interchange of skills in the industry.

The long-term competence provision encourage young people to choose studies with specializations that are in demand and to work for greater immigration. For example, the Luleå University of Technology offers range of education regarding the value chain of steel industry and research in mining and technology. The short-term is the need for training is great for employees in industry and in other parts of value chain. The high average age in the steel sector and the negative population trend shows that a major obstacle to the transformation of the steel industry is a shortage of qualified labor.

Economic consequences of the transition

A framework for prioritizing innovation in support of economic transformation, including the need for investment to diversify and develop a more resilience regional economy, is provided by Norrbotten's smart specialization strategy. The ability of the steel industry and its value chain to transition to carbon neutrality while keeping competitiveness is essential for GDP, the regional economy, and the companies involved in steel production. The investments in the steel sector are enormous. For instance, the facility for the HYBRIT initiative is expected to require an investment of SEK 15-20 billion, excluding the expense of the electrical infrastructure. According to Luossavaara-Kiirunavaara Aktiebolag (LKAB), there will be a need for 10–20 billion in investments annually for the next 15–20 years due to climate change.

Environmental consequences of the transition

According to the estimates, the transition of the industry to carbon dioxide neutrality might reduce the emissions of carbon dioxide in Sweden by roughly 10 percent. The emissions in Norrbotten correspond to just over half of this reduction. The transition also means that other air emissions are reduced. An investigation is needed into the environmental effects of the steel industry's transition to hydrogen reduction. In the consultation materials for the demonstration plant for the direct

reduction of iron ore with hydrogen gas, the environmental impact on climate, emissions to air, water, noise, and reindeer herding are explained.

The Norrbotten electricity grid must be expanded to produce more electricity. The power demand is predicted to rise by about 15 TWh/year if all blast furnace-based steel production in Sweden were to convert to hydrogen gas reduction.

Development needs and goals until 2030

The Steel Industry has set a climate roadmap with the aim of becoming a fossil-free and competitive industry by 2045. The industry commits to ongoing research and reducing emissions, and to adopting new low-emission technology when it becomes economically viable. The roadmap highlights expectations from the political sphere, including efficient transportation and infrastructure, stable electricity supply, strong supply of skills, research support, favorable conditions such as harmonized taxes and fees, and streamlined permitting processes.

Ongoing measures to reduce the emission of the steel industry

a) Reduce iron ore with renewable hydrogen

The current process of reducing iron ore is done in blast furnaces and causes up to 85% of the industry's carbon dioxide emissions. To eliminate emissions, the focus is on replacing the blast furnace process with a direct reduction process that uses renewable hydrogen instead of coal and coke, where iron ore is reduced to iron sponge with hydrogen as a reducing agent and the byproduct is water instead of carbon dioxide. The iron sponge is then melted in an electric arc furnace to produce steel.

In 2016, SSAB, LKAB and Vattenfall launched the HYBRIT initiative with the goal of producing the world's first fossil-free steel and have commissioned a pilot plant in Norrbotten in 2020. A fossil-free process requires massive production of renewable hydrogen. The initiative involves the development of large-scale technology for the production and storage of renewable hydrogen. In 2020, LKAB launched a transition strategy that takes advantage of the technology being developed in HYBRIT to change its processes and products to reach net zero emissions by 2045. With hydrogen-based technology, LKAB will move from producing iron ore pellets to producing carbon dioxide-free iron sponge. In 2020,

the company H2 Green Steel was launched, which will establish a new production facility in Norrbotten to produce carbon-dioxide-free steel using hydrogen technology.

b) Exchange coal with biochar

The Höganäs process for producing iron powder cannot replace coal with another reducing agent without affecting its properties. However, it is possible to use bio-based carbon instead of fossil carbon. Access to sustainable biomass is crucial, and further research and development is needed to address emissions and improve the use of pre-treated biomass in metallurgical processes.

c) Replace natural gas and gas oil with biogas, biogasol, or green hydrogen

Steel is heated primarily in fuel-fired furnaces using gas oil and natural gas before hot processing. These fossil fuels could be replaced by biogas, biogasol, biochar, or green hydrogen. However, some materials still require the use of fuel-fired furnaces, and the Höganäs process and smelting processes also require fossil fuels.

d) Electrify heat treatment

Heating can only be partially electrified because of the high temperatures, but it can be further electrify heat treatment by converting existing furnaces or installing new ones.

e) Increase energy efficiency

Most energy is used in main processes that are already highly efficient. there is potential to use more residual energy, especially heat in district heating systems.

f) Increased recycling and use of residual products

Recovered by-products reduce the need for new raw materials and contribute to reduced emissions. The recycling rate of used metals is about 80-90%. New manufacturing processes will generate new by-products that can serve other needs. For example, the ReeMAP project is underway, where LKAB wants to produce rare earth metals and phosphor products through the recycling and refining of by-products.

g) Digitalize and autonomize

The Sustainable Underground Mining project is driven by LKAB, ABB, Epiroc, Combitech and Sandvik to develop an autonomous, carbon dioxide-free and safe production system.

Diversification

Over 90 percent of businesses in Norrbotten have fewer than 10 employees. To sustain economic growth in the region, it is crucial to build on existing strengths in natural resources. By adopting a systems approach, the region can enhance innovation and development, improve product processing, encourage international expansion of companies, and foster entrepreneurship. This will differentiate the region's economy and create new opportunities. The success of these efforts can be supported by innovation systems that foster knowledge development and exchange, bring together key players, and have well-functioning institutions in place.

The ERUF Upper Norrland initiative is working towards promoting diversity in the business sector. Since FRO should operate where it can have the biggest impact in a short time, and it is important that the two funds do not compete with each other, FRO does not include initiatives for financial diversification. However, FRO favors economic diversification through competence-enhancing efforts for SMEs in the steel industry's value chain and through research efforts that benefit the industry in a broad way.

Research and development

The Energy Agency is in charge of overseeing the energy transition in Sweden and helps with research, innovation, business growth, and the promotion of new solutions globally.

The government's investment in strategic innovation initiatives seeks to establish the groundwork for global competitiveness and provide sustainable answers to global societal issues. The involved parties establish shared, long-term objectives and prioritize investment in research, advancement, and innovation.

The Metallic Materials strategic innovation program unites Sweden's metal industries. The industry organizations Jernkontoret, Svenskt Aluminum, and Svenska Gjuteriföreningen, along with representatives from Swedish processing firms, have jointly developed a strategic research and innovation plan.

The Swedish Mining Innovation strategic innovation program for mining and metal extraction supports centers and clusters for research, innovation, and education where sustainable methods for metal extraction are developed. A research and innovation plan has been established to enhance sustainability and efficiency in exploration, extraction, and processing. The program office is located at Luleå University of Technology in Luleå, which is the northern node of EIT RawMaterials, funded by the European Institute of Innovation and Technology.

Consistency with other relevant national, regional, or territorial strategies and plans

- **National energy and climate plan of Sweden**

The territorial adjustment plan for Norrbotten county aligns with Sweden's National Energy and Climate Plan. EU Member States must notify the EU Commission of their National Energy and Climate Plan, as outlined in Regulation (EU) 2018/1999 on the governance of the Energy Union and climate measures. Sweden's National Energy and Climate Plan was established in January 2020, and it builds upon existing energy and climate goals, policies, and measures, as well as scenarios based on these.

The National Energy and Climate Plan aims to have research and innovation in energy contribute to achieving set energy and climate goals, long-term energy and climate policy, and environmental policy goals related to energy.

The aim of research and innovation in the energy field in Sweden is to build technical and scientific knowledge to transition to a sustainable energy system that balances ecological sustainability, competitiveness, and security of supply. The focus is also on developing technology and services that can be commercialized in Swedish business and promote sustainable growth, as well as contribute to the transition and development of the energy system in Sweden and other markets through international cooperation.

- **Strategies for smart specialization**

The Smart Specialization Strategy in Norrbotten serves as the starting point for the territorial transformation plan and the challenges and opportunities outlined in the strategy align with the transformation plan. The strategy focuses on strengths of county in natural resources (e.g., mineral and forest resources, unique energy infrastructure). FRO's efforts align with the strategy's priorities in providing skills and research, and addressing sustainability and the circular economy, with a focus on the Energy Technology area.

- **European pillar of social rights**

The transition plan aims to support the principles of the European Pillar of Social Rights, with a focus on equal opportunities and access to the labor market, education, gender equality, and lifelong learning. The plan was developed through dialogue with labor market partners and the objective is to improve the possibility of the steel industry becoming carbon neutral while keeping its competitiveness, thus having a positive impact on Norrbotten County and its residents.

- **Other regional or national development plans**

Norrbotten's climate and energy strategy aims to achieve net zero greenhouse gas emissions by 2045 in line with the national target, to increase energy efficiency by 50% compared to 2005 by 2030 and have 100% renewable electricity production by 2040. The strategy addresses the challenge faced by the steel industry.

The transition plan aligns with Norrbotten's climate and energy strategy. The strategy emphasizes that increased electrification, digitization, and development of a circular economy and transition to renewable fuels are crucial for achieving climate goals and maintaining the county's competitiveness in the future.

Type of planned interventions

FRO can provide support to:

1- **The HYBRIT initiative’s demonstration facility for direct reduction of iron ore with renewable hydrogen and associated processes.**

The HYBRIT initiative is a collaboration between SSAB, LKAB, Vattenfall and Hybrit Development AB to produce sponge iron using renewable hydrogen gas as a reducing agent, with water as the residual product. The planned start of operations is in 2026, with full production expected in 2028. The HYBRIT initiative involves the large-scale production of hydrogen from renewable electricity, with a hydrogen storage system to balance the electricity grid. The production will be exclusively powered by renewable electricity. The initiative involves investment in the plant, production, storage of renewable hydrogen, and research and development.

2- **Transition at SSAB Luleå to carbon dioxide neutrality**

SSAB Luleå's transition is based on the HYBRIT process. By 2030, coking plants and blast furnaces will be replaced by minimills, electric arc furnaces, and rolling mills for fossil-free steel production. The sponge iron from the demonstration plant will be melted in an electric arc furnace to produce steel. The process will require an increased electricity need of 4-5 TWh per year.

The input for the HYBRIT initiative involves investments in the construction of a minimill with electric arc furnaces and rolling mills, electrical switchgear to adapt incoming electricity for the new manufacturing process, production of bio-based coal at the plant, and research and development. The transition will require the use of biogenic coal and/or biogas. Currently, there is no large-scale production of biochar in Sweden that meets the requirements of the iron and steel industry and can replace the fossil coal used today.

Research and innovation

The efforts align with the Strategic Innovation Program for Metallic Materials with the goal of creating synergies:

- **Large-scale energy storage and development and implementation of fossil-free technology**

A fossil-free steel production process requires massive production of hydrogen using renewable electricity. The production, storage of renewable hydrogen, and from a larger societal system perspective require research, innovation, development of large-scale technology.

- **Other alternative energy carriers and raw materials**

The aim is to replace fossil fuels with electricity, biogas, biogasol, or renewable hydrogen. This involves researching, innovating, and developing bio-based fuels and raw materials for the steel industry.

- **Investments in innovation for the production of key raw materials and necessary materials for a transition to a fossil-free society**

The goal is to develop processes that promote circularity in the steel industry which can help create integrated material flow value chains.

- **Development of long-term collaboration platforms** for research, business, and the public sector.

Skill enhancement and retraining employees

The objective is to guarantee the availability of skilled workers needed to transition the steel industry in Norrbotten to carbon dioxide neutrality. The Kompetensforzørnning authority cooperation has a working group named Omställningen Norra Sverige that focuses on coordinating these efforts. This group works closely with Region Norrbotten, Region Västerbotten, labor market partners, and other relevant stakeholders.

- **Assessment of the competency needs of the steel industry**

The steel industry in Norrbotten requires a collaborative effort to assess the need for skill development during its transition to become climate neutral. FRO can support efforts to study the needs that arise for the steel industry and its value chain.

- **Support for networks and clusters to enhance competencies in the steel industry and its value chain**

Joint efforts are needed between training providers, companies, industry organizations, and industry-relevant actors in the value chain to ensure that the transition to climate neutrality in Norrbotten's steel industry is carried out with maintained or strengthened competitiveness and value for the region. FRO can

support clusters and networks to increase competence in the steel industry and its value chain.

- **Efforts for retraining and skill development of existing and new workforce**

The steel industry and its value chain are undergoing changes that will require new skills and qualifications and phase out others. Internal training and certifications need to be supplemented by a system based on research-based knowledge. The fund can support initiatives such as studying the possibilities of internal and external training and skill development programs within the required qualifications; identifying and conducting training to enhance skills in high-demand areas within the steel industry and its value chain; promoting lifelong learning and fostering cooperation between educational institutions and the industry to create new education programs and methods.

- **Validation efforts**

The fund can support validation efforts to help individuals enter the labor market more quickly and support companies in finding the right skills. This can be achieved by investigating possible paths to validation within the steel industry's value chain related to the transition to climate-neutral production and building a validation structure for the industry.

- **Efforts to strengthen the companies' strategic work on competence issues**

To ensure that companies in the value chain have the skills they need in the future, FRO can provide support in developing strategies and implementing action plans for skill development. For example, FRO can help increase the number of students staying in the region after graduation.

ETS plants

The first ETS plant that can receive support is SSAB EMEA AB; produces steel based on iron ore pellets, which mainly supplied from the Malmfälten area, which includes both Kiruna and Gällivare municipalities. The operations in Luleå include a coke plant, blast furnace, steel mill and continuous casting. The second

ETS plant is a mining group owned by the government of Sweden and is called LKAB Luossavaara-Kiirunavaara AB. The mines and processing plants that LKAB operates are located in the Ore fields. As a key player in the steel value chain, LKAB mines the ore that is provided to SSAB for production.

Companies

Two large companies can receive support to enable the conversion at SSAB Luleå are HYBRIT Development AB, which is a joint venture company owned by SSAB, LKAB and Vattenfall with the goal of developing fossil-free steel manufacturing technology and Vattenfall AB which is European energy company that owns transformers that need to be upgraded for the transition.

Synergies and complementarities with other Union programs

The measures in the Transition plans can be complemented by Pillars II and III of the Just Transition Mechanism. Infrastructure requirements for electricity supply, investments in energy efficiency and renewable energy, green hydrogen, electro fuels, and ammonia, in particular, may be presented for investment.

FRO has synergies with other programs (e.g., ERDF and ESF+) with the aim of employment and growth and thereby synergy effects are expected to be generated. Also FRO is for complementing ESF+ and ERDF with a focus on the climate transition of steel industry.

Investments with ESF+ and ERDS can support the activities with aim on skills provision and target groups. ESF+ also works on activities which aimed at strengthening the individual and their position in the labor market. ERUF focuses on activities regarding the competence development in the region for small and medium-sized companies as well as in the areas of smart specialization and entrepreneurship.

Steering mechanisms

- **Partnership**

The development of the program proceeded with actors in existing cooperation structures and close collaboration in Region Norrbotten and dialogue with parties in public, and private sectors, academics, and other relevant organizations.

All positions in the process have been developed by a group of authorities that consists of the Agency for Growth, the Employment Agency, the Energy Agency, and the Environmental Protection Agency. They have also assisted with expertise and documents. The county board of Norrbotten has participated in the meeting at the regional level and provided opinions.

The most important starting point in the program was climate roadmaps in the framework of Fossil-Free Sweden. Broad anchoring processes have been conducted using these as a basis in an attempt to develop partnerships for both the program's development and implementation.

From November 26 through December 16, 2020, a written consultation on the Norrbotten County transition plan, the program, and the environmental impact assessment were conducted to gather opinions from interested parties.

- **Monitoring and evaluation**

In general, the government is in charge of achieving the long-term objective of net zero emissions by 2045. In accordance with the Climate Act, the government is required to present an annual climate report to the Riksdag that details the emission trend, the most significant climate policy decisions that have been made, and the potential impact of those decisions on future greenhouse gas emissions. Every four years, the government is required to submit to the Riksdag a climate policy action plan that demonstrates how the government's overall policy advances the objectives of the framework. The action plan must specify what further steps the government intends to take if it determines that the objectives cannot be met with the current policy measures.

The Climate Policy Council is an authority in the form of an organizationally independent interdisciplinary expert body whose task is to independently evaluate how the government’s overall policy is compatible with the climate goals that the Riksdag and the government have decided.

The Norwegian Energy Agency works in various sectors of society to create the conditions for efficient and sustainable energy use and a cost- effective Swedish energy supply. The authority's mission includes Industriklivet, a government

investment that supports the development of technology and processes to reduce process-related greenhouse gas emissions in Swedish industry.

The Swedish Environmental Protection Agency has a central role in environmental work and must be driving, supportive and unifying in the implementation of environmental policy. The Swedish Environmental Protection Agency must work to ensure that the generational goal for environmental work and the environmental quality goals set by the Riksdag are reached and, if necessary, must propose measures for the development of environmental work. Within its area of responsibility, the Swedish Environmental Protection Agency must also coordinate follow- up and evaluation of the environmental quality target for limited climate impact. The Swedish Environmental Protection Agency annually produces statistics on territorial emissions and uptake of greenhouse gases.

The employment service is responsible for public employment and labor market policy activities.

SGU has responsibility for the country's geological condition and knowledge of raw materials necessary for a green adjustment.

Svenska kraftnät is the authority tasked with building a reliable and economically viable transmission network.

County boards – Sweden is divided into 21 counties, all of which have a county board headed by a county governor.

The County Administrative Board is a state authority with the task of promoting cooperation and coordinating the efforts of state authorities at regional level, a service authority, and an appeal body, and has supervisory responsibility. The County Administrative Board must work to ensure that national goals have an impact in the county, while at the same time regional conditions and conditions must be taken into account.

Region Norrbotten has regional development responsibility.

Municipalities are important in Sweden's climate work. With their proximity to the citizens, their roles in physical planning and as major employers, they are significant climate actors. The municipalities drive local development in

collaboration with companies, organisations, residents and other actors and thereby contribute to reaching set national and local goals.

- **Coordinating and monitoring bodies**

Concerned authorities and actors have different roles and responsibilities for commitments in this transition plan, within the framework of their respective mandates. Tillväxtverket is the managing authority for the national program established for FRO. The authority is thus responsible for monitoring the results of the funding and reporting to the European Commission for the program. Consultation with at least the Swedish Environmental Protection Agency and the Swedish Energy Agency will be carried out prior to decisions on support from FRO.

Region Norrbotten and the County Board of Norrbotten County have important roles regarding the realization of the transformation plan, especially in terms of the plan's integration with the regional development strategy, connection to measures to reduce differences between town and country, coordination of social sustainability issues and promotion of an inclusive labor market. Companies and operations within the relevant sectors are responsible for implementing the technical measures presented in the conversion plan.

In order to monitor the implementation of the operational program, a monitoring committee is established. Commission representatives shall participate in the monitoring committee's work as supervisors and advisers. The government will return in a separate order regarding the composition of the monitoring committee.

4.3.2. Plan 2 – Model for territorial plans for a just transformation: Gotland County

The transition towards a climate-neutral economy on Gotland Island in Sweden has various impacts that need to be considered, including economic, social, and territorial effects. Being the least populated county in Sweden, Gotland County encompasses the main island of Gotland and smaller islands in the Baltic Sea. To meet Gotland's target of reaching zero net emissions of greenhouse gases by 2040, several steps must be taken, such as transitioning to a renewable energy system, implementing measures to lower emissions from various industries,

construction, transportation, and other sectors, and altering consumption and production practices on the island.

The labor market in Gotland features a diverse and small-scale business sector, with a considerable portion of employment coming from the public sector. The industrial landscape comprises primarily of small companies, though there are also larger corporations like Cementa, Nordkalk, and SMA Mineral.

The cement and limestone industry plays a significant role in the rural areas and in the northern part of Gotland Island, which is particularly dependent on this sector. In the island's local rural communities, there are also other small and medium-sized enterprises and industries that are to some extent reliant on the cement and limestone sectors, such as those in the construction and transportation sector, and workshops for repair and maintenance. Although the cement industry creates only a limited number of jobs, its importance to Gotland's economy is greater than other counties. The non-metallic mineral products industry is the most disproportionately represented economic activity in terms of employment in Gotland's economy compared to the national average in Sweden. Other industries that have a higher concentration on Gotland than the national average include primary activities like agriculture and forestry, the tourism and hospitality sector, and the building and construction industry.

The sector in transformation: Cement industry and lime mining on Gotland

Investigations have shown that Gotland generates almost 5% of the greenhouse gas emissions at the national level despite having a negligible impact on Sweden's economy and employment (0.5 and 0.6 percent, respectively). Also prominent in Gotland are the cement industry (i.e., a subsidiary of HeidelbergCement Group which developed 2019 a roadmap for the Swedish cement industry to reduce GHG emissions) and lime mining which are particularly important for the rural communities and the northern part of the island (due to the dependency on the industrial sector), and in 2019, the facility at Slite was accountable for 93% of total emissions. Also, several small and medium-scale companies in the surrounding local countryside are highly dependent on the cement and limestone industry (e.g., construction and transportation industries). The direct jobs related to the cement industry are limited but the non-metallic mineral industry provides the most

economic activities for employment in the economy of the Gotland. The economy sector of Gotland emits 88.9 tons of greenhouse gases per employee on average. Despite the fact that the island's emission productivity has dramatically increased recently.

Social consequences of the transition

In Gotland, the transition toward a net-zero carbon economy has both pleasant and unpleasant social ramifications. There are currently no effective estimations to show the possibility of disappearing jobs due to climate change in Gotland. However, the social consequences may accompany the transition. In this light, the transition plans to improve energy efficiency, the use of biogas, and other relevant activities demand proper skills which have become difficult to ensure. Moreover, small companies may have trouble regarding hiring or training staff with the required skills to remain innovative and implement technical changes. In addition, gender segregation in the labor market on Gotland could play a vital role in energy and climate change. For example, approximately 80 percent of men work in the private sector and male-dominated sectors (e.g., cement and limestone industry), and about half of all women work in the public sector (e.g., health) and they are more educated than men. Therefore, men should be encouraged to use the opportunities to improve their skills and lifelong learning, and women should be more recruited in male-dominated sectors to reduce the gender gap in Gotland’s labor market.

The positive societal implications of climate change are also diverse. The benefits can include improvements in the local population's health carried on by environmental impact. Therefore, if Gotland successfully reduces climate change emissions and maintains its position as a pioneer in the energy transition, it will also aid the local identity and the sense of participation and ownership of the issue.

Economic consequences of the transition

The most huge direct source of GHG emissions on the island which causes concrete vulnerabilities is the cement industry which would have a significant impact on the economy of Gotland with the loss of direct occupations in the factory. However, simultaneously it has a crucial role in the economy through business

connections with subcontractors. Its operation may also have an impact on a large part of the jobs on the island besides a particular strategic value for the national economy. The primary issues are intra-regional balance and rural development in the regional strategies of Gotland.

The prominent industries in Gotland are mining and querying. Hence, there is a greater dependence on these industries in the northern part of the island due to the risk of uneven distribution of the economic consequences across the island.

Environmental consequences of the transition

The environmental impacts of the transition are highly connected to potential actions to reduce emissions from cement's plan in Slite. The plant generates 1.6 million tons of CO2 annually, which is around 10% of all industrial emissions in Sweden or 72% of emissions from the Swedish cement sector. Reduction of the external impacts of cement production and limestone mining as well as the rise in availability of renewable energy will increase the environmental benefits of the transition.

Throughout the Cement industry of Sweden, different measures are evaluated and expected to meet the reductions in CO2 by applying the percentage of the relative emission reduction to the total emissions from the Cements Slite plant. Also, Fuel substitution and energy efficiency could reduce emissions by 22 percent and 2 percent respectively. Emissions might be reduced by 18 percent using new cement products and carbonation separately. On the contrary, carbon dioxide capture and storage (CCS) is estimated to provide larger climate and environmental benefits by storing the remaining 45% of emissions. It is also the only vital option to manage the process of emissions that originate from the primary raw material.

Development needs and objectives untill 2030

In 2019, Cementa developed a roadmap for the Swedish cement industry for climate-neutral concrete construction until 2030. The elements of the plan aim to reduce emissions in the Swedish cement industry, which consists of Cementa's facilities in Slite and Skövde.

Overview of the trasnition plans of cement industry in Gotland and reduce emissions in the cement industry

The most important element to achieve a zero carbon economy is to provide development requirements and goals until 2030. In this light, Cementa plan in order to achieve carbon dioxide neutrality in the cement industry has been considered a couple of measures and compared with the Swedish cement industry's conversion plans (Table 4.1).

Table 4.1 – Comparision between Cementa's measures and Swedish industry's conversion plans for cement and CEMBUREAU roadmap for low carbon dioxide emissions[9]

Measure to achieve a reduction	Cementa's roadmap	Swedish industry's transition plans	CEMBUREAU roadmap	FRO-financeable
A – Energy efficienyc measures (electricity and heat)	✓	✓	✓	✓ *
B – Fuel substitution measures (waste fuels and bio-based fuels)	✓	✓	✓	✓
C – New cement qualities inculding reduced percentage of clinker compared to other components (clinker to cement ratio) and new cement types	✓	✓	✓	✓
D – Carbonation (recarbonation)	✓	✓	✓	✓ **
E – Separation and storage / use of carbon dioxide	✓	✓	✓	✓ **
F – Replace thermal processes with electrified ones	✓	✓		✓ **
G – Transport efficiency	✓	-	✓	X

* Energy efficiency is perceived to have an extremely limited impact and is therefore not considered in section 2.4.

** These measures are within the framework of the JTF, but the technology is not mature enough to be implemented during the JTF funding period. As such, JTF financing could only be considered to cover RD&I related to these measures.

Despite having a negligible impact on carbon dioxide emissions, the "thermal and electrical energy efficiency" of cement facilities is among the measures that have been taken into consideration. Waste and bio-based fuels with a degree of

[9] Model terrritorial plans for a justific transfer: TJTPs of Gotland

substitution are currently used to substitute the coal and Petroleum coke and the plan of Cementa in Slite is to substitute 90 percent of coal or petroleum coke consumption with a high biomass content by 2030. The other measure is the “development of types and grades of new cement” where clinker is substituted with other types of raw or secondary cementitious materials. The development of new cement types that are not lime-based (such as low carbon cement) and the reduction of the proportion of clinker in comparison to other components (clinker to cement ratio) by using alternative non-clinker raw resources (e.g., blast furnace slag from primary steel production, etc.) can be split into two different actions. Notwithstanding this, the most significant cement product in both cases will still be limestone-based cement. Also, through research, Cementa and HeidelbergCement have evaluated the chemical process for” carbonation” (recarbonation), CO 2 uptake in concrete and it accounts for 350 thousand tons of carbon dioxide annually in Sweden. Even when the most effective production procedures are implemented, process-related emissions cannot be avoided since approximately 60% of today's emissions are directly derived from the raw materials used in the process. Therefore, solutions for “carbon capture” must be developed, followed by geological “storage” and complementary technologies. By 2030, Cementa seeks to develop a carbon capture plant. Cement is investigating “the possibility of substitution of the thermal process with the electrified process” in the “CemZero” project, although employing electricity in the primary production process will take several years of research, development, and innovation. The last measure refers to the “efficiency of transportation”; emissions of transportation are already reduced. Due to the location of the factory, maritime transport is employed for the vast majority of both incoming and outgoing resources, fuels, and products, however, is not guaranteed by JTF.

Economic diversification

Three priority areas with potential for economic diversification and smart specialization have been identified by the regional development strategy for the region of Gotland by 2040 including the three main areas hospitality industry, food, as well as the energy transition of business. The island has excellent resources for producing biofuels as well as renewable electricity from sources such as solar and

wind. According to the “Carbon-Neutral Iceland” project, the regional economy can benefit greatly from local energy production. The value of energy production on the island may be maintained by increasing the local production of power, heat, and fuel from renewable sources, which will also help to provide jobs and a more reliable energy supply.

Research and development requirements

Research, development, and innovation, together with other forms of technical support, are necessary to satisfy the demands and the targets set for the year 2030. Industrial research and research on Gotland's energy system are two sectors of development that are required. The primary research areas needed are as follows: ”Carbon and capture and storage (CCS)” is currently a primary focus at HeidelbergCement which seeks to illustrate technical and economic feasibility and environmental performance. ”develop the use of new materials as raw materials in cement and concrete production” contains in addition to using ashes and clay minerals, recycling concrete offers an opportunity to increase cement production. Alternative waste-based fuels are a highly developed technology that can be used ”to support further conversion to climate-neutral fuels”. This alternative is interesting but it has been confronted with challenges regarding accessibility to proper biofuels and other issues also usage of electricity is at the early stages of development. The last research area is devoted to the ”energy transition assessment”; Particular attention should be paid to the development of feasible grid connections to the Swedish mainland and local transmission and storage systems.

Consistency with other national, regional, and territorial strategies and plans

- **National energy and climate plan of Sweden**

In the case of Sweden, there is a consistency with other national, regional, and territorial strategies and plans. In terms of the national energy of Sweden and the climate plan in Sweden, it has several climate and energy goals, they go beyond the EU’s climate neutrality goals for 2050 and energy and climate goals for 2030.

An increase in the proportion of sustainable energy, and measures to develop the local robustness and resilience of the energy system are required to mitigate

climate change in Gotland, notably given the importance of the cement and limestone industry. The authorities concentrate specifically on the massive industrial facilities and new technological advancements to mitigate emissions since the industrial sector is the third largest source of emissions in Sweden. Therefore, the government desire to integrate climate change with welfare which is compatible with the general goal of the transition plan to make Sweden one of the first fossil-free welfare states on the globe.

Emphasis on Gotland as an energy pilot is crucial to reaching the energy targets of producing 100% renewable electricity by 2040 and achieving a 50% increase in energy efficiency from 2005 to 2030. There are several goal conflicts at the national, regional, and local levels that must be evaluated specifically to recognize the best long-term solutions.

Smart specialization

The regional development strategy for Gotland identifies three key areas for smart specialization: the hospitality industry, food and foodstuffs, and the energy transition of business. Collaboration in these areas can help address the potential impacts of the transition and support the goals of the transition plan. The priorities in these three areas are outlined in the Strategy for Smart Specialization in Gotland County 2021-2027 and focus on: 1) enhancing the development and experience of the hospitality industry, 2) improving product, process and brand development, and 3) accelerating the energy transition of businesses by being at the forefront of adapting technology and driving the development of climate-neutral cement in the mineral industry.

Regional and local development strategies

Regional strategies of Gotland aim at encouraging local actors (e.g., investors, authorities, etc.) to shift to more climate-friendly services and products, therefore, identifying climate change as an opportunity to develop sustainable production systems and consumption methods. The most critical goals which refer to climate and energy in the regional development strategy for 2020 include a climate-neutral Gotland, an energy system based on renewable energies, and a circular economy of materials, nutrients, and chemicals.

Types of planned interventions

FRO can offer assistance in regards to Carbon Capture and Storage/Utilization (CCS). In 2021, HeidelbergCement/Cementa stated their intentions to transform the Slite plant into the world's first carbon-neutral cement factory, with the aim of having a fully-operational carbon capture system by 2030. Additionally, the use of bio-based fuels in cement production is expected to rise and lead to negative emissions as biofuel releases CO2. The captured CO2 will be transported from Slite to a geological storage site via ship, and there are several storage sites being built in the North Sea that may be of interest. FRO can provide support for the planning and preparations of the CCS facility and the necessary investments in technology and infrastructure, including research and development, feasibility and impact analyses, site-specific investment preparations, and investments in electricity infrastructure.

The proposed measures must be considered within the framework of the Fund for a Fair Adjustment with particular regard to the cement industry (Table 4.2).

Table 4.2 – Planned measures with support from the Fund for a fair transition

Planned actions	Financial cost	Environmental impact	Social effects
1- Investments in the expansion of technology and infrastructure for a flexible and robust energy system on Gotland	Solutions for the island of Gotland (hybrid layer) EUR 15–45 million Electricity network upgrades on Gotland (-)	-	-
2- Substitution of fuels	3 - 21 million euro investment EUR 22.4 - 44.8 million for operating costs per year	Up to 432,000 tonnes of CO_{2e} per year (27% reduction)	/
3- New Cement Qualities	46.7–56 - million euros per year	Up to 400,000 tonnes of CO_{2e} per year (25% reduction)	Limited impact on the limestone industry
4- FoI in Industrial Transformation	-	/	Positive impact on the proportion of SMEs, universities and other organizations participating in the R & D cycle

The summary of this table is based on assumptions with some uncertainty, as described in the following sections.
* (-) indicates that the effects are unclear. (/) indicates no impact or anticipates less indirect impact.
(Source: Model terrritorial plans for a justific transfer: Gotland)

Many of the Cementa-planned actions for 2030 might be carried out after 2027. This is especially true for carbon capture, as deployment is influenced by a variety of factors (electricity network, connection to the mainland, technical development, and the availability of carbon dioxide storage).

- **Investmetns in the expansion of technology and infratsructure for a flexible and reboust energy system on Gotland**

The local energy system, currently, prevents the phase-out of fossil fuels on the island. Investments that are necessary to facilitate the connection of the electricity grid on Gotland internally on the island and to the mainland (should have a minimum capacity of 400 MW and it should be sufficient to satisfy current needs and estimated extra demand from cement). Due to the uncertainties about future wind and power expansion and increased consumption, quantifying a new connection is a challenge. The evaluated costs for these measures can be divided into Hybrid storage including energy storage, operations centers, etc., promoting the electricity grid with the substitution of 70 KW with 130KW on Gotland, and the new connection to the mainland (Lidstrom, et al, 2018).

The transformation of the electricity system leads to a medium and large scale of energy production and electrifies the cement industry which not only aids to phase out fossil fuels in the economy of Gotland but also increases the renewable energy supply and new jobs and stimulates the local economy on the island. The capacity to produce renewable energy on Gotland, however, is dependent on investment, overall assessment of legislation, and policy design as well as permit processes. The investment measure correlates Pillar II (InvestEU Fair Change Program) and Pillar II (EIB Public Sector Facility) of the Fair Change Mechanism, which supports the reduction of CO2 projects and developing and improving energy infrastructure, gas infrastructure, district heating projects.

- **Fuel subtitution**

The second planned measure which is fuel substitution might help Cementa AB's Slite facility by gradually replacing coal and petroleum coke with waste- and bio-based fuels. This measure correlate the second pillar (the InvestEU program for a fair transition) of the fair transition mechanism. Since the project won't need to

produce enough market revenue, the third pillar of the mechanism - the EIB public sector lending facility - is unlikely to be complementary.

- **New cement grades**

New cement grades as the third planned measure would aid Cementa AB's Slite plant to use it more efficiently (e.g., reduce the percentage of clinker compared to other components such as cement ratio). The concrete makers in the Swedish construction industry employ complementary cement materials for their manufacturing as well as for climate efficiency. In other markets, concrete production uses fewer supplementary cement materials than cement production. However, as clinker is anticipated to still play a significant role in Cementa's output (with a supposed 10% drop in use), the effect is assumed to be minor. The decreased concentration of limestone as a clinker could have a severe influence on the limestone sector and jobs in Gotland. This measure complements' is in the same way of the second planned measure.

Research and innovation in industrial transformation

Several research areas and innovations regarding the effect, technology, and socio-economic consequences are required for the Cement industry to speed up the technical process. To speed up the transition to biofuels and electrification, the first primary research area is "alternative fuels and electrification", which refers to the technical assessment of suggested fuels and electrified cement production processes. New cement grades and materials used in production, which examine new methods of cement construction, are the second major research area. The third main research area is CCS, which is concerned with impact and feasibility studies to help determine the prerequisites for using CCS technology in the cement industry. By attracting or enhancing research capacities in these areas, Cementa might improve its support for the local innovation system. Also, the complementation of this measure is same as the two previous planned measures.

The transition plan is therefore in line with the European pillar of social rights, which includes equitable access to the labor market with a focus on education and lifelong learning, gender equality, etc., as well as fair working conditions and employee involvement.

Investments in the expansion of a flexible and robust energy system on Gotland

Electricity has been supplied to Gotland's local electricity system via cables from the mainland since 1955. Local production accounts for approximately 50% of the island's annual electricity needs. The electricity grid on Gotland is far from being dimensioned for the greatly increased capacity needs that are predicted primarily for the conversion of the mineral industry, but also for increased electrification of transport, work machines and heating. In order to be able to connect more renewable electricity and cope with the greatly increased demand for electricity on Gotland, a renewal and capacity increase of the island's central electricity grid is required.

Svenska Kraftnät is investigating investments in electricity transmission between Gotland and the mainland. The increased demand for electricity on Gotland will require new solutions, such as Smarta Elnät, which will improve electricity quality and delivery capacity. There is also work being done to explore solutions for output flexibility and investments in production capacity and storage. The CoordiNet project, involving Vattenfall AB and Gotlands Elnät AB, has gained important insights.

Sweden's electricity is sourced from a main grid that is considered to be fossil-free and is primarily produced from hydropower, wind power, and nuclear power. The additional production to be built in Sweden until 2030 will consist solely of wind power and 25 TWh of wind projects are already in the pipeline. The environmental impact of this wind production is assessed by national authorities in each case according to the Environmental Code, taking into account impacts on forestry, cultural landscapes, and biological diversity.

Synergies and complenetaries with other Union programs

The measures in the transition plans can be complemented by pillars II and III of the Just Transition Mechanism. In particular, infrastructure needs related to electricity supply or investments in renewable energy and energy efficiency, green hydrogen, electrofuels and ammonia may be presented for investment. The transition plan is consistent with the European Pillar of Social Rights,

including Equal opportunities and access to the labor market. The fund is also supplemented by Industriklivet, which through its program supports measures to reduce Swedish industry's process-related emissions of greenhouse gases and to achieve negative emissions.

The transition plan for Cementa's transformation can be complemented by the Just Transition Mechanism, the European Pillar of Social Rights, and Industriklivet. Other funding sources such as Horizon Europe pillar 2, the EU Innovation Fund, LIFE, and NER 300 programs may also support the implementation of innovative ways to address climate challenges. FRO interacts well with ERDF and ESF+. ERDF can support initiatives with a focus on skills provision with different focuses and target groups. ESF+ works with efforts aimed at strengthening the individual and his position on the labor market.

Companies

A company called Cementa AB is eligible for support as it is part of the EU ETS. Cementa is a manufacturer and seller of cement and operates factories in Slite and Skövde. It is part of HeidelbergCement Sweden AB.

Steering mechanisms

- **Partnership**

The transition to a climate-neutral economy requires active participation from various stakeholders including authorities, the region, business, and other relevant actors. The creation of the conversion plan was done in collaboration with Region Gotland and through dialogue with various stakeholders. A group of authorities including the Agency for Growth, Employment Agency, Energy Agency, and Environmental Protection Agency worked together and provided expertise and documentation to help create the transition plan. This plan was developed with the help of the Commission's Instrument for Technical Support and based on the climate roadmaps within the framework of Fossil-Free Sweden. Partnerships were established with the goal of both developing and implementing the program. A written consultation on the transformation plan for Gotland County was conducted from 26 November to 16 December 2020 to gather views from relevant actors.

- **Monitoring and evaulation**

The government is accountable to meet the goal of net zero emissions by 2045. The Climate Act requires the government to present an annual climate report to the Riksdag, highlighting the trend in emissions and the significant climate policy decisions made by the government and their potential impact on greenhouse gas emissions. Every four years, the government must submit a climate policy action plan to the Riksdag that demonstrates how their overall policy contributes to meeting the framework's goals. If the government believes that the current policy measures are insufficient, the action plan must specify additional steps the government intends to take.

The Climate Policy Council is an authority in the form of an organizationally independent interdisciplinary expert body whose task is to independently evaluate how the government’s overall policy is compatible with the climate goals that the Riksdag and the government have decided.

The Norwegian Energy Agency works in various sectors of society to create the conditions for efficient and sustainable energy use and a cost- effective Swedish energy supply. The authority's mission includes Industriklivet, a government investment that supports the development of technology and processes to reduce process-related greenhouse gas emissions in Swedish industry.

The Swedish Environmental Protection Agency has a central role in environmental work and must be driving, supportive and unifying in the implementation of environmental policy. The Swedish Environmental Protection Agency must work to ensure that the generational goal for environmental work and the environmental quality goals set by the Riksdag are reached and, if necessary, must propose measures for the development of environmental work. Within its area of responsibility, the Swedish Environmental Protection Agency must also coordinate follow- up and evaluation of the environmental quality target for limited climate impact. The Swedish Environmental Protection Agency annually produces statistics on territorial emissions and uptake of greenhouse gases.

The employment service is responsible for public employment and labor market policy activities.

Svenska kraftnät is the authority tasked with building a reliable and economically viable transmission network.

The County Administrative Board is a state authority with the task of promoting cooperation and coordinating the efforts of state authorities at regional level, a service authority and an appeal body, and has supervisory responsibility. The County Administrative Board must work to ensure that national goals have an impact in the county, while at the same time regional conditions and conditions must be taken into account.

Region Gotland is responsible for areas within the municipal mission. Region Gotland also has regional development responsibility. The fact that Region Gotland has both the municipal and regional mission makes the region unique in Sweden.

Tillväxtverket is the managing authority for the program and is therefore responsible for monitoring the results of the financing. The Agency for Growth is also responsible for reporting on how the program is progressing.

- **Coordination and monitoring bodies**

Several actors play a crucial role in the implementation of the transition plan for Gotland. The concerned authorities and actors have different responsibilities and duties within the scope of their respective mandates. Tillväxtverket is in charge of managing the national program established for FRO and is responsible for monitoring the funding results and reporting to the commission. Consultations with the Swedish Environmental Protection Agency and the Energy Agency will be held before any decisions regarding support from FRO. Region Gotland and the County Board of Gotland play significant roles in the implementation of the transformation plan, particularly in terms of integration with the regional development strategy, reducing differences between the city and countryside, coordinating social sustainability issues, and promoting an inclusive labor market.

Companies and operations in the relevant sectors are responsible for implementing the technical measures outlined in the conversion plan. Other important players include business organizations such as Svenskt Näringsliv and Tillväxt Gotland, and local development groups such as Slite development. A monitoring committee is established to keep track of the implementation of the operational program.

Commission representatives will serve as supervisors and advisors for the monitoring committee's work. The government will provide further details regarding the composition of the monitoring committee in a separate order.

4.3.3. Plan 3 - Model for territorial plans for a just transformation: Västerbotten County

In addition to a developing service sector, the county has an industrial sector focused on mines, the processing of minerals, and raw materials from the forest. Energy-intensive data centers and a battery factory have been attracted by the availability of renewable electricity and cooling.

The county administrative board on behalf of government was in charge of organizing and coordinating the work of government to produce the climate and energy strategy “Tillsammans för klimatet” which means “Together for climate” in Västerbotten which applies from, and it is against the background of the national long-term energy and climate policy goals.

The main obstacles to the climate transition are the availability of skills, access to sustainable renewable fuels, and the distribution of reducing agents. In the county, approximately 20 percent of the total GHG emissions are related to the industry.

According to the Sami Parliament's investigation into climate adaptation, the conditions for Sami culture and nutrition are also significantly impacted by climate change. Due to their status as an indigenous people in Västerbotten, the Sami have a specific right to protect and advance their language, culture, and economic and industrial activities. The effects of climate change may necessitate the construction of new industrial facilities and energy investments. Goal conflicts can arise when ensuring that they take into account the reindeer husbandry's requirement for land and migration routes, which emphasizes the necessity for innovative solutions and efficient planning and consultation processes.

Sectors in transformation: the metal industry

Metals and minerals are crucial societal building blocks both inside and outside of Sweden. They represent the start of value chains in infrastructure, communication technology, and sustainable energy systems, all of which depend on the availability

of new raw materials. A comprehensive restructuring of the mining and mineral industries is required to achieve Sweden's climate objective of climate neutrality. Within the context of Fossil-free Sweden, the industry has created a Roadmap for a competitive and fossil-free mining and mineral industry.

The only base metal smelter in Sweden, Boliden Rönnskär (the largest private employer in the county), was ranked 10th among Swedish facilities with regard to CO2 emissions in 2020. The plant is a leader in the metal extraction from electronic materials globally. The smelter uses raw materials from its own mines and external suppliers to extract metals including copper, gold, silver, lead, and zinc from clinker. Boliden has made the decision to lower its CO2 intensity by 40 percent from 2012 to 2030, and it is crucial that the transition be accelerated and maintain competitiveness.

The implementation of test facilities in intricate processes necessitates significant investments. It is necessary to invest in the research and development of new reducing agents that can take the place of coal that is made of fossil fuels-based coal, as well as in new investments to replace the fossil fuel-based melting furnaces with furnaces that are driven by electricity and biogas. The development of carbon dioxide storage technologies is an additional factor.

Social consequences of the transition

- **Job opportunities**

The difficulties in the labor market in Västerbotten are primarily driven by a skills shortage, high levels of current and future retirements, and in some municipalities, negative net migration. Statistics Sweden predicts a 12,500-person increase in Västerbotten's population from now to 2030, while the Employment Agency notes a trend toward a declining percentage of persons who are working age. The prediction, however, does not consider the industrial investments made in the county by existing companies or predicted new businesses. The number of people in working age has dropped by almost 7,000 between 2010 and 2018.

Considering the changes in the economic sector, it is predicted that Västerbotten would require 60,000 new workers by 2025. By 2026, it is anticipated that 10,000–18,000 new workers will be needed for the construction of Northvolt's battery

factory and related outlying businesses. It will take labor to expand the workforce base overall to address this issue.

The labor market in the county can be characterized as being highly segregated by gender; men are more frequently found in the traditional commercial professions, while women work in the service sector. The women have more education than the men do.

- **Demand for retraining and skills provision**

The rapid development of the technology increases greater demand on the workforce. The use of new technologies by companies will be crucial, and automation will partially replace manual work while also generating new sorts of jobs. The demand for industry and society to reduce resource and wasteful material usage, as well as to improve waste and pollution management, will increase due to climate change, which will also result in changed professional positions.

In the metal sector, Region Västerbotten finds a persistently high need for qualified workers and critical capabilities, such as operators, technicians, and engineers. The industry is now having trouble to recruit new employees. Long recruitment processes necessitate compromising on qualification standards on the part of the employers, who frequently begin by retraining their new recruits.

It is necessary to make sure that the existing skills of workers and those outside the labor market are employed to fulfil the growing need for skills. To address the demands made by the climate and technological transformation, competence must also be updated. In addition to strengthening the field's research, measures that make the transition from research to education easier, including validation, are needed. There is also a wider variety of shorter and longer training interventions for current and potential industrial workers, interventions that improve the attractiveness of the industry, and interventions that broaden the supply of labor.

According to Svemin's skills supply plan, cooperation between industry, government, and the educational sector is needed to ensure the supply of skills for this industry. The public sector supports the need of industry for skills by, among other measures, improving regional skill supply systems, simplifying labor immigration regulations, and strengthening vocational training. To support the

growth of the industry, new training initiatives are needed. For example, Luleå University of Technology offers education in the value chain of the mining and mineral industry and research in traditional studies such as mining and process technology. The other example is the Umeå University which provides courses for technology, energy, and the environment and conducts research on these areas. Also, the University of Applied Sciences in Skellefteå Municipality supplies courses for the development of programs and shorter courses that strengthen development.

Economic consequences of the transition

Technology advancement and a rise in workforce competency are necessary for transition. It can also be necessary to create new value chains. For instance, pulp mills are linked to factories that produce the raw materials used by the mining and mineral industries. The mining and forestry sectors in Västerbotten have a strong ecosystem that puts it at the forefront of sustainability and efficiency.

Umeå University has made significant expenditures in artificial intelligence for both research and education. Västerbotten's mining firms are productive and far ahead in terms of digitalization and automation.

For the GDP, the local economy, and the businesses dependent on the production of metal, it is essential that the metal industry transition to carbon neutrality while preserving or improving competitiveness. Most enterprises in the county employ fewer than 10 people, and there are few small and medium-sized enterprises in the county.

Environmental consequences of the transition

Increased demand for biomass (a renewable asset) is a result of climate change. The forest in Västerbotten can be utilized for a variety operation and as a reducing agent in industry. With increased biomass extraction and subsequent increased climate effect, the collagen stock may decline. Additionally, because of climate change, there is a greater demand for energy storage, network development, and the production of renewable electricity, all of which are necessary for the process of climate change to occur. For example, Reindeer farming and the indigenous Sami people risk being crowded out in climate change, as they are already

affected by the consequences of climate change and the solutions planned to reduce the climate impact.

In theory, every scrap metal that enters the facility is recycled, which helps to a large extent to reduce the extraction of raw materials and to supply the necessary metals. In particular, copper is crucial for producing and conducting electricity, making it one of the most crucial metals for the transition to alternative energy sources such as solar, wind, and hydropower.

Development needs and goals until 2030

The "Roadmap for a Competitive and Fossil-Free Mining and Mineral Industry" outlines the opportunities and challenges facing the mining and mineral sector. The transition to fossil-free energy systems, climate-smart construction, and increased recycling all depend on the sustainable production of high-quality metals and minerals, especially those needed for batteries and infrastructure. Key to this is the prioritization of long-term political decisions, efficient permit processes, and access to renewable electricity, which will allow the industry to stay competitive globally. Ongoing measures that need further development include:

Ongoing measures that require continued development work

a) Reduce metal materials

Currently, the reduction of base metals produced in Västerbotten is done in furnaces, leading to up to 80% of the industry's carbon dioxide emissions. To mitigate these emissions, the focus is on replacing fossil-based carbon with alternative reducing agents, such as green hydrogen, ammonia, sulfur, or other substances that significantly lower the CO2 emissions. The complexity of Boliden Rönnskär's production and the material composition of the process demand a change that is closely tied to the production process itself.

b) Change coal to biochar

In production processes where fossil coal is used, replacing it with other types of reducing agents can be challenging as it can negatively affect the quality and properties of the metal products. One potential solution is to use refined bio-based carbon. However, further research and development is necessary to increase the

production of bio-based carbon and to understand how it can be effectively used in metallurgical processes. This also requires an increase in the production of biogenic coal that is sustainable in terms of biomass production and availability.

c) Reduce metal-related emissions; material development, CCS

Approximately 40% of CO2 emissions are related to materials, which means that this part of the emissions must be addressed. One opportunity is to collaborate with material companies to pre-treat the materials, such as separating plastics before metal fabrication. Additionally, there are possibilities to develop point-related collection of CO2 through Carbon Capture and Storage (CCS) technology. However, the technology, logistics, and business models for CCS are still in the early and uncertain stages and require further research and development.

d) Change oil to bio-oil

Currently, oil is utilized for various processes in the mining and mineral industry, such as starting up processes, melting, warming, drying, firing, and heating. These processes can potentially be replaced by bio-oil of similar quality, if it can be produced sustainably. Alternatively, it is possible to switch to other renewable energy sources such as green hydrogen and biogas through proper renovations.

e) Energy efficiency

Even if the key operations already use the majority of the energy, there is still room for improvement. It is also possible to make better use of leftover energy, particularly the heat from surrounding district heating systems.

f) Increased recycling and use of residual products

Recycled residual products reduce the need for new raw materials an contribute to reduced emissions. Currently, about 50% of Europe's base metals come from recycling, with great potential for increase in access to materials. New production processes will generate new residual products that can fill other needs. Boliden Rönnskär’s lacquer works and the associated unique process of extracting metals from former residual materials, which were previously not considered profitable.

g) Digitization, automation, and electrification

Digitization, automation, and electrification play a crucial role in optimizing material and process in the metal production industry. By utilizing these advancements, it is possible to optimize material flows and achieve the best process conditions, leading to lower energy consumption and reduced emissions.

Diversification

Most companies in Västerbotten have less than 10 employees. To ensure continued growth for the county's economy, it's important to continue developing the strengths related to its natural resources. More businesses are being created in environmental technology, wind power, biofuel and bioenergy, among other things, because demand is increasing in these sectors. Large investments are also being made to develop energy storage solutions and to electrify the transport sector. These efforts will create new technology that supports the transition to a more sustainable economy.

Research and development

To continue the progress of research initiatives, Västerbotten has a distinctive advantage that encompasses the entire industry's value chain, from raw materials to recycling, innovation-critical metals and minerals, and a close collaboration between industry, academia, and renewable energy. By participating in strategic innovation programs aimed at creating conditions for international competitiveness and sustainable solutions to societal challenges, the transition can be accelerated. To develop the metal industry, cooperation with complementary partners in the EU and globally is important, by participating in strategic platforms like the Battery Alliance and Raw Material Alliance, and through innovation programs like the Metallic materials and Swedish Mining Innovation programs.

By working with other industries and knowledge areas, research and development can be improved in Västerbotten county. This will lead to better internationalization of companies, increased entrepreneurship, and product processing. The investments planned at Boliden Rönnskär align with the national innovation program for metallic materials which aims to reduce CO2 emissions through research and development in new reduction technology, alternative fuels, and CO2 collection and storage.

Consistency with other relevant national, regional, or territorial strategies and plans

- **National energy and climate plan of Sweden**

The Västerbotten County territorial adjustment plan is in alignment with Sweden's national energy and climate strategy.

- **Strategies for smart specialization**

The 2014-2020 innovation strategy for Västerbotten is compatible with the territorial transformation plan and focuses on seven areas, including technology, sustainable energy, and digital service industries, which align well with the region's economy. The fair transition fund increases the chances for Västerbotten to transition, and the strategy will be updated in the future to include new smart specialization areas.

- **European pillar for social rights**

The transition plan is aligned with the European Pillar of Social Rights and focuses on equal opportunities and access to the labor market. It also supports principles of education and lifelong learning, gender equality, and equal opportunities. The plan was created through collaboration with the county's labor market partners. The proposed initiatives aim to increase the chances of the metal industry's conversion to carbon dioxide neutrality, maintain competitiveness, and benefit the conditions for Västerbotten County and its residents.

- **Other regional or national development plans**

The Västerbotten County Climate and Energy Strategy 2020 highlights that industries that rely on high temperatures cannot shift to full electrification, hence, alternative renewable energy sources will be necessary in the future. The strategy prioritizes energy efficiency, transition to renewables, self-generated energy through solar cells and heat pumps, resource and material reuse, waste reduction, and smart transportation. Collaborating with research for sustainable development can bring numerous benefits for businesses. The adopted strategy is currently being revised and is expected to be updated by 2021.

The transition plan aligns with the Norrbotten County's climate and energy strategy, which emphasizes that increasing electrification, digitization, and the development of a circular economy and transition to renewable fuels are crucial for achieving climate goals and ensuring the county's future competitiveness. The Västerbotten Forest Program strategy and action plan states that the forest and its value chain must play a role in implementing Agenda 2030 and global sustainable development. Swedish forestry needs to innovate and sustainably produce refined forest materials to meet the demands of a growing bioeconomy and provide sustainable, fossil-free products and services to the global market.

- **National level**

The Västerbotten County transition plan supports the National Strategy for Circular Economy by advocating for the use of innovation and new technologies. The focus is on prioritizing metals and minerals critical for innovation as the county shifts towards a circular and bio-based economy. Taking the lead in this transition has the potential to provide a competitive advantage to companies in Sweden. The Roadmap for a Fossil-Free and Competitive Mining and Mineral Industry highlights the importance of sustainable and high-quality minerals and metals to enable the transition to fossil-free energy systems, electric transportation, and climate-efficient construction.

The Strategy for Innovative and Sustainable Development of the Mineral Sector recognizes the growing global demand for copper and iron ore and the strong international demand for metals and minerals. This presents opportunities for Norrbotten and Västerbotten counties to become central mining regions within the EU. In 2013, these counties produced 90% of the EU's iron ore, 24% of its gold, and 10% of its copper. These counties also account for the majority of national mining production and are the EU's leading mining district, with 40% of the EU's mining production value of metals created in the region. Additionally, relevant strategies, such as the National Wind Power Strategy and Electrification Strategy, are being developed to support the area.

Type of planned interventions

FRO intends to provide support for investments that will be carried out in conjunction to reach the target CO2 reduction:

1. **Replace oil burners with burners for fossil-free fuel and/or hydrogen**

The melting furnaces currently use oil burners as backup heat, which need to be replaced with gas burners that can run on biogas and hydrogen. This requires new burners and the necessary components such as valve systems, burner controls, gas lines, and a receiving station/storage. Gas production is done externally. There is ongoing development and investigation into how biogas and hydrogen can be used in the existing melting furnaces. Both development and investment are necessary components to develop the intervention.

2. **Installation electric boiler. Investigate possibilities with energy storage to reduce the load on the electricity grid**

The current use of oil as fuel for auxiliary steam production is to be replaced by an electric boiler with energy storage. This is intended to reduce the load on the electricity grid and requires new infrastructure, including a new boiler, energy storage, transformer, and a connection to the electricity network. The project also involves the development of a process for energy storage. The inputs are development and investment.

3. **Installation of electric preheater for melting furnace**

The goal is to replace the use of hard coal in zinc production with preheated carrier gas (air). To achieve this, an electric pre-heater for the melting furnace will be installed, which requires a pre-heater, new transformers, and new power supply. If the previously mentioned activity has been completed, no new connection point will be needed. Development work is also required to improve the distribution of salvaged gas in the melt process. The inputs for this project are development and investment.

4. **Smelting furnace powered by new reducing agents: biochar/ alternative reducing agents instead of hard coal**

hard coal is currently utilized as a reducing agent in zinc production. However, it has the potential to be replaced with biochar or alternative reducing agents. This requires further development to ensure the proper handling of these alternative reducing agents within the production plant and to fully understand their function within the melting furnace. The input in this case is solely focused on development.

5. **CCS for incineration of electrical waste and/ ore reducing agent hard coal**

Presently, Rönnskär's emission of CO2 from electrical waste and hard coal as reducing agent accounts for approximately 75% of its total emissions. Currently, the CCS technology is not a viable option for Rönnskär, as their operations are carried out in batch processes. To adopt this technology, development, research, and alignment with market advancements are necessary. Required efforts include development, research, and adaptation to market development.

FRO finances efforts that lead to increased electricity consumption from the national grid, which in 2021 was mostly hydropower (43%), nuclear power (31%), wind power (17%), thermal power (9%) and 1% solar power. Wind power is expected to grow significantly, and Sweden aims to have 98% fossil-free electricity production. The environmental impact of increased wind production will be evaluated by national authorities. Rönnskär can use hydrogen gas in their burners until 2030 but needs cooperation with hydrogen production and storage companies and a review of fuel cells to ensure adequate electricity supply.

Research and innovation

The investments align with the Metallic materials’ strategic innovation program and the research agenda of "National gathering around metallic materials."

- **Investments in innovation for the production of innovation-critical raw materials and necessary materials for a transition to a fossil-free society**

Efforts made to promote circularity in new and existing production processes, which may, for instance, aid in the development of integrated value chains for primary, secondary, and tertiary material flows within the metal industry.

- **Large-scale energy storage and development and implementation of fossil-free technology**

Efforts that include innovation, research, and development for the production, storage of renewable hydrogen, and a larger societal system perspective.

- **Other alternative energy carriers and raw materials**

The fossil fuels could be replaced by electricity, biogas, biogasol or hydrogen gas and fund can cover research, innovation, and development surrounding various types of bio-based or other types of fossil-free fuels and raw materials for the metal industry.

- **Development of long-term collaboration platforms** for research, business and the public sector

Skill enhancement of employees

The objective is to secure a reliable source of skilled labor for the transition of the metal industry in Västerbotten towards carbon dioxide neutrality. The Kompetensforzørnning authority is leading the efforts through its working group, Omställningen Norra Sverige, which prioritizes coordination. The group, consisting of Skolverket, the Norwegian University of Applied Sciences Authority, local universities, Arbetsförmedlingen, Vinnova, the ESF Council, and the Agency for Growth, will work closely with Region Norrbotten, Region Västerbotten, labor market partners, and other relevant parties.

- **Efforts for retraining and skills development of existing and new workforce**

With the changes in the metal industry and its value chain, there will be a need for new skills and qualifications, while some existing ones will become outdated.

The development of competencies is crucial for both the staff at Rönnskär and its approximately 150 subcontractors to successfully adopt the technological

transition. This requires the development of skills related to process conversion, sustainable production, operation, automation, digitization and electrification, among others. The ability of subcontractors to interact and have the required competencies in these areas is essential for the successful implementation of the transition plan.

FRO can support the metal industry and its value chain by supplementing their internal training and certification system with a research-based knowledge system. FRO can investigate and implement opportunities for internal and external training, enhance skills in high demand, promote lifelong learning, and promote cooperation between educational actors and the industry to develop new education and methods.

ETS plants

The support is available for an ETS facility, Boliden Mineral AB.

Companies

FRO can support Skellefteå Kraft Elnät AB, a company that operates in the transmission and distribution of electrical energy, to enable conversion at their facility.

- **Synergies and complementary with other Union programs**

The transition plans can be supported by the pillars II and III of the just transition mechanism. This includes investment in infrastructure related to electricity supply, renewable energy, energy efficiency, green hydrogen, electro fuels, and ammonia.

Steering mechanisms

- **Partnership**

The development of the program has been carried out through a collaborative and inclusive process. It involved close collaboration with Region Västerbotten and involved parties from both the public and private sector, academia, and relevant organizations. The development process also involved experts from the Norwegian Agency for Growth, the Employment Agency, the Swedish Energy Agency, and the Swedish Environmental Protection Agency. The County Administrative Board in

Västerbotten County has also participated and provided opinions. Contacts have been established with the Swedish ESF Council, Vinnova, Sweden's Geological Survey, the Sami Parliament, and relevant companies and organizations, including Svemin.

The development of the program in Västerbotten County has been carried out in close collaboration with various parties including the public and private sector, academia, and relevant organizations. The program was based on the climate roadmaps produced within the framework of Fossil-free Sweden and has undergone broad anchoring processes to establish partnerships for its development and implementation. A written consultation was conducted between 8 to 25 February to gather views from relevant actors.

- **Monitoring and evaluation**

In general, the government is in charge of achieving the long-term objective of net zero emissions by 2045. In accordance with the Climate Act, the government is required to present an annual climate report to the Riksdag that details the emission trend, the most significant climate policy decisions that have been made, and the potential impact of those decisions on future greenhouse gas emissions. Every four years, the government is required to submit to the Riksdag a climate policy action plan that demonstrates how the government's overall policy advances the objectives of the framework. The action plan must specify what further steps the government intends to take if it determines that the objectives cannot be met with the current policy measures.

The Climate Policy Council is an authority in the form of an organizationally independent interdisciplinary expert body whose task is to independently evaluate how the government’s overall policy is compatible with the climate goals that the Riksdag and the government have decided.

The Norwegian Energy Agency works in various sectors of society to create the conditions for efficient and sustainable energy use and a cost- effective Swedish energy supply. The authority's mission includes Industriklivet, a government investment that supports the development of technology and processes to reduce process-related greenhouse gas emissions in Swedish industry.

The Swedish Environmental Protection Agency has a central role in environmental work and must be driving, supportive and unifying in the implementation of environmental policy. The Swedish Environmental Protection Agency must work to ensure that the generational goal for environmental work and the environmental quality goals set by the Riksdag are reached and, if necessary, must propose measures for the development of environmental work. Within its area of responsibility, the Swedish Environmental Protection Agency must also coordinate follow- up and evaluation of the environmental quality target for limited climate impact. The Swedish Environmental Protection Agency annually produces statistics on territorial emissions and uptake of greenhouse gases.

The employment service is responsible for public employment and labor market policy activities.

SGU has responsibility for the country's geological condition and knowledge of raw materials necessary for a green transition.

Svenska kraftnät is the authority tasked with building a reliable and economically viable transmission network.

County boards – Sweden is divided into 21 counties, all of which have a county board headed by a county governor. The County Administrative Board is a state authority with the task of promoting cooperation and coordinating the efforts of state authorities at regional level, a service authority, and an appeal body, and has supervisory responsibility. The County Administrative Board must work to ensure that national goals have an impact in the county, while at the same time regional conditions and conditions must be taken into account.

Region Västerbotten has regional development responsibility.

Municipalities are important in Sweden's climate work. Due to their proximity to the citizens, their roles in physical planning and as large employers, they are important climate actors in the work towards set climate goals. The municipalities drive local development in collaboration with companies, organizations, residents, and other actors and thereby contribute to reaching set national and local objectives.

- **Coordinating and monitoring bodies**

The different authorities and actors have specific responsibilities and commitments in the transition plan within their mandates. The national program established for FRO is managed by Tillväxtverket and is responsible for monitoring the results and reporting to the European Commission. Consultations with the Swedish Environmental Protection Agency and Energy Agency will be conducted before decisions on support from FRO. Region Västerbotten and the County Board of Västerbotten County play important roles in the implementation of the plan, especially in terms of integrating with regional development strategies and promoting an inclusive labor market. Companies and operations in the relevant sectors are responsible for implementing the technical measures in the conversion plan. A monitoring committee has been established to monitor the implementation of the plan and the government will specify the composition of the committee in a separate order.

4.4. Synoptic overview

Just Transition in Sweden refers to the process of transforming the country's economy towards a more sustainable, low-carbon and climate-neutral system while ensuring that the process is fair and equitable for all citizens, especially those most vulnerable to the impacts of the transition. This involves supporting communities and workers in traditional industries as they shift to new, more sustainable jobs and industries, while also addressing social and economic inequality. In Sweden, this is achieved through the implementation of policies and programs, such as the Just Transition Fund (JTF) and the Territorial Just Transition Plans (TJTPs), which aim to provide resources and support to those communities and workers most in need.

In Sweden, three potential counties have been selected to provide Territorial Just Transition Plans (TJTPs) as part of the country's efforts to move towards a climate-neutral economy through the Just Transition Fund (JTF). The different social, economic, and environmental conditions of each county have been taken into account when planning the type of interventions required to address the specific challenges and territorial specifics of each area.

Sweden was one of the countries that prioritized industry investment to reduce greenhouse gas (GHG) emissions by 2030. Each county in Sweden had a specific target for investment, such as focus of Gotland on cement plants, and the metal industries and mining in Norrbotten and Västerbotten (Table 4.3). These investment efforts aimed to support the country's transition towards a more sustainable, low-carbon, and climate-neutral economy.

Table 4.3 – General overview of TJTPs in Sweden

County	Investment strategic	Plants	Timetable
Norrbotten	Investment in Carbon dioxide-neutral steel production and technology, research, and innovation including large-scale production of renewable hydrogen	Transition at SSAB's plant in Luleå	2022 - 2027
Gotland	Investment in Carbon dioxide-neutral mineral production and technology, research, and innovation including Carbon Capture and Storage (CCS)	Transition at Cementa's cement factory in Slite	2023 - 2029
Västerbotten	Investment in Carbon dioxide-neutral metal production and technology, research, and innovation	Transition at Boliden Rönnskär	2022 - 2027

Norrbotten

The steel industry's value chain involves the process of mining and refining raw materials such as iron ore into steel products. Currently, two companies, LKAB and Kaunis Iron, are involved in the process by mining iron ore in Norrbotten and refining it into iron ore pellets or refined iron ore respectively. The steel industry is working to transition to carbon dioxide neutrality through various initiatives, including the replacement of coking coal with fossil-free electricity and green hydrogen in steel production. SSAB Luleå aims to convert its blast furnace to an electric arc furnace and build a rolling mill for fossil-free steel production by 2030. LKAB aims to transition to zero emissions processes and products by 2045.

The transition to carbon dioxide neutrality in the steel industry's value chain faces challenges such as need for government support to overcome market failure and meet investment needs, increased competence, and further research and development. The program FRO addresses the challenges in each county by providing support for research and innovation, clean energy technology and

infrastructure, the circular economy, and employee skill enhancement and retraining. The goal is to achieve carbon dioxide neutrality and zero emissions in the steel industry and maintain long-term competitiveness while retaining employment.

The program aims to support the transformation of the steel industry's value chain in Norrbotten to become carbon neutral with a goal of zero emissions. It also aims to promote the scalability and widespread implementation of methods developed in the process. The program will help reduce CO2 emissions on regional, national, and global levels if the solutions produced are exported. The implementation of the national policy on climate change is also a target, with the goal of making Sweden a leader in climate, environment, and energy and becoming the world's first fossil-free welfare society. Additionally, the program seeks to enhance skills and facilitate the transition for workers in the steel industry as the technology shifts towards carbon dioxide neutrality.

Gotland

Cementa is Sweden's sole producer of cement. Its factory in Slite is one of Europe's most environmentally friendly cement factories, but it is also a significant source of carbon dioxide (CO2) emissions in Sweden. Efforts are underway to transition the cement industry towards carbon neutrality, including improving energy efficiency, phasing out the use of fossil fuels, developing new types of cement, researching ways to increase CO2 absorption in concrete structures, using carbon capture and storage (CCS) technology, and using electrification in cement production. Most of Cementa's CO2 emissions are produced during the manufacturing process, and it is necessary for the company to develop technology for CCS or CO2 recycling in other industries to achieve carbon-neutral production.

The challenges in making the cement industry carbon neutral include the need for government support, secure renewable energy supply, and more. The program aims to make the mineral industry in Gotland carbon neutral, spread and scale effective methods, maintain employment through sustainability, reduce carbon emissions, implement national climate policies, make Sweden a leader in climate, environment and energy and a fossil-free welfare society, and increase renewable energy production and secure electricity supply on Gotland.

Västerbotten

The metal industry in Västerbotten mainly consists of mines and smelters. Boliden Rönnskär is Sweden's only smelter for the production of base metals. The plant is a world leader in the extraction of metal from electronic materials and extracts copper, gold, silver, selenium, lead and zinc clinker. Rönnskär is an important player in the circular flow. Virtually all scrap metal is recycled and greatly contributes to reducing the extraction of virgin materials and providing the necessary metals required, mainly copper which is absolutely essential for generating and conducting electricity, making it one of the most important metals for the transition to alternative energy sources such as solar, wind and hydropower.

The challenges in carrying out the conversion include but are not limited to the need for government support to meet investment requirements, the need to enhance competence across the metal industry's value chain, and the need for further research and development in the areas of circular economy, raw materials, biochar, and renewable hydrogen for the metal industry.

The aim of the program is to make the metal industry in Västerbotten County carbon neutral with a goal of zero emissions. The methods developed must be replicated and made scalable. To ensure long-term and sustainable competitiveness and maintain employment in the industry. To reduce CO2 emissions at a regional, national, and potentially global level through the export of low-emission production and solutions. To implement the national policy on climate change. To position Sweden as a leader in climate, environment, and energy and become the world's first fossil-free welfare society. To enhance competence and facilitate a smooth transition for workers in the metal industry's value chain as the industry shifts to CO2 neutrality.

Generally, the fund aims to enable regions and people to deal with the social, employment, economic and environmental impacts of the climate transition. The fund must pursuit the direction of the energy unions and climate goals for 2023 and a climate-neutral economy in the union by 2050 based on the Paris agreement. The specific sector of each region with their consequences have been illustrated.

5. Just and green transition in Italy

5.1. Introduction

The "Territorial Just Transition Plans (TJTPs)" in Italy is part of the national program "Just Transition Fund Italy 2021-2027" with the goal of creating job opportunities and boosting growth in outermost regions. The "Just Transition Fund" in Italy primarily targets Taranto and Sulcis Iglesiente, which have been identified by the European Commission as the most impacted regions. The coordination of the National JTF program is managed by the Manager Authority (MA), Territorial Cohesion Agency.

The TJTPs are part of Italy's Integrated National Energy and Climate Plan, which provides guidelines for decarbonizing the economy and reaching climate neutrality by 2050. The national program faces challenges in three main areas: energy and the environment, economic diversification, and social and employment impacts. These challenges are addressed in the program to achieve a climate-neutral economy.

5.2. The governance of just and green transition in Italy

The "National Program JTF" supports the European Green Deal initiative, which seeks to implement the 17 sustainable development goals of the United Nations 2030 Agenda and make Europe the world's first climate-neutral continent by the middle of the century. The program has specific objectives, including providing access to affordable and sustainable energy systems for all, and attending an inclusive and sustainable economic growth, among others.

The National Program Just Transition Fund (NP JTF) adopts a governance approach that shares the responsibility for determining and implementing the Territorial Plans (PT) at the regional level and involves active engagement with national competence centers in order to harmonize with the other national programs to be implemented in the territories of intervention.

The NP JTF is aware of the challenges in administrative capacity, governance, and simplification and is taking measures to address them. The administration in charge of the JTF PN will equip itself with a specific PRigA for the JTF, and the Agency for Territorial Cohesion (ACT) is planning to provide support for policy and procedural issues through a service action. The service structures for the territorial realities of the Puglia Region and the Sardinia Region can also help bridge the gaps in administrative capacity.

The process of identifying the challenges for a just transition, prior to defining the National Plan, and designing the governance mechanisms for the operations outlined in the Territorial Plans took place through a partnership comparison process that will continue until the negotiations are completed. The negotiations began in October 2020 as part of the "Support for the Preparation of Territorial Just Transition Plans in Italy" project led by PricewaterhouseCoopers (PwC) on behalf of the DG Reform.

The objectives outlined in the 2020 country report for developing a partnership approach aim to strengthen partnerships and bottom-up policies with increased involvement of cities, local authorities, and economic and social partners. The goal is to ensure effective and timely implementation of territorial and urban strategies. Additionally, to make the partnership approach as responsive as possible to the needs of the Just Transition Framework, institutional meetings were held with central and local governments, including the central administrations, the local administration of Sulcis Iglesiente, and the Province of Taranto. The report also aims to strengthen the capacity of social partners and their participation in achieving the objectives set by politicians.

In the first phase of gathering information, consultation was carried out with social, economic, and environmental partners through a series of meetings coordinated by the Region of Sardinia and the Region of Puglia. Subsequently, the Minister for the South and Territorial Cohesion promoted a national expression of interest to detect territorial planning and identify the main contents of the Territorial Plans. A total of over 80 meetings were held, involving all relevant stakeholders from both territories.

In the Sulcis Iglesiente area, the process of consultation involved various groups, including businesses, regional organizations, the Local Action Group (GAL) Iglesiente Capoterra and Campidano of Cagliari, social and employer partners, universities, and consortia working in the area, as well as organizations promoting social inclusion and human rights. In the Taranto area, a call for project ideas was made open to local stakeholders and a series of meetings were held with regional agencies, Strategic Regional Agency for Eco-sustainable Development of the Territory (ASSET), the municipality of Taranto, universities, research centers, and worker and employer unions. The results of these meetings and the analysis of the contributions from the participants helped to determine the key areas for intervention in the Just Transition Plan.

In the PR partnership process in Sardinia, there are five groups involved: the Supervisory Committee, made up of 82 subjects identified by Decree Councillorship; the Enlarged regional partnership of the ERDF OP, made up of 199 subjects of regional importance such as municipalities, universities, and representative offices; regional bodies of the Institutional Partnership with economic and social partners like trade unions, production organizations, and professional associations; Civil society partners, such as environmental and health promotion associations and sports associations; and the Territorial partnership, made up of 669 subjects of territorial importance.

The PR partnership process in Apulia involves the following organizations: ANCI, UPI, CLAAI, CNA, Confapi, Confartigianato, Confcommercio, Confcooperative, Confesercenti, Confindustria, Lega Coop, UNCI, CGIL, CISL, UIL, CISAL, UGL, Casa Artigiani, Unioncamere, ABI, Regional Forum of the Third Sector, University of Bari, University of Foggia, University of Salento, Polytechnic of Bari, and LUM University.

Joint Assistance to Support Projects in European Regions (JASPERS) is a support mechanism that has been activated to help Italy prioritize its pipeline of Just Transition Fund (JTF) projects and develop related investments in two areas. JASPERS may help develop and screen projects eligible for funding under Pillar 2 and Pillar 3 of the JTM and work with the InvestEU Advisory Hub. It will also support

the development of selected investments while ensuring consistency with relevant plans.

The next phase involved discussions with regional structures to identify the types of actions to be supported, as well as public consultation for the Strategic Environmental Assessment (ESA) procedure. The partnership for the program involves a range of national, regional, local, and civil society partners, as well as research organizations and universities, in accordance with multi-level governance and a bottom-up approach. The partnership is involved in all stages of preparation, implementation, monitoring, and evaluation of the program, and decision-making in accordance with regulations and the European Code of Conduct on Partnership.

The MA of the PN JTF ensures the effective participation of all partners in the Management Committee (MCs), taking into account their ability to guide the planning and implementation of the program, and to make sure the procedures for identifying and involving partners are transparent. The partnership will also be involved in the implementation phase by the Intermediate Bodies and will have a role in execution, monitoring and evaluation. A technical-partnership table is established to support the CdS of the JTF PN and promote coordination between national and territorial initiatives, as well as participation in European initiatives. This table may be convened in an enlarged form for specific topics or in a territorial form, involving local partners, for matters specific to a single JTF area.

For a fruitful partnership relationship, it is intended to ensure open information to mobilize the heritage of existing knowledge in the territories through facilitated access to information, timely communication, the identification of the appropriate forums for discussion and concertation at the territorial level and the dissemination of the results of the contribution of partnerships.

A dedicated section of the PN JTF website has been created for the partnership which will have information and consultation tools for public documents as well as a tool for partners to provide contributions and pre-information on preliminary documents.

5.3. The Territorial Just Transition Plans (TJTPs) of Italy

In Italy, the European Commission (EC) identified two territories that are most affected by the transition towards a climate-neutral economy in its 2020 Country Report: Sulcis Iglesiente and Taranto. These areas have economies that heavily rely on fossil fuels, making the transition a challenging but necessary step towards sustainability.

To support the transition, the Italian government has implemented Territorial Just Transition Plans. These plans aim to create a sustainable future for these regions by providing support to local communities and businesses in the process of moving away from fossil fuels. The plans aim to ensure that the transition is inclusive and equitable, taking into account the specific needs of the regions, and ensuring that the transition results in positive outcomes for the local communities.

Sardinia faces challenges with energy supply, particularly a lack of electricity at competitive prices, leading to the highest energy cost in Italy and affecting the Portovesme steel industry. The absence of a natural gas distribution network has also led to energy poverty in homes. Despite the reliance on fossil fuels for energy production, Sardinia has a significant capacity for producing electricity from renewable energy sources, particularly wind and photovoltaic. As of 2020, the total power from RES plants in Sardinia was 2,641.5 MW, 4.5% of the national total of 56.6 GW. Sardinia has the second-highest potential for generating electricity from renewables in Italy, after Sicily.

An amendment to the Constitution has been proposed to address the disadvantages of insularity in Sardinia and ensure territorial continuity. The Republic would recognize the unique qualities of the Islands and implement necessary measures. The amendment was approved by the Chamber of Deputies on March 30, 2022.

In the coming sections, a more in-depth examination of the Territorial Just Transitions Plans for the regions of Sulcis Iglesiente and Taranto will take place. To gain insight into the planning process in Italy, interviews have been conducted with coordinators and relevant stakeholders, particularly in Sardinia.

5.3.1. Model for territorial plans for a just transformation: Sulcis Iglesiente

Identification of territories

Sulcis Iglesiente where is the province of southern Sardinia and is one of the largest mining areas in Italy. It is home to metallurgical enterprises that are integrated with the coal, as well as the last coal mine in Italy (Monte Sinni), which stopped mining in 2018. 1,400 jobs were lost because of the termination of the coal industry, and more will be lost when the transition process is complete. In collaboration with the PNIEC, ENEL has a decommissioning plan for the Grazia Deledda coal-fired thermoelectric plant that calls for the definitive shutdown and safety measures for the coal-fired groups by 2025. The recent National Plan to contain Natural Gas Consumption may cause a delay.

Currently, both ETS plants – Power Plant and Portovesme Srl - are the primary sources of CO2 emissions in the region (almost 85.6 percent of the emissions in the Sulcis Iglesiente which declined almost 4.6% in 5 years).

The Portoscuso pole, a center for metallurgical activity, employed over half the workforce in 1996 and caused significant exposure to the area's dependence on this industry. This monoculture has faced growing signs of crisis in recent times.

Estimate of the economic and employment effects

The determination of the Monte Sinni coal mine and the crisis in the mining industry have led to the progressive disappearance of companies linked to the mining and manufacturing sector. The phase-out of coal threatens extra jobs in a region already struggling with a prolonged economic crisis.

In the territory, there are various critical factors affecting the choices of the PT (unspecified) including job losses, high unemployment, low entrepreneurship, poor education, lack of services for work-life balance, and environmental issues from mining and iron/steel activities. These issues include the loss of approximately 1,400 jobs, a 28% decline in manufacturing employment, only 13 new SMEs per 100,000 inhabitants, low innovation, 63.9% of the population with a middle school

education or lower, a low female employment rate, and the presence of 360 areas in need of reclamation, 50 of which are in the Municipality of Portoscuso.

Identification of the affected economic activities and industrial sectors

The territorial context analysis reveals the following development needs to tackle the challenges posed by the transition in Sulcis Iglesiente. The transition process, which has been ongoing for many years, has resulted in a decrease in job opportunities in the mining and industrial sectors, affecting both direct workers and related industries. This drop in employment causes economic hardship for the population, particularly for single-income families where women have limited involvement in the local job market.

- **Sectors in decline**

The Sulcis Iglesiente region in Italy has experienced a slow economic decline since the 1990s due to the closure of lead and zinc mines, along with repeated crises in the metallurgical industry. In 2018, the closure of the Monte Sinni coal mine added to the economic difficulties. The energy transition plan for Sardinia calls for the cessation of the use of coal by 2025, with a provisional plan to convert the plant to gas through the construction of a virtual pipeline for gas.

There is potential for job losses and a need for professional retraining at the Carbosulcis Spa and Grazia Deledda thermoelectric plant (the ENEL plant is operational). Company policies in place make it possible to design realistic intervention scenarios. The phase-out of coal and rising energy costs negatively affect businesses and households, exacerbating the issue of energy poverty. To address this, increased production from renewable energy sources (RES) and improved energy efficiency are needed. The increase in RES can lead to new job opportunities and is essential for economic diversification and mitigating the impacts of the energy transition. The energy transition measures could have positive effects on companies in the mining and manufacturing sector.

- **Sectors in transformation**

The iron and steel industry and Portovesme industrial hub were established because of the territory's shift away from coal and metal mining in the 1950s and 1980s. Portovesme is now the top industrial site for non-ferrous metal production

in Italy, drawn by its mineral resources (coal and zinc minerals) and access to electricity infrastructure. However, changes in electricity prices have contributed to a crisis in the energy-intensive steel industry, which highly includes energy-intensive industries and accounts for 50% of all electricity used by major Sardinian industrial companies. Interventions to decarbonize Portovesme include the transition from fuels with high CO2 emissions to LNG (also mixed with hydrogen) for the production of zinc and lead and energy efficiency interventions.

In the Sulcis Iglesiente area, there have been occupational losses due to the closure of the Eurallumina Spa and SiderAlloys (formerly Alcoa Srl) plants. The low level of entrepreneurship in the area limits the possibilities of developing new sectors. However, the area presents growth opportunities in the green economy sector, such as the circular economy and sustainable tourism, agriculture, sea economy, and mobility. The Green & Blue economy program can help insert the unemployed into innovative and high-value regional economic sectors.

Vision

The transition process for Sulcis Iglesiente is guided by the assessment of the area's needs and through consultation with local institutions and key economic, social, and environmental stakeholders. The support from the JTF will help mitigate the effects of the transition and encourage the diversification of production towards sustainable and innovative sectors. This will provide new job and training opportunities and support initiatives to combat energy poverty. Interventions are as following:

- **Counter the effects of the transition by increasing the share of energy produced from renewable sources for businesses and people and intervening in situations of environmental compromise**

By 2040, Sardinia's energy needs are projected to increase, particularly with the revival of aluminum production. It is crucial to mitigate the impacts of the transition away from coal and ensure a secure energy supply. This can be achieved through the implementation of renewable energy sources (RES) to offset the rising electricity prices, which negatively affect businesses and families by causing energy poverty. The support for RES production will also drive economic

diversification through the creation of new production chains related to the installation, maintenance, and management of plants. The priority is to maximize Sardinia's potential for producing and generating electricity from RES by building plants that can meet the energy needs of local communities. Additionally, it is important to optimize and reduce energy consumption of small and medium enterprises (SMEs) through the use of clean technologies for energy efficiency.

The Sulcis Iglesiente region is dotted with abandoned areas, some of which have started being reclaimed but not completed. It is essential to complete the reclamation of these areas to make way for new economic opportunities.

Actions:

1.1 Promotion of the use of renewable energies

The promotion of Renewable Energy Sources (RES) production will create jobs and economic diversification. The approach will involve the whole community, including private entities, the public sector, and public service managers. It will also aim to combat energy poverty and reduce dependence on fossil fuels. The focus will be on medium-to-small-sized plants and will be based on successful regional initiatives.

1.2 Incentives to SMEs for the improvement of energy performance

The goal is to support companies in decarbonizing their production process through subsidies and incentives for energy efficiency and the construction of RES plants. The focus is on reducing the environmental impact of production and promoting the generation of wind, solar, and marine energy through small-to-medium-sized plants, reducing dependence on non-RES energy.

1.3 Implementation of intelligent energy distribution and storage systems

The growth of Renewable Energy Sources production necessitates investment in modernizing transportation networks, including ICT and advanced energy storage systems such as hydrogen production to optimize self-consumption. Transforming transportation networks into "intelligent" systems will aid the integration of distributed generation, reduce power cuts, and foster the expansion of renewables.

1.4 Reclamation of sites to be used for new economic activities

The presence of mining and iron and steel activities has had negative effects on the environment and health of the Sulcis Iglesiente area. To counter this impact, new economic activities in the circular economy sector, especially utilizing material resulting from the mining activity, are encouraged. In accordance with the "polluter pays" principle, reclamation interventions and productive re-functionalization of affected areas are planned. Priority will be given to the interventions in the high priority sites of the SIN Sulcis Iglesiente Guspinese and which have a maturity level compatible with the JTF timing.

- **Promote a diversification of the local production system aimed at countering the effects of the transition**

Companies in the metallurgical sector have only slightly reduced their emissions by 4.6% in the last 5 years through participation in the EU ETS. Research projects are aimed at finding process innovations to support the transition to more sustainable practices.

The recovery of land polluted by mining and industrial activities can lead to the development of new economic activities based on the circular economy. The material from mining (about 65 million tons) in these areas can be collected and reused as secondary raw materials. The economic diversification will be focused on sustainable sectors like sustainable green economy, agriculture, tourism, and marine economy, which have shown growth potential. The focus is on creating collaborative research projects to promote new technology and new businesses, as well as accompanying services.

Actions:

1.5 Support for the transition and diversification of the local economy, also through research projects

The action will fund research, development and technology transfer projects that focus on the priority areas of remediation and reuse of geo-mining waste, energy reconversion of production processes, circular economy solutions, use of hydrogen and renewables, and innovative solutions related to the transition process. Investment is expected in green economy, agriculture, sustainable tourism, and

sustainable sea economy, with a focus on process, product, organizational and marketing innovations, as well as dimensional parameters and aggregations. The action will be carried out in the logic of a hub, with a focus on generating qualified demand for projects that meet the challenges posed by the territory and promote sustainability.

1.6 Strengthening of technical support capacity for innovation processes

The measure finances the use of existing facilities for incubation services to support new businesses, the dissemination of research results and exchange of information. It also provides advanced support services, such as management and marketing, to SMEs with a focus on digital innovation and connectivity. Additionally, there may be calls for funding new innovative startups with a focus on promoting circular economy.

- **Mitigate the social and employment effects of the transition**

The increasing demand for personnel with green training affects all professions. It is expected that between 2021 and 2025, the number of professionals who will need intermediate-level green skills will be 59% for low-skill groups and 64% for high-skill groups, and 35% and 39% for high-level skills. Upskilling and reskilling paths must not only be limited to the green economy sector but also to other sectors of local development. This includes support for renewable energy production and economic diversification, which will lead to new specialized employment opportunities, including for women. The plan will use the Workers' Employment Guarantee Program (GOL) and the New Skills Plan (PNC) to profile workers affected by the transition and provide retraining courses, reducing skill mismatch, and increasing job opportunities. The aim is to improve employment support services and vocational training courses, while also increasing care services to enable better work-life balance for women and increasing their participation in the labor market. Women's training in green jobs will be encouraged to prevent gender discrimination, and new levels of specialization will be required to access the labor market. Measures will also be taken to free up time for women to pursue qualifications.

Actions:

1.7 Support for up-skilling and re-skilling courses for the unemployed, workers at risk as a result of the transition, women, and young people; strengthening of services for job search and the creation of a new business; active inclusion of job seekers.

The proposed training measures aim to finance the training and retraining of around 3,000 unemployed and workers at risk of job loss during the transition process to a green economy. The training will focus on vocational and advanced courses that will increase employability and support new income opportunities. Additionally, the expansion of training offerings will be financed by the creation of new courses, with a focus on topics related to the green economy and renewable energies. The implementation of the training will also involve funding the design of learning contents and methods, with a focus on the green transition of territory.

The measures aim to integrate a range of services into the proposed itineraries to help the unemployed and those seeking their first job. These services include profiling and orientation, information and support for training courses, identification and possibly provision of managerial training, development of business plans, and disbursement of incentives for business creation. These measures aim to support personal entrepreneurial development and provide personalized support, including tutoring, alongside accompanying activities.

The measures also include an active inclusion program for job seekers, which provides additional support such as attendance allowances to participants of the various training activities provided by the PT for a period of about 2 months. The allowance will be paid during the courses and its amount cannot exceed that of the accompanying measures. Participants must register with the CPI (Employment centers) and declare that the allowance does not overlap with other social benefits. If the territory needs to create new structures in education and social inclusion, assessments will be made during implementation to justify the investment.

1.8 Services for the reconciliation between work and family to raise activity rates

The action aims to improve work-life balance for women, particularly in green jobs, by providing support for conciliation services. This includes increasing access to existing services and encouraging the development of new providers. The Region will collaborate with local authorities to make necessary infrastructures available for the provision of these services.

Consistency with other relevant national, regional, or territorial strategies and plans

The Territorial Just Transition Plan in Italy is aimed at promoting a sustainable economy in the territories of Sulcis Iglesiente and Taranto. The plan seeks to increase the use of renewable energy sources, diversify the local economy, and support the growth of small businesses while combating energy poverty. It is in line with the United Nations Agenda 2030 for sustainable development. The plan operates in collaboration with the ERDF PR, FSE+ PR, and ESF+ PR and integrates with programs such as PN ESF+ Youth, Women, Work, PN School and Skills, and PN Social Inclusion and Fight Against Poverty to avoid duplication of efforts. The plan will also benefit from the simplification measures and development of the logistics system in the Special Economic Zone (ZES) in Southern Sardinia.

- **Smart Specialization Strategy**

The two implementation paths, JTF and ERDF, will be integrated with Sardinia's S3. The S3 process will help to focus on the development needs of the Sulcis area and provide useful information for the operational choices of the PT and JTF PN. The challenges and factors of change identified in the PT align with the regional S3 and have potential for a sustainable and resilient transformation that fits with European policies and goals, such as the SDGs and EU Green Deal.

- **Territorial strategies and regional development plans**

During the planning phase, consideration was given to the involvement of national programs such as the National Recovery and Resilience Plan (PNRR) with the goal

of reducing territorial disparities. The PT has already made informed decisions about how its interventions will complement these national programs.

The goal of reducing the impact of the transition is supported by measures implemented with the help of the European Fund for Maritime Affairs, Fisheries and Aquaculture (EMFF). The EMFF works in conjunction with the PN JTF and the PT and LAG/FLAG, which have been successful in promoting the green economy and sustainable sea economy with funding from the European Social Fund (ESF). The implementation of projects under the WESTMED initiative will be promoted for skill development and circulation and strategic research and innovation through territorial cooperation.

The Regional Environmental Energy Plan of Sardinia (PEARS) aims to cut CO2 emissions by 50% by 2030 compared to 1990 levels. The plan calls for the development of distributed generation and self-consumption through the creation of energy communities and provides an intermediate stage to 2025 to take into account the phase-out of coal. The Regional Sustainable Development Strategy 2021 focuses on "greener Sardinia" objectives for decarbonizing human and productive activities. The extraordinary Sulcis plan of 2012 outlines a development strategy for the territory, with interventions underway for production, infrastructures and reclamation, and completed for schools and technological research. The Territorial Development Project "CRP-PT 42" is also an important tool for enhancing the environment and culture of the Sulcis Iglesiente area.

Governance mechanisms

- **Partnership**

The partnership will play a role in every stage of the preparation, implementation, and evaluation of the Territorial Just Transition Plans in a timely and effective manner, following regulations and the European Code of Conduct. The challenges for the transition and design of governance for operations come from a partnership process that started in October 2020 as part of a project developed by PwC on behalf of DG Reform. Since December 2021, the intervention logic, and actions to be supported have been identified, along with the public consultation for the Strategic Environmental Assessment, with the involvement of the competent

environmental authorities and various stakeholders. The Managing Authority (MA) of the NP JTF will ensure the partnership's effective participation in the Monitoring Committees and its involvement in the implementation phase, maximizing its role in execution, monitoring, and evaluation activities, and supporting the development of the administrative capacity of the subjects involved.

- **Monitoring and evaluation**

The most appropriate rules are established within the Si.Ge.Co of the PN JTF to supervise the intermediate bodies, ensure the separation of functions and verify that the intermediate bodies correctly performs the tasks and functions delegated to it, under the responsibility of the MA itself, through the procedures and tools established by means of a registered written agreement. The intermediate bodies will have to comply with these rules by adopting suitable internal procedures and related methods for carrying out the tasks and functions specified by written provisions in the delegation agreement with the most effective methods for achieving the expected results in compliance with the common operating rules of the PT and the PN JTF.

- **Coordination and surveillance bodies responsible for coordinating and monitoring the implementation of plan and their perspective roles**

The PT for Sulcis Iglesiente will be carried out by an intermediate body, selected by the Director General of the Regional Planning Center, which is part of the Department of Planning, Budget, Credit, and Territorial Structure of the Sardinia Region. This choice is aimed at promoting a unified vision and complementarity of action between the various programs and funds managed.

The identification and strengthening of the regional administration offices is a basic condition for the PT in Sulcis Iglesiente. The intermediate bodies are responsible for assigning tasks and functions, including coordinating the implementation system, monitoring, financial management, partnerships, control activities, and other necessary operations. The intermediate bodies must also ensure its participation in central level working groups, periodically report on the plan's progress and its environmental, employment and social effects, and organize local level activities with institutional, socio-economic, and environmental partners to

promote participation and ensure the full implementation of the SEA and DNSH principle.

The MA is responsible for managing the PN JTF, conducting management checks, supporting the activities of the MC, using an electronic system for data exchange, and dedicating specific meeting sessions to coordinate the European Agricultural Fund for Rural Development (EAFRD) and JTF actions. The MA will consider the experience of the Agency for Territorial Cohesion in previous programming cycles.

5.3.2. Model for territorial plans for a just transformation: Taranto

Identification of territories

The economy of Taranto is heavily dependent on the high carbon steel sector. Therefore, Taranto is the most polluted city in Italy with 9 percent of total CO2 emissions nationwide.

According to the European Pollutant Release and Transfer Register (E-PRTR), it reported that in 2017, 12.3 million tons of CO2 were emitted, which accounted for 50% of the total emissions in Apulian. The following year, in 2018, the figure dropped slightly to 11.9 million tons. In addition to Acciaierie d'Italia (AdI), there are three other ETS plants (ENI, Leonardo spa, and Unicalce spa) in the area that contribute to 89% of the CO2 emissions in the province and are considered among the most polluting in the Puglia region.

AdI is responsible for 50% of emissions in the province and reducing emissions from AdI and ETS plants is the main objective in the decarbonization process in the Taranto region. The AdI plan aims to complete the electrification of the hot area by 2033 using electric furnaces powered by natural gas and eventually hydrogen, leading to a decrease in CO2 emissions in steel production. However, this decarbonization process poses a threat to both direct and indirect jobs.

In Puglia, 541 contaminated sites have been confirmed with 77 of them located in the province of Taranto. The industrial area of Taranto, including the municipalities of Statte and San Giorgio Jonico, is designated as a SIN (Site of National Interest)

due to pollution with only a small portion being reclaimed. Most of the contaminated areas are not currently being addressed for reclamation.

Estimate of the economic and employment effects

The seizure of the AdI plant in 2012 caused a decline in economic activity in the Taranto area with a decrease in workers in the industry and a decline in goods transited through the port of Taranto. The suspension of activity led to a loss of 23 billion with a deadweight loss of GDP between 3 and 4 billion. This had a direct and negative impact on the wealth of the territory. Additionally, the transition could lead to job losses, a low birth rate of SMEs, high youth migration rate due to unemployment, a lack of care and childcare services, and difficulty in finding technical professions with high specialization and skilled workers.

Identification of the affected economic activities and industrial sectors

The development needs identified to address the challenges related to the transition and outlined below, based on the analysis conducted of the intervention area.

- **Sectors in decline**

In the area, there are no plans to halt or downsize declining industries, apart from some potential impacts on Acciaierie d'Italia (AdI) operations as a result of the transition process. The exact timeline for these changes is not yet known. The potential for economic diversification and growth opportunities to counter the impact of declining industries are comparable to that of industries undergoing transformation.

- **Sectors in transformation**

The steel industry, whose economic weight in the Taranto region is, as already mentioned, preponderant, both in terms of economic and employment (34% of workers in the industrial sector of the entire province are employed in the steel industry), is on a path of profound transformation that is having an impact on all three spheres of society: economic, social, and territorial.

Following the conversion of the Acciaierie d'Italia site, it is anticipated that the shift to a climate-neutral economy could result in negative employment impacts, including job losses for direct and indirect workers (e.g., fossil fuel logistics).

- Expected Job Losses and Need for Professional requalification: The energy transition is expected to result in significant job losses in the iron and steel sector and related industries, which are crucial to the local economy.

- Potential for Economic Diversification and Development Opportunities: The transition process in the Taranto area is facing some structural challenges that need to be addressed.

In terms of energy, the transition of the iron and steel industry in the province of Taranto causes a significant increase in the demand for RES energy and water (both required for the production of green hydrogen), but it also directly causes a rise in prices that affects business competitiveness and energy poverty.

The steel industry and related industries (the cement sector) have a considerable number of former employees or employees on unemployment in the Taranto area, and the number of layoffs has increased. Other economic sectors were negatively impacted by the AdI crisis, and their repercussions are still being felt today.

Vision

The transition of an area will be accompanied by a long-term development plan with the goal of reducing its impacts and addressing the challenges of the transition. A vision for a climate-neutral economy was formed through analysis of needs and discussions with local institutions and stakeholders. The support of the JTF will allow the province of Taranto to begin transforming its economy and social structure towards climate neutrality. The blue and green economy will be the driving force behind the economic transformation, while also enhancing human capital to support the transition of area. The following are the listed interventions:

- **Counter the effects of the transition by increasing the share of energy produced from renewable sources for businesses and people, also intervening on situations of environmental compromise**

Taranto is the leading province in Apulia for electricity consumption, primarily due to its industrial sector. As the steel sector undergoes an ecological transition, the demand for energy produced from Renewable Energy Sources (RES) will significantly increase. The PT is taking action to ensure access to affordable RES energy for both economic and residential use, while also exploring the potential of hydrogen as a zero-emissions alternative for steel production. The PT is investing in research and experimentation to address current limitations and industrialize the production and use of hydrogen as an energy carrier.

In addition to the positive impact on public health, the PT's experimental interventions will also bring about new business and employment opportunities.

Actions:

2.1 Support for the production and storage of energy produced from renewable sources and for the energy efficiency of production processes

The aim of the action is to support the transition to a low-carbon economy in the area, driving the production of renewable energy plants and creating new jobs and economic diversity. The financing will be provided for the construction of photovoltaic plants, wind energy systems, geothermal plants, and biogas systems. Incentives will also be provided for SMEs to improve their energy efficiency and production processes. The action also includes support for local communities to reduce energy poverty, as well as financing for advanced energy storage systems, including smart grids and ICT systems.

2.2 Support for research projects and the development of the green hydrogen supply chain

The action supports the development of research projects in low-carbon economy, resilience, and adaptation to climate change. These projects will be a partnership between public and private research centers and companies, with a focus on highly scalable applied RTL. The research will also include projects promoting new

solutions and technologies related to green hydrogen and its use as an energy vector, as well as pilot actions for its innovative use. The action will consider any synergies with the Horizon Europe initiatives.

2.3 Support for innovative projects to support the ecological transition and protect natural resources.

The action focuses on creating environmentally friendly infrastructure, such as green belts around city areas, in order to restore abandoned and degraded land, improve the microclimate, reduce CO2 emissions, and support the development of blue economy activities. This is based on the "polluter pays" principle. Additionally, bioremediation interventions are carried out on land to be restored for productive reuse, specifically in certain municipalities affected by industrial crisis. These interventions exclude the SNI areas of interest to the Commissioner.

- **Promote a diversification of the local production system aimed at countering the effects of the transition**

The PT aims to reduce the area's reliance on carbon-intensive activities by promoting diversification and mitigating economic and employment losses during the transition to more sustainable practices. This will be achieved by developing renewable energy sources, hydrogen, circular economy, and high-knowledge services, enhancing local knowledge niches and repositioning traditional sectors to be more competitive.

Actions:

2.4 Support for research projects of significant impact in the perspective of transition and diversification of the local economy

The action is aimed at promoting the implementation of joint research projects that would bring about the introduction of new technological solutions to the market. The goal is to enhance the productive potential of the region and encourage cooperation between research institutes, universities, and companies. The action could also support research and innovation processes, technology transfer, and the development of a circular economy. The support could include activities that align with the "New European Bauhaus" project and take advantage of synergies offered by the Horizon Europe initiatives.

2.5 Strengthening of the capacity of technical support to processes of innovation and economic diversification of the territory

The action is aimed at promoting the creation of new businesses in innovative production areas through the establishment of innovation centers, hubs, incubators, and business accelerators. It provides financial support for local innovation processes by offering advanced support services for SMEs and groups of SMEs, as well as support for incubation initiatives, spin-offs, spinouts, and startups. Additionally, it promotes cultural and creative potential as a driving force in diversifying the economy and creating new competitive identities in the territory, through operations that aim to develop and promote the area.

2.6 Entrepreneurial development enterprise creation and productive investments

The action is aimed at addressing the worsening employment situation and social unrest caused by the crisis of local businesses as a result of the energy transition. The development of SMEs and their groups is supported through productive investments, the development of skills for smart specialization, industrial transition, entrepreneurship, and firm adaptability to change, as well as the acquisition of advanced support services such as management, marketing, and design services. The action also promotes incubation, support for spin-offs, spinouts, and startups in all sectors of activity and projects supported by Actions 2.2-2.5.

- **Mitigate the social and employment effects of the transition**

The area has a lack of social infrastructure and lower spending on social services compared to the regional average. It is estimated that 18% of the population in the area will be negatively impacted in the short term by the energy transition processes, due to the combination of critical factors and the impact on the direct work in the energy-sensitive sectors.

The area has a high demand for technical environmental profiles, biochemistry, energy saving, and renewable energies. However, the lack of professional upper secondary education profiles and higher education opportunities hinders the growth of the labor market. The PT plans to invest significant resources in training and requalification programs to support workers who may be negatively impacted

by the energy transition. The goal is to encourage their re-entry into the job market in technology-based industries related to the energy transition and the circular economy, and to promote the creation of new jobs. New integrated courses in professional profiles related to these fields will be introduced with the help of universities and companies. The PT also plans to improve care services to support women who are excluded from the job market and to provide better support to vulnerable populations affected by the energy transition.

Actions:

2.7 Support for the creation of retraining courses of workers at risk and affected by the transition and training courses for economic diversification; enhancement of job search services

The current transition demands action to address the impact on workers, specifically targeting improved access to employment, particularly for the unemployed. The measure, which is a central part of the plan, offers support for basic and advanced personalized training, including reskilling and upskilling of professional profiles to align job supply and demand. It also provides support to women and young people, to create new income opportunities for single-income families that have been affected or are at risk due to the transition.

The action plan focuses on several measures to help workers affected by the transition. It includes strengthening training and lifelong learning to improve employability and help the unemployed find jobs. Vocational training and academic tertiary education will be improved to reduce dependence on the steel sector. The plan also involves functionalizing existing infrastructure, purchasing equipment for new labs, and expanding employment services through advanced career guidance and counseling functions. Financial support is provided to those participating in the training activities, including an attendance allowance during the trial period. Beneficiaries must declare that the indemnity does not overlap with other social benefits.

2.8 Supply of care and social services

The goal of the action is to support the reconciliation of work and family life and to increase women's participation in the labor market, especially in green jobs that

require new levels of specialization. This aims to finance the implementation and functionalization of offices for care services on a micro-territorial scale and the creation of new entities capable of providing these services. The intention is to support the most vulnerable and marginalized population through the provision of social, socio-health, educational, and cultural services, such as the establishment of a permanent observatory on the social effects of decarbonization, support for vulnerable families, community empowerment, environmental education courses, etc.

Actions that focus on young people will be a priority, as they are the first ones to experience the impact of the transition in reducing job opportunities in the local labor market. This makes young people who are already at risk of dropping out of school or have already left their studies even more vulnerable. These actions will be aimed at providing training on topics related to green jobs.

Consistency with other relevant national, regional, or territorial strategies and plans

The PT works closely with the ERDF and ESF+ to achieve their common goals, especially in regard to those impacted by the transition. The delegation of the Intermediate Body role to the Puglia Region will help ensure that implementation methods and selection criteria are integrated, and reward plans are improved. The focus will be on improving job orientation and care services, in an effort to increase the participation of young people and women in the provincial labor market. The PT will also work in a way that is complementary and non-duplicative with the ESF+ initiatives "Youth, Women, Work", "School and Skills", and "Social Inclusion and Poverty Reduction", with a specific focus on the training and requalification actions of the PT.

- **Smart specialization strategy**

Both the JTF and ERDF implementation paths will share the characteristic of being fully integrated with the regional S3, allowing the entrepreneurial discovery process in the Taranto area to be more focused on the development needs. This will result in useful evidence that can inform the operational decisions made by the PT and the related PN JTF.

- **Other national and regional development plans**

During the planning phase, the involvement of national programs, such as the PNRR, aimed at reducing regional disparities was also taken into account. The governance model of the NP JTF is based on sharing responsibilities for defining and managing the PTs between the national and regional levels, and on the active participation of national competence centers to ensure cooperation with the thematic National Programs. The objective of mitigating the effects of the transition to a circular and low-carbon economy is supported by the measures taken with the help of the EMFF and is also considered in the context of complementarity with the PN JTF and the PT.

Governance mechanisms

- **Partnership**

The partnership will be involved in all stages of the PT JTF's preparation, implementation, and evaluation in accordance with RDC and the European Code of Conduct. The identification of just transition challenges and the design of governance mechanisms came from a partnership process that began in October 2020 as part of a project by PwC for DG Reform. Stakeholder engagement and meetings with regional agencies were conducted from January to November 2021. Since December 2021, regional structures have been identifying the intervention logic and public consultation for the SEA. The MA of the PN JTF will ensure effective partnership involvement in monitoring committees and maximize its role in the implementation, surveillance, and evaluation phases, potentially supporting administrative capacity development. A technical-partnership table is in place to support the Supervisory Committee of the PN JTF and a section of the PN JTF website is dedicated to the partnership for updates and interaction.

- **Monitoring and evaluation**

The Management and Control System of the PN JTF sets rules for the MA to oversee the intermediate bodies and ensure proper separation of duties. The intermediate bodies must abide by these rules and adopt internal procedures to carry out delegated tasks effectively, achieving desired results in accordance with the PT and PN JTF's common operating rules. The MA is responsible for

monitoring the intermediate bodies' compliance with these rules, which are outlined in a written agreement.

- **Coordination and surveillance bodies**

The PT JTF for Province of Taranto will be executed by an intermediate body, selected and appointed by the MA of the PN JTF, who is identified in the MA of the PR ERDF ESF+ 2021-2027 and in the offices of the Puglia Region. This will align the vision and action of the managed Programs and Funds. The intermediate body is responsible for adopting an appropriate structure and resources in line with the regulations and identifying and strengthening the regional administration offices. It will also assign responsibilities for the delegated functions and tasks, such as coordination, monitoring, financial management, partnerships, control activities, and operations implementation. The IO will select and finance operations, participate in central working groups, transmit performance indicators, and organize local level partnerships for wide participation, knowledge, and involvement in the SEA (Strategic Environmental Assessment) process, and implement the indications from the SEA. The MA manages the PN JTF, conducts management checks, supports the activities of the Supervisory Committee, and ensures the use of an electronic system for data exchange.

5.4. Insights from the interview

To investigate the procedure of planning and stakeholder involvement in the Italian TJTPs in Sardinia region, various stakeholders involved at various levels were interviewed in separate sessions to gather their insights and perspectives.

In the realization of the subjected regions, two identified regions by European Commission were already part of regional plans for cohesion. The representative of the autonomous region of Sardinia specified that JTP of Sulcis Iglesiente was complementary of another national plan which called Piano Sulcis Iglesiente.

The national program was launched at the end of 2020 with technical assistance of PwC. The initiative started with two calls for application of project and classification of received proposals and it involved all relevant actors of area. After one year, PwC produced two outputs regarding action plan for territorial plan with context analysis that considered all complementary aspects of initiatives. The

Sulcis Iglesiente action plan has three main components with various priorities including promoting employment and developing new skills to enhance high-potential economic sectors, fostering research and innovation for the establishment of new supply chains, and supporting and advancing towards a carbon-neutral economy.

The European Commission, national level, and agency department held one meeting per month for a year, all of which were held online due to the Covid-19 pandemic. The autonomous region of Sardinia, acting as a public administration, informed stakeholders in meetings that covered topics such as energy, research, and upskilling and reskilling processes. All representatives outlined that all involved stakeholders in different sectors including economic and social sectors were satisfied with the initiative and planning process. The representative of PwC emphasized the importance of finding a way to collect the input. In this regard, they set meeting rooms in the initial phase as a dissemination approach to outline the socio-economic and environmental contexts, the priorities of plan, explain, and then organize separated or thematic meetings; it depends on influential major stakeholder (e.g., ENEL, ENI) since they do not tend to share data with other sectors at the same table.

According to the discussions with stakeholders engaged in the whole process of JTF program in Italy, there was an effective coordination and collaboration among different stakeholders in the operational phase of the process regarding the fund to understand their interest and possible involvement in the project.

The process started with existing partnerships in the area and involvement from national bodies (ministers) and regional bodies (regional administrations, municipal actors, etc.) with an interest in the subject matter included in the plan. The minimum requirement for involving relevant actors was to consider the territorial criteria and to select the appropriate part of the territory. The other criteria that highlighted by the representative of PwC were “influence” and “interest” of stakeholders to assess the level and methods of participation in the development and implementation of JTPs.

The representative of Sotacarbo also noted that the minimum requirement to involve actors depends on the type of stakeholder and the project needs. For

example, they sought local expertise in the industrial sector and started by considering the specific needs of each proposal. If they needed to build a demonstration unit, they required a company capable of constructing the structure with high-level work in steel and other materials, as well as a company capable of providing a detailed design of the components.

The proposals presented by Sotacarbo to the Sardinia regional government to launch discussion with the European Union, consisted of 6 projects at various levels, and they engaged with potential partners including local and multinational industries to understand their potential involvement in the project if it were to be funded. Sotacarbo aimed to demonstrate and commercialize advanced technologies in Sardinia to promote the local economy.

JASPER was involved in the JTF project when it was already drafted and helped to identify potential project proposals. JASPER identified investment proposals and developed them for financing based on a long list collected from the territory and provided written feedback on the projects. They also interacted with selected project promoters through virtual team meetings, in-person meetings and written notes.

The main objective of JTF is not environmental protection but rather the creation of awareness among the population in the area. The environment is not the primary focus of the program, and its strategy does not prioritize it, instead it focuses on diversification of economic system. Despite the high level of pollution in the region, it is hoped that the JTF's resources will contribute to both economic growth and environmental improvement, stated by the representative of autonomous region of Sardinia. However, the representative of JASPER mentions that when evaluating project proposals under the plan, both socio-economic and environmental factors are considered. This contrasts with other Cohesion Policy instruments, such as the ERDF, which have specific sectoral eligibility criteria (e.g., renewable energy or sustainable mobility). However, in the JTF regulation, there is an article (Article 2) that requires investments to contribute to a specific objective of mitigating the effects of the transition. This not only includes economic effects, but also social dimensions, particularly with regards to job losses. The representative added that the consideration of environmental factors is also important, as there may be

situations where traditional industries (e.g., mining or power generation using coal) need to be phased out. In these cases, the screening process of the project proposals takes into account the potential social and environmental impacts of the investment. For example, while renewable energy projects, such as installing PV panels, may be eligible, they may not necessarily have a positive social impact as they typically do not create jobs. The representative notes that the social aspect of investments is given more focus than the environmental aspect in JTF, compared to other Cohesion Policy instruments like the ERDF.

Additionally, the representative of JASPERS added that in terms of important policy sectors to address issues in the plan, two areas seem to be significant - energy and innovation/industrial policy. The process helped integrate these sectors at the regional level by looking at the consistency of proposed measures with regional Energy and Environment plans and the smart specialization strategy of the region. These topics were considered and integrated into the JTP. However, employment and education policies are less covered by this process. The representative of Sotacarbo shared the common idea about the integration of sectors at the regional level which is the main goal in their proposals.

Referring to JASPERS, at the level of project proposals, there were projects that would require land recontamination efforts, but these efforts would also lead to the creation of new economic activities and diversification of the economy. For example, there were proposals to overlap the circular economy and energy, such as using plastics in advanced processes to generate energy, which could create positive spillovers. There is a strong synergy between the development of certain energy areas and the decarbonization of industrial processes, and a holistic approach to planning is assumed to take these effects into account.

According to the interviews, changes in the planning phase were due to the legal framework regarding energy context and supplies, as well as unexpected challenges posed by the conflict in Ukraine. The region is facing the challenges of economic diversification and reskilling the workforce, while also considering the time constraint. Another issue is the exclusion of big firms from the JTF program, which the representative believes could have been beneficial as they could have played a leadership role in driving change.

Moreover, the stakeholders expressed the main takeaways from the TJTPs are including the importance of deeply understanding the territories, their problems, and conditions; the need for continuous intensive dialogue among institutions; and paying attention to every single actor. The lessons that can be transferred are raising awareness of people about their territory, developing a strategic vision for young people, and exchanging experiences with other territories to provide motivation for participating in the JTF program.

The representative of JASPERS stated that there are parts of the plan related to supporting the energy transition that are considered no-regret investments, as decarbonizing energy is a priority no matter what happens. Therefore, there is some flexibility in the plan as it covers a period of several years and allows for modifications if needed during evaluations. The other representatives have a differing view on the flexibility of plans and believe it is not easy to make small changes and that it is not within their control.

In terms of potential risks in the implementation process, as stated by the respondents, there is a financial risk. The next generation EU package presents a big opportunity for additional funding; however, this funding won't be paid out until 2026. There may be overlapping with the previous funding period from 2014-2020 which can lead to potential challenges in absorbing the funds. The concern is that there may be more money than available projects, which could result in potentially losing some resources. JASPERS is trying to help identify a pipeline of viable projects to minimize this risk.

The territorial specificities that are most relevant for JTF are its location-specific planning requirements. Unlike national or regional programs under the structural funds or other policy instruments, JTF focuses on territories that are typically at a much smaller scale and unique in terms of their local conditions and realities. For example, in Italy, the focus may be on phasing out industrial activities that are specific to the territory and require the retraining of workers to mitigate the risk associated with the closure of mining-related economic activities. Additionally, the territorial specificities of JTF are also related to the condition of the territory and the need to address the impact of previous mining activities and shift towards phasing out coal generation.

The interviewees suggested that the Transition Plan has a well-designed intervention logic that focuses on identifying transition challenges and using funds to address the negative impacts of the transition. The TJTPs in Sulcis Iglesiente and Taranto addresses specific challenges, but there may be a tendency for solutions to be general and not specific to the territory. This could be due to technological limitations. However, there are location-specific initiatives such as regional energy research centers proposing energy solutions based on the potential features of the region.

The place-based approach was considered a crucial approach for the development of the JTF program in the affected territories. It helped in identifying the territories based on their industrial and economic structures, resources, demographic trends, available skills, and other territorial specificities and challenges. The representative of the autonomous region of Sardinia stated that the place-based approach is a good approach, but it requires the awareness of the population and the cooperation of the municipality. It is a complicated process, but it is still a good approach. The speaker mentioned that improving place-based solutions is challenging and that continuous exchange with other experiences could help in making them better.

According to the common idea of involved stakeholders, there is a lack of physical infrastructure in Sulcis Iglesiente, including railways, ports, and human capital, which makes it difficult to implement new projects and initiatives. The representative of Sotacarbo highlighted the shortage of financial capacity in terms of infrastructure. The actors mentioned that the funding situation is better when it comes from the European Union, but the experience with national funding is concerning. For example, they have a funding program from the national government, but payments are often very late, causing financial challenges. The was a doubt regarding the efficiency of national level management in making projects feasible, as they believe that all stakeholders have the technical expertise to develop the project but not necessarily the financial capability.

Conclusion

The PN JTF contributes to the European Green Deal strategy and aims to alleviate the effects of the transition in the two regions and address the identified challenges, which are a result of recent changes in the economic and social landscape and

aims to promote territories that are environmentally sustainable. The main challenges the PN JTF will face in both regions include energy and environment, economic diversification, social and employment effects, administrative capacity, governance and simplification measures.

According to the TJTPs of two regions, the planned interventions and actions are comprehensive and well-structured based on the type and problems of the territories. Also, the interviewees expressed a high level of satisfaction with the partnership and way of managing the programming of plans. However, there were a doubt in financial risk as a scarcity of infrastructure to implement the plans. The interviewees agreed that one of the key takeaways from the JTF program is the importance of thoroughly understanding the territory and its challenges, as well as engaging all relevant stakeholders. This will allow territories facing similar issues to share experiences and learn from each other.

To summarize, the review of the TJTPs and interviews has provided valuable information about the strengths, weaknesses, and challenges of the planning process in Italy, specifically in the region of Sardinia. To ensure the success of the program, it will be crucial to address these challenges and provide support to all involved parties.

6. Results and Discussion

6.1. Introduction

The research is aimed at exploring the planning process and procedures of stakeholder involvement in the development of the Just Green Transition Plans (JGTPs). The five dimensions of Territorial Governance, as identified by the ESPON TANGO project (2013), serve as the framework for the research including stakeholder's engagement, cross-sectoral aspects, training and skilling, and territorial impact awareness. Through content analysis of these five categories of Territorial Governance and interviews conducted in two counties of Sweden, the findings of the interviews have been categorized as shown in Table 6.1.

The research process involved reading all the interviews and highlighting important notes, extracting codes from the content of the interviews, and grouping similar and common codes into themes. These themes were then compared with the indicators of Territorial Governance from the TANGO project to gain a deeper understanding of the stakeholder involvement process in the development of Just Green Transition Plans (JGTPs).

6.2. Insights from the interview

6.2.1. Tillväxtverket

The research analysis was conducted through thematic analysis to identify the key lessons from the process, highlight challenges, and best practices in the processes of the Just Green Transition Plans. According to the discussions with ten experts and stakeholders in different sectors, the four counties of Sweden- Gotland, Västra Götaland, Norrbotten, and Västerbotten- were selected as the potential regions to mitigate the emissions and get Just Transition Fund (JTF) from the European Commission.

Stakeholders' engagement

Tillväxtverket (Swedish agency for regional economic growth) was selected as the main coordinator among actors and stakeholders to coordinate the process of JTF program in Sweden from government. EU Commission and Tillväxtverket started

to communicate with various stakeholders to raise awareness regarding the JTF program through common channel of communications including meetings, media coverages, conferences, workshops, etc. the representative of Tillväxtverket highlighted that their agency had commission from national government to develop a collaboration regarding the JTF program.

Interviewees highlighted that the Just Transition Fund program proceeded with vertical coordination across institutional actors and dialogue between non-state stakeholders. To begin the process, Tillväxtverket started at the state level, county council, to consider all the relevant stakeholders to the program which was a long and complicated process. The national agency was successful in meeting the goal set by the Swedish government to include all necessary stakeholders in the program.

“What will be covered by the just Transition fund” is the topic of national political debate between the Commission and the government of Sweden. Initially, Norrbotten was the focus of the entire JTF initiative, and all the process commenced from the northern part of Sweden which is known as Norrland.

The first discussions among policy makers did not include Gotland or Västerbotten. Discussions primarily involved industrial stakeholders and then included the university and the regional authorities. As conversations were ongoing, Region Västerbotten joined to the discussions do to the potential of carrying industrial transitions in the metal industry. Later on, Region Gotland entered the discussion due to its key role in the production of cement. Therefore, it was a somewhat long interactive process. Eventually, it was decided that the Just Transition Fund should cover the three regions of Gotland, Norrbotten, and Västerbotten.

After Tillväxtverket launched the program to conduct investigations on the four counties, policy makers in the EU Commission refused the application of Västra Götaland from the fund since it has high economic power.

The investigation was started by the county council of Norrbotten (due to the focus on the steel industry in the northern part of Sweden as mentioned in the country report) who were in charge of sharing different actors of Norrbotten with Tillväxtverket. In this regard, the representative of Tillväxtverket organized joint

meetings with different stakeholders, including county council, academic actors, the county administrative board of Norrbotten and industry representatives.

The criteria for choosing counties and stakeholders were based on the government mandate which pointed out that the fund must be devoted for the decarbonization of the industry and ETS installation with high CO2 emissions. Tillväxtverket focused on pre-existing regional strategies in the counties as base for where to direct the funds.

Cross-sectoral aspects

In providing the socio-economic impact assessment Tillväxtverket had the aid of Nordregio regarding the socio-economic calculations or estimation of the changes to the industry and social economic implications.

In meanwhile, there were some conflicts of interests in the wind power among stakeholders and population as Tillväxtverket remarked that there is significant wind energy capacity in the northern Sweden. Opposition was mainly connected with the land use rights; the issue that has already been identified in previous studies. Considering these conflicts was vital when programming the JTF but it is vital to keep in mind that funding in Sweden is relatively scarce. Hence, even though these kinds of conflicts are part of the puzzle they were played out of the JTF program since this is not the only process to start to tackle the issues. Some of the issues are tackled with the ETS installation, which is looking for environmental permissions for their industry, but these kinds of conflicts always emerge.

The elaboration of the JTF program offers several benefits for the counties and stakeholders. One of the advantages of the JTF program was its ability to integrate various sectors and policies in innovative ways, resulting in a more comprehensive consideration of the socio-economic impacts of the industry on the country and the integration of economic planning perspectives. Due to the severe labor shortage in the north of Sweden, the JTF planning process revealed a strong correlation between demographic challenges and the capacity of the industry to effectively carry out its industrial transition back to north of Sweden. The extreme labor shortage endangers the capacity of the industry to carry this transition out.

According to experience of the representative of Tillväxtverket the process helped sectoral integration to increase cooperation among actors at the regional level:

“The process improved cooperation among regional actors by encouraging regional authorities and state agencies to think in new ways. The agencies had to work together and consider the impact of the transition on various factors such as the labor market and the environment. The County Councils responsible for territorial development found it useful to have all these considerations in one document.”

Training and skilling

Regarding the changes during the planning process and how much the final plan has the capacity and flexibility to adopt to the new contexts, Tillväxtverket noted that perhaps under extremely extraordinary circumstances the plan may change because the plans designed specifically due to the regulations:

“The JTPs changed during the process. Initially, the JTPs were broad and allowed for a wider range of applications, but the goal to directly address high CO2 emissions in ETS installations through JTPs led to negotiations with the European Commission. This resulted in the plans becoming more specific and focused on ensuring that funds invested in the industry would benefit the climate. The plans were narrowed and streamlined to avoid overlap with other funding instruments and to find the best interventions for different sectors. As a result, the plans are now more specific and focused than they were at the beginning of the process.”

There are several important lessons that can be transfer to other regions to prevent the potential risks in those regions even it leaded through a place-based approach. The first important point is transparency, and all regions should program the JTF in the most transparent way as Tillväxtverket as a leader of the programming highlighted that:

“The effort was to work transparently with the actors involved in the plan by publishing different versions of the drafts on their website and welcoming comments. They proactively contacted stakeholders and tried to build trust through transparency, despite difficulties during the pandemic as most meetings were held digitally. It was challenging to build trust and deal with some issues as physical meetings and deeper conversations were preferred.”

Territorial impact awareness

As the JTF program and TJGTPs are place-based, there are several territorial or place-based specificities that are most relevant to this context such as industrial or economic composition, available resources and skills, historical or cultural

traditions, demographic trends, and strength of institutions and multi-actor partnerships, collaboration culture, etc. and Tillväxtverket remarked that all these features could be relevant in each territory:

“Gotland is an island with specific challenges in access to electricity and a lack of competences in certain areas, with a less educated population compared to the national average. Northern Sweden is dominated by the big steel and iron industry, leading to a cultural connection to the industry, which is viewed both positively and negatively. There are also territorial issues with the indigenous population in northern Sweden, causing conflicts with the opening of new mines and clearing of interests. The current main issue in the region is a shortage of workforce.”

The JTF program experienced difficulties and obstacles in implementing place-based policymaking during its planning process. The main barriers were the limited funding and time, as well as political decision making. Tillväxtverket delved into these challenges in more detail:

“The budget for JTF underwent changes during the planning process. The funding originally announced was significantly increased by the Commission as a result of the Green Deal coming out of the corona situation, but then decreased again. This made the government uncertain about how the funds should be distributed, causing challenges in terms of changes to the amount of money available, who was involved, and which territories would receive it. The allocation of funds became political, leading to discussions between the political level and territories over which territories should receive the funds. Additionally, it took a long time for the European Commission to finalize the budget, causing further delays. The biggest challenge faced was the time constraint, as 70% of the funding had to be allocated by the end of the following year.”

There is a strong opportunity to reduce emissions, but measures come with many risks. With ETS installations, there are several uncertainties such as getting the green light for electrical access. It is challenging to make decisions when the full consequences are uncertain, and financing and acceptance from society are essential to carry out the project on schedule. Cementa in Gotland, for example, has faced many issues in relation to environmental permissions and societal debate surrounding its environmental impacts.

The environmental strategist of Gotland explained their experience in the initial steps regarding the process to include the county in the JTF program:

“The Swedish just transition plan was intended only for the northern part of the country, which has a concentration of energy-intensive companies. However, Gotland, with its heavy industry based on limestone extraction, argued that it

should also be part of the just transition plan. Gotland and Västra Götaland made a proposal to the European Commission, requesting to be included in the just transition, but only Gotland was accepted by the commission."

While the representative of the Luleå University of Technology stated that it could be better to join forces to provide one development plan both regions of Norrbotten and Västerbotten as they are not quite different. At the end, there are two different development plans for each two counties of Norrbotten and Västerbotten.

The steel industry in Norrbotten and the metal industry in Västerbotten have been the subject of intense debate and disputes between the two regions over how interconnected they are. The representative of national growth department in Region Norrbotten, a key person behind the JTF program, highlighted that the representative from Västerbotten could influence the political decision to include Västerbotten in the plan by arguing that the close interlinkages between the steel and metal industries in the two regions will mean that the transition will affect both regions alike. Even though, there is no clarification in the JGTP of Västerbotten that in which context there are interlinkages and how would transition can have similar influences in both regions. Since, according to the same informant methods and technologies are very different. Both industries consist of mining and production process, but through significantly diverse procedures. As a result, they are not as interconnected as they had originally intended for the regions to believe.

6.2.2. NORRBOTTEN

In the case of Norrbotten, the research involved conducting five interviews with representatives from various organizations that were actively involved in the JTF program. The representatives included those from Region Norrbotten, the County Administrative Board, the Environmental Protection Agency (EPA), the Luleå University of Technology, and the national growth department (who was also one of the writers of the Just Transition Plans (JTPs)). These interviews aimed to gain a comprehensive understanding of the stakeholder involvement process in the development of JGTPs in Norrbotten.

Stakeholders' engagement

The coordination process among institutions and actors proceeded up smoothly and perfectly because there was a strong collaboration among involved actors under the expert leadership Tillväxtverket. For instance, the region of Norrbotten provided input on the stakeholders, organizations, and labor unions that were potentially relevant to just transition plans in the county of Norrbotten. In this regard, the coordination of developing the JTF program regarding transition to a just green economy was successful in Norrbotten. However, the citizens and indigenous people were not involved directly in the planning process and the representative of citizens involved such as municipalities and citizens will be involved more directly in the implementation process. Also, there were discussions with the Sami parliament to be aware about their needs and there were conflicts of interests regarding the reindeer hardening and land uses in the future.

There was a significant controversy regarding the emphasis of the funding in Sweden, particularly, from the Norrbotten and Västerbotten sides. The ambition of the regions was to consume the fund to manage the effects of the zero carbon emissions on the society, nevertheless, the government has provided a priority to reduce emissions from the big emitting companies. Therefore, focusing on allocating fund to big emitting industries became a criterion to identify stakeholders and a few stakeholders were missing in the planning process. For instance, different stakeholders of SMEs, schools, as well as the hospital system, etc. Furthermore, the Region Norrbotten representative noted the fundamental criteria that were taken into account to identify the stakeholders. The criteria were to identify the organizations and households that the transition of the industry to zero carbon emissions will have an impact on. The representative of national growth department who was one of the writers of the JTF program additionally stated the following:

"The target companies for the fund and transition plan were already known. The challenge was to find a balance between reducing the scope of the fund to prevent inefficiency, while still ensuring that it was broad enough to include all relevant regions, stakeholders, and those involved in both the downstream and upstream portions of the value chain of materials and companies. Despite the challenge, it seems that a successful outcome was achieved."

Moreover, the representative of county administrative board of region Norrbotten highlighted that the civil society sector was missing in the coordination process of involving relevant actors and stakeholders, while this sector has an important role for society:

“The process of green transition is at full swing for the moment, and it is quite early to make definite conclusions regarding the coordination process. At this stage, the process is improving. Initially, it was heavily dominated by top – down approaches, but now the civil society and other actors and institutions are being included and having greater influence which is crucial for society.”

In Norrbotten, raising awareness regarding the JTF program started quite early through joint and bi-lateral meetings with different stakeholders (e.g., industry and academics institutions) as well as some meetings in the format of workshops to have an inclusive process. In this regard, the representative of the Luleå University of Technology was early involved in discussion with Region Norrbotten and the regional development part of all the region. Also, the Environmental Protection Agency (EPA) invited to participate into some meetings with Tillväxtverket and other stakeholders of the region (e.g., energy agency, technical, and industrial experts) to be involve in the process. The EPA always was in communication with almost four of different industrial and technological experts to prepare the draft of the environmental impact assessment. Additionally, since Norrbotten is a huge region with few stakeholders, they were frequently in dialogue and had consultations more than minimum level with other stakeholders.

The regional platforms and contacts in the region enabled the environmental protection agency to communicate with stakeholders. They could collaborate in this regard with the county administrative board, which is the state's local offices in each county. Having the appropriate connections and information from the county administrative board was also helpful for dealing with their doubts and questions.

Cross-sectoral aspects

Due to the focus of the plans on the companies with higher emissions, the environmental impact assessment gave much more weight compared to the social factors in the plans of the JTF program. This action has not been a critique form the regions, at least Norrbotten and Västerbotten, during the entire process. Only

a very minor portion of the strategy is concerned with the social effects of the transition. This is presumably due to pretty welfare system of Sweden. Therefore, there is a visible and explicit imbalance between socio-economic impact assessment and environmental impact assessment. Additionally, the representative of the Luleå University of Technology was on the opinion that even though the socio-economic and environmental impact assessment is a particular case where there is a good match between sustainability goals, in the case of the JTF program, the environmental issues played a greater role than the other economic or social factors. However, it was well under control. The just green actions satisfy all social, economic, and environmental requirements, but it takes time to observe results. In meanwhile, the Environmental Protection Agency (EPA) was also actively involved to provide the environmental impact assessment for the county of Norrbotten and the representative of EPA at the climate policy unit emphasized the need to find a balance between these two requirements:

“The involvement of EPA mainly centered around conducting environmental impact assessments, although they were cognizant of the social aspects of the Just Transition Fund. The expertise of EPA primarily lies in evaluating the environmental impacts of the fund and its ability to support the transition of industries. However, the EPA had discussions regarding the social aspects, such as programs and initiatives that could help address these aspects, as well as competence and skills.”

Nevertheless, the representative of national growth department who was one of the writers of the JTF program discussed regarding the balance between socio-economic impact assessment and environmental impact assessment:

“The primary objective of the fund is to facilitate the transition in areas that are most impacted by it, encompassing both social and environmental changes. When it comes to upskilling workers, which is a significant challenge, it is important to consider what is needed from a delivery perspective and enhance knowledge throughout the entire value chain, both upwards and backwards. Therefore, both social such as competence and upskilling workers and transition within companies must be considered to achieve a successful outcome.”

Generally, the green transition fund provides a fantastic opportunity for all regions to move towards carbon emission free. In this light, all stakeholders were eager to get involved in the planning process so they could enjoy the benefits of fund in their individual regions. It was difficult to navigate the interests of every actor with the fund's genuine objectives and their connections to the JTF program. Furthermore,

because the actors and sectors had already established strong relations through the previous programs, it is difficult to discuss the strong relationships that occurred in the favor of the transition program.

There was a synergy and integration among universities as institutions, regions, municipalities, and ministers across policy sectors to achieve the just and green development in the region. The representative of the Luleå University of Technology emphasized the need for stakeholders' engagement at a regional level, as this is where the responsibility should lie according to the structure of the Just Transition Fund. Currently, the university's engagement in policy-making is bilateral with the region. However, the representative expressed a desire for a broader dialogue involving industry and other stakeholders in reskilling and upskilling efforts, as well as research related to the just transition. He suggested that a broader stakeholder engagement would have been a better choice to achieve more comprehensive and effective collaboration.

The steel industry or more specifically, the iron ore mining and steel production sector in Norrbotten, should be considered as the significant sectors to address the challenges of the plan. In addition, these industries have already participated in direct bilateral conversations with Tillväxtverket and were invited to a discussion with the EU Commission, the Swedish desk, Tillväxtverket, arbiters, the employment agency, and other relevant parties by the region. They have actively been engaged in many ways.

For the Just Green Transition Fund program to be successful over time, several policy sectors are crucial to address the shortcomings in the plans. The representative of the county administrative board remarked the three important policy sectors that are signified. Since skilled workers are in high demand in both the public and private sectors of the Norrbotten county labor market, "competence development" is the first policy sector has to be targeted. Second, a solid approach needs to be taken to the policy sector of "housing and construction." The high number of completed houses and apartments needed to meet the expected influx of around +100 000 inhabitants in the two most northern counties during the future decades is of greatest priority. Thirdly, progressive ideas and reforms must be implemented to develop the "gender equality" policy sector. Tradition dictates that

both men and women have traditionally gone to school first before accepting positions in the typical "male" and "female" commercial sectors. There is no doubt that we need to alter our attitude, both in the context of the educational system and in the workplace.

Additionally, the representative of the environmental protection agency at the climate policy unit remarked that the focus regarding the most important sectors that should be addressed in the planning process was mainly on three fundamental questions that “where do we have the major emissions?”, “where can we do the major emission reductions?”, and “where in the broader policy does the JTF fit them?”.

It is clear that there is a strong synergy between the mining and steel industries in Norrbotten, as the entire value chain is located there. Although there have been discussions, there have been no conflicts between the different sectors. Norrbotten and Västerbotten collaborate closely on the value chain topic. The value chain for iron ore is primarily located in Norrbotten, but the majority of the ore is also delivered to Västerbotten from the Norrbotten mines. As a result, Norrbotten would have preferred that the definition of the metal value chain include the uppermost regions of Sweden, which would have allowed for even greater synergies.

The regional development strategies including Smart Specialization Strategy (S3) which is well considered in the JGTPs were highly contributed to the content of the JTF program. The representative of the Region Norrbotten added more details on the benefit of contribution of the regional strategies:

“The regional development strategy in Norrbotten considers sustainable development, but the Smart Specialization Strategy has a greater impact. This is because the steel industry and the mineral mining industry are defined as a specific sector to work with in the Smart Specialization Strategy. Additionally, the energy sector has become increasingly important in Norrbotten's green transition and is also specified in the smart specialization strategy. The Smart Specialization Strategy has a significant impact and is like past transition plans.”

In the contrary the representative of national growth department, one of the writers of the JTF program, believed that the regional strategies did not significantly contribute to the content of the JGT plans since they had to comply. The strategies could collaborate and produce stronger outcomes.

The spillover effects of transformation of the major sectors on the related sectors are not highly considered in the planning process. Though, it was one of the issues from the regional side to have it broad but that's not the case as it looks today, Just Transition Plan (JTP). The statements from representatives of Luleå University of Technology, the Environmental Protection Agency (EPA), and the national growth department regarding the spillover effects of major transformations that are not addressed in the planning process and final plans will be discussed below.

The representatives of the Luleå University of Technology:

"The focus was solely on the steel industry in Norrbotten and metal production in Västerbotten. The impact could have been greater if the scope was expanded to include spillover effects on other sectors."

The representative of the Environmental Protection Agency (EPA):

"The program of EPA attempted to address it by promoting the acquisition of relevant skills among employees across various industries. Not only in the main sector but also in the sub-sectors, since it is crucial for them to have the necessary skills as well. Therefore, EPA tackled this issue early on and included in the program in e sensible manners."

The representative of the national growth department:

"The transition to a fossil-free value chain is a significant and comprehensive change that affects not only the main sector such as the SSAB steel plant in Norrbotten, but also all connected parties, including upstream and downstream partners, transportation and delivery companies, and suppliers. The transition requires everyone involved to learn new technologies and work in a fossil-free manner. Regional stakeholders and Nordregio have played a crucial role in planning and considering all the upstream and downstream effects and conducting relevant studies, making the transition a much smoother process."

In the layouts of the JTF program, various roadmaps have been mentioned. All sectors have their own roadmaps with explicit directions and objectives, and the JTF is now supporting them. Additionally, a fossil-free roadmap was produced by Sweden. A few additional roadmaps worth mentioning include the use of hydrogen for ore reduction, green energy, new processes in the steel industry, inside the products of reducing the iron ore, heating the iron in the steel plant, and the processes connected to that. As a result, there is a lot of hydrogen and green electricity or energy. The most valuable and helpful action was taking into consideration Sweden's fossil-free roadmaps. The representative of the national

growth department explained the significance and importance of sector-specific roadmaps. Each sector, such as the steel and mining sector, has its own roadmap that was developed through collaboration with relevant stakeholders such as Jankatantoret and Sverige. These stakeholders played a crucial role in helping the national growth department in its work and were also involved in developing the roadmaps for the respective industries.

Facilitating sectoral integration at the regional level is one of the significant effects of the JTF program but this has posed challenges in the analysis process. For instance, some stakeholders stated that it is still quite early to criticize the process, while others thought it did not aid in sectoral integration. The representative of the Region Norrbotten emphasized that the process in the county did not help the sectoral integration at the regional level to contribute more actors in the green transition process as the actors have a close connection and it is narrowly defined to enhance the synergies and coordination between different sectors.

Moreover, the representative of the county administration board in Region Norrbotten expressed the opinion that it is quite early to discuss if the current procedure is optimum for sufficient sectoral integration. The process of green transition will take several years and perhaps decades from now to be completed, despite the existence of a strong commence. While the representative of the Luleå University of technology remarked that process could help more to have more sectoral integration at the regional level but still it is too early to judge the integration.

The government and Tillväxtverket made an effort to give a very clear and narrow plan with explicit directions, however the simply green transition plans are not very adaptable (very static). (At first, it wasn't quite clear, but it's becoming increasingly obvious, like the demand for electricity).

Time and Just Transition fund are highly limited as the region must decide upon 75% of the total fund by 2024. Even though the planning process progressed up quite quickly, it is problematic because Sweden like any other country is an extremely bureaucratic country and implementation will be a lengthy process. So, they need to set conditions for the companies and actors who will apply for funding. Nevertheless, for the implementation phase if there will be a need to make a

change in the plan itself under specific circumstances (e.g., rules from EU Commission), there is some important issues that should be considered including; to save the job opportunities which is not a problem at this moment in Norrbotten (quite the opposite of current issue in Norrbotten) and to attract more people to move to Norrbotten. The representative of the Region Norrbotten highlighted that:

"There was a desire to expand the view of the metal value chain. In Norrbotten, the focus is on the iron or steel value chain, while in Västerbotten it is the metal industry. For example, the company Luossavaara-Kiirunavaara AB (LKAB), which is a major producer of iron ore, also has other minerals and metals that could play a crucial role in the green transition. The process of utilizing their waste to produce metals for industries related to the green transition, such as the battery industry, was emphasized as being important."

Training and skilling

Regarding the flexibility of the plan to be adopted to the new contexts in the upcoming years, the representative of the county administrative board pointed out there is absolutely demanded to be as much as flexible as it is possible:

"Sweden and the county of Norrbotten are part of the global economy, and thus, subjected to the megatrends. As these trends are changing, so need us to change."

The greatest part of the changes during the planning process was due to the internal Swedish discussions in the government, and a relation between the government, national authorities, regional authorities, and EU Commission. For instance, there was discussion for a short while regarding the region in the western part of the Sweden for the refining industry in that part which is also necessary to transform in this way; should be included or not.

People always learn something from anything. To back this notion, the planning process of JTF program also leaded to individual and institutional learning, for instance, all of the interviewees as an involved stakeholders remarked that one important lesson (also a great challenge) that is worthy to transfer to other regions is to engage all relevant stakeholders (e.g., big industries, SMEs, regions, municipalities, etc.) very early in the process (otherwise it would be an easy to miss out). Engagement of all stakeholders facilitate to understand what the need(s) of the industry and authorities is whether they are regional or national. In this case, all the infrastructures (e.g., education and research, reskilling, and upskilling) will

be provided properly to facilitate the transition in the region. An additional lesson is transparency in the planning process, discussions at three levels, and meetings from the early stages. One more lesson was in the case of Norrbotten and Västerbotten, it was not optimal to have different development plans and working parallel since the industrial ecosystem is pretty much the same. Therefore, the actions could be devoted to reflecting on the industrial system and a single comprehensive plan could address both regions. The last and important learning lesson is patient which is highlighted by many interviewees. Plans and instructions may change in the upcoming years as reality changes. All was well organised and explicit at this stage of the process. We must roll the plans, do a review and evaluation, and then wait one or two years before deciding whether to alter our action plan. The national growth department representative emphasizes the importance of patience, good listening, humility, and inclusiveness in the process of drafting the JTF program. They advise being a good listener and taking everyone's opinions into account, being humble and avoiding the perception of being a bully or dictator and keeping everyone involved from the early stage and ensuring a wide reach.

Therefore, here comes several challenges and unexpected events during the planning process. The first challenge was regarding the political decisions and internal discussions in the government of Sweden regarding the including potential regions in JTF program. The representative of the EPA at the climate policy unit expressed the process of involving different regions in the JTF program in more details:

“The process of drafting the JTPs involved multiple drafts and discussions on which regions and sectors to include. Initially, the plans were developed for Norrbotten and Gotland, but later, other regions like Västra Götaland, Västerbotten, etc., were added. The decisions on which regions to include were mainly driven by politics and national considerations. The goal was to make the just transition fund as focused as possible, to make a big contribution in fewer sectors and regions, but there were also other political considerations that influenced the final decision. The decision was made jointly by Tillväxtverket and the government.”

The representative of Region Norrbotten explains that the biggest and unexpected events in the planning process were the decisions made by the government. There were many discussions at the political level regarding the inclusion of different regions in the just transition plans. The initial plan was for Norrbotten and

Västerbotten, but the government tried to include Gotland and Västra Götaland. However, the EU Commission did not approve the inclusion of Västra Götaland, leading to the need for re-doing parts of the process. The representative also mentions that there are always unexpected events, such as the arrival of new industries that consume a lot of electricity. However, these events are part of the process and not unexpected surprises.

The second challenge involved ensuring that all relevant stakeholders were involved from the start to avoid missing the fundamental requirements in the process. These key elements include being inclusive, making sure that the transition to a sustainable economy is fair for everyone, including workers, communities, and the environment, and engaging stakeholders, as well as being transparent, adaptable, sustainable, etc. The third barrier was for Tillväxtverket to properly grasp all the technical details of the program during the planning process. However, the national agency had a great task in coordinating all different areas. In the sense the national agency is used to handle different funds but in the case of JTF program, they were dependent on the technical substance and a lot of other actors, the representative of the environmental protection agency at the climate policy unit stated.

Territorial impact awareness

As the the JTF program is a place-based program, each region or place has unique compositions. The SSAB in northern Sweden, for instance, is like the first factory in the world to totally produce Fossil Free steel.

Several place-based or territorial specificities may be relevant to the inclusion of the regions in the program, such as geographic resources and industries like SSAB that assisted in integrating the economy of Luleå, the largest city in this county. Iron ore and the steel industry are other geographical resources of this county. However, the plan does not account for the new steel plant located just 30 km from SSAB. Additionally, the representative of the County Administrative Board stated that more place-based specificities are relevant to place-based context of the JGTPs including industrial and economic composition, historical, and cultural traditions, demographic trends, available skills, and collaboration culture, etc.:

“This is more about availability of resources and skills, as well as the tradition of collaboration between different institutions and actors. However, demographic trends present a challenge in terms of developing sufficient competence.”

One of the resources in the case of Norrbotten could be the enormous investments made in battery factories, green steel, and fossil free steel. Additionally, there is a severe shortage of skilled labor, however, the existing equipment is reskilling and upskilling. To recruit more people, the cultural aspects and attractiveness of the society are essential. Also, investigate how do the rights of the indigenous people play into the transition. Therefore, the system is highly intricate and integrate. the population, labor, workforce, and competence in the north and south of Sweden varies significantly. In general, all comes together, although in various dimensions.

The representative of the Region Norrbotten expressed two scenarios regarding the concern that the JGTPs accurately follow the regional just transition specificities and challenges. If the main target is low emission, the final plans accurately target the regional JT specificities and challenges; otherwise, in other cases, such as lack of competence and workforce in Norrbotten, it does not address properly:

“The plan to reduce emissions targets the intended challenges effectively, specifically with regards to the emissions from the SSAB steel plant in Luleå, which is a significant contributor to emissions in Norrbotten county. However, the plan does not address one of the main challenges, which is the lack of resources and sufficient human capital needed to work in new industries, which was an intended inclusion in the plan but ultimately not included. while the plan effectively targets the reduction of emissions, it will create other challenges that are just as important to making the transition a reality.”

In general, it may still be quite early to evaluate the extent that JGTPs play in providing place-based solutions. But it provides the context of place-based approach. The unique circumstances in the county of Norrbotten form the basis for a large portion of the transition processes. As an illustration, mining for natural resources and the extensive usage of hydropower are both place-based. Additionally, it offers an opportunity for the industries and workers to participate in a necessary transition.

Locals are one of the JTF program's most affected groups, although they weren't fully involved in it. The lack of a regional or local person to discuss the JTF program with when they were already in transition from the previous programs, according

to the representative of the Region Norrbotten, was one of the problems that in some way excluded citizens. Regarding the use of the land and reindeer hardening, which requires a significant amount of space, there was extensive discussion with indigenous people.

The county of Norrbotten has the fundamental and critical infrastructure to implement the JGTPs, however, there is still a huge shortage in the transmission of electricity, or the railways and highways should be expanded, also housing and construction sector should be considered. There was a significant effort made throughout the planning phase to address the grids in Gotland and the skills and competence and the hydrogen infrastructure in Norrbotten and Västerbotten. Although all the critical infrastructure is not in place, it is hoped that the JTF will help to establish it since without green and proper infrastructure, it will not be possible to do the transition. The representative of the Region Norrbotten says that their biggest challenge is the physical infrastructure, specifically the transmission of electricity which needs to be enhanced to meet the demands of producing hydrogen. They also mention that they have the institutional infrastructure to make the transition happen, but the biggest challenge will be the capacity of the municipalities to build the necessary infrastructure, as they have limited personal resources and are already facing difficulties in finding people to work in the public sector.

At the end, the direction that the final JGTPs reflect the place-based context is quite well organized by Tillväxtverket but due to the shortage of labor and competence in the north part of Sweden perhaps it was better to have more concentration on social aspects, a good balance between environmental aspects and socio-economic aspects, or transition in transportation instead of mainly focus on transition in industries. The representative of the Region Norrbotten highlighted that “the industry will make the transition out of economic reasons. This will shorten the timeframe, but they would have done this anyhow.” Generally, the JTF program had a good and commenced rapidly, the scope of actions in the program could have broader scale and be more integrated.

6.2.3. GOTLAND

In the case of the Gotland, four interviews conducted with representatives of Region Gotland who were actively involved in the JTF program, the representative of County Administrative Board, and the representative of civil sector (Energycentrum) who were not actively involved in the programming.

Stakeholders' engagement

The JTF program assessment in the county of Gotland commenced with one of the representatives of Region Gotland was actively involved in the planning process. The planning process in the Region Gotland started from the cement/concrete industry in the town of Slite where it is located, and they have been active in local setting around the city. Regarding the coordination of actions of actors and institutions as well as the core sectors in the planning process of JTF in Gotland County, the representative of Region Gotland highlighted that:

"The central government in Sweden initiated a national project called Carbon-Free Sweden (Fossilfritt Sverige) to create roadmaps for key industry sectors, including construction. The construction sector, including companies like Cementa, provided inputs on how to transition from a carbon-dependent to a green industry. Gotland was appointed as an energy transition pilot and the Swedish National Agency for Energy created a roadmap within this framework."

Furthermore, the representative of the Region Gotland added that considering the fact that there is a regional development strategy, and all the essential components are present, it isn't necessary to precisely distinguish from JTF because it has already been identified in earlier work. Therefore, we used these procedures, and we also conducted interviews with both internal and external corporate officials. Both the corporation in charge of the energy grid and the concrete plant in Slite are direct benefactors of Gotland's industry, which is also responsible for the island's electronic or electrical infrastructure improvement.

The main coordinator of the planning process was entirely the national agency, Tillväxtverket, with a lot of experience of dialogue and interaction with regional level. The first representatives of Region Gotland highlighted that Tillväxtverket is a national agency, but they actually used their experience to inform. One of the salient examples could be that they were always available to respond all the

concerns and queries. Whole of the process and raising awareness started from the Tillväxtverket, and they invited region to meetings, and they made a number of interviews with region Gotland.

Tillväxtverket was the most important actor to facilitate the planning process directly to engage stakeholders and the process organized professionally. The representative of the Region Gotland highlighted their experience of collaboration with the national agency, Tillväxtverket:

“The national agency was dedicated, transparent, smooth and efficient, which is a key success factor. They were able to provide information on funding from the European Union and made an excellent report through Nordregio. The agency, Tillväxtverket, was very open and proactive throughout the entire process, responding quickly to the offer from the Commission to subcontract Nordregio. The process was fast and efficient.”

The extent to which Region Gotland should become involved at the regional level initially caused some confusion. They played a crucial role in informing Tillväxtverket to potential stakeholders. Establishing first contact with the two involved companies in Gotland took a while. The development of the plan did not cause any disagreement amongst the various sectors. The fundamental concern, however, is the ongoing procedure considering the access of Cementa to extended permissions to extract more raw materials from the ground, which is a constant issue but has no conflicts connected to JTF.

It was simple to include the stakeholders in Gotland because everyone wanted to help reduce the emissions of fossil fuels there. The 90 percent of the industrial emissions on Gotland come from one plant. They claim that they represent a small percentage of all industrial emissions in Sweden. They therefore play the primary role in the industry's potential transition, although the transition of a cement plant means that they need more electricity. In terms of the steel industry, it differs slightly from northern Sweden. The carbon sequestered from fuel will need significantly more electricity to the cement factory. Therefore, it's possible that CCS won't increase the energy efficiency of cement production; rather, it will cause cement production to become less energy efficient. In this regard, it is necessary to enable the delivery of significantly more electricity to the cement plant. According to the environmental strategist of Gotland, this also affects the local electrical grid

firm on Gotland. Moreover, the representative regarding the stakeholder's involvement added:

"On Gotland, there is currently no process to involve locals in the just transition fund for the cement factory. Public considerations will need to be taken into account regarding issues such as limestone mining, the cement factory, and improving the electrical grid. Environmental concerns are present, particularly about the impact on groundwater from the open bit on Gotland. The approach must involve multiple stakeholders, and every time a new electrical grid is requested, public considerations will take time to determine acceptable solutions. The goal is to make the cement factory less harmful to the environment while addressing public concerns."

Cross-sectoral aspects

Due to the volume of questions from Tillväxtverket, Nordregio, and Trionomic, who worked together to elaborate the survey regarding climate issues, decarbonization, the region's economic situation, and labor market issues, the region of Gotland put a lot of effort into this survey. Additionally, the region recommended education to get involved because it leads to skill and training of worker. Therefore, it would be beneficial if the JTF could provide funding for some sort of skills development and training, but it turned out that the Cementa plant was not interested, so they abandoned that issue. Therefore, the institutions and actors across policy sectors integrated properly to achieve the just and green development in the region.

There are further, significant issues that need to be addressed, such as transport energy and the capacity to add prerequisites to expand the production of non-fossil fuel electricity on Gotland and in the sea surrounding Gotland. Additionally, the grid cable infrastructure connects the grid on Gotland to the mainland of Sweden. So, everything pertaining to the infrastructure for electricity was covered. There were numerous difficulties with the transportation policies. The things that just described are more like to the framework for entire regional development if Cementa is going to make their road map for transition possible, which they cannot make individually. There is a need to greatly expand the capacity for the production of fossil-free electricity. Therefore, either there must be significant investments in offshore wind power enhancement capacity, or there must be at least an updated connection to the mainland with the cable. These are just a few examples, so they had to take rob deep into their policy domains to keep it for themselves. The JTF is vital for

Cementa itself and the electricity grid on Gotland to make transition, but it's also a means to activate sort of the needs of Gotland in this regard, despite the JTF's desire to do so. Therefore, the institutions and actors across policy sectors integrated properly to achieve the just and green development in the region.

Moreover, the representative of the EPA at the climate policy unit in the county of Norrbotten added that in many different processes, there is a close relationship between industry, regions, universities, and agencies, where they learn to understand each other's needs. During the development of programs, it was important to learn from the industry and regions about their technological development, but also to have the agencies provide a second opinion on the program. The focus was on discussing technological and logistical solutions, rather than policies, as there are other processes for discussing policies.

There is no comprehensive socio-economic analysis because Gotland was appointed by the national government to an energy pilot that should be coordinated as a project by the national energy agency a few years back. The analysis is carried out on variety topics; how power production increased, social economics situation on Gotland, the tourism industry, whether it strengthened the local economy in a positive or bad way. The environmental strategist of Gotland remarked further details regarding the analysis:

“A multi-criteria analysis has been conducted to determine the best fuel for local buses, but it is difficult to fully analyze the transition. It is important to focus on the transition rather than analysis, as failure to do so will result in a dire situation in the future. The focus should be on companies and the positive outlook for the food industry in Gotland, which is a rural region with a strong agricultural industry that includes the production of food such as sausages.”

Fossil free Sweden was the initial roadmap that provided but other sectors such as cement industry produced their own roadmap with their specific directions.

The transformation of major sectors in the region could impact on related sectors (e.g., the cement sector on the construction sector). How the spillover effects are considered in the process or plans is a crucial question. How is important the cement production in the Gotland for the rest of Sweden. On Gotland, a very small fraction of the production is consumed; the majority is exported to mainland Sweden and other countries. Therefore, their cement production has been

terminated in terms of regional economic development. A significant number of employments have undoubtedly been affected, particularly in that region of Gotland, but it isn't as though the entire Gotland economy has been negatively impacted; rather, it has a direct effect. Since the cement plant on Gotland is essential to supplying Sweden and, to a lesser extent, outside of Sweden, it has an impact on construction across the rest of Sweden. They might therefore change their process to one that is more sustainable and beneficial to the construction sector. For instance, the central government had to prolong the permission for the cement industry because without it, Sweden would run out of building supplies and the construction sector would simply cease to exist. There are several consequences from the cement industry, including direct effects on the local economy and regional economy as well as indirect effects on the Swedish construction sector in general. The transmission of cement free of fossil fuels is also strengthening. The representative of the civil sector-energycenterum emphasized that if cement can transition on Gotland, that will certainly spillover to the products that are currently being produced on the market in Sweden.

“The spillover effects from halving the number of plants on the island result in excess energy that is used for district heating or cooling in surrounding villages. The cement factory uses different materials as fuel in the production process and there is no need for a waste incineration plant on Gotland. Although less than half of the cement produced by the factory is used on the island, there are large construction companies demanding greener cement. The transition to greener cement can be difficult if customers are resistant to change, but there are also customers who demand improved products. The demand for better cement can have a positive impact on Gotland, but there are negative effects from the open pit cement factory and problems with the ground. The cement factory has both positive and negative effects on Gotland and there is a need to find the best solution.”

The main actor of the County administrative board was quite his job in the sector. So, I could not reach to the comprehend information form this sector. However, through contacting the other representative of county administrative board of region Gotland who was involved less than the main stakeholders of county administrative board in the planning process, the individual could provide me with good information; They were less involved compared to region Gotland but they provided written observations and feedback regarding the process and program. The region Gotland are in charge of municipality and regional development also

one of the central actors in the county of Gotland. The county administrative board just participated in an early interview, and they were not part of any workshop.

The representative of the civil sector-energycentrum was not involved actively and merely informed that JTF program was going on and Gotland could be chosen. And he was informed at various meetings from their representatives as well as Tillväxtverket but no participation in workshops, seminars, etc. The representative stated that the initial ambition of the JTF program was extra force to mitigate the greenhouse gas emissions which is quite good, however, the is constrains in timeline and budget. The performers of fund perhaps get into problems in allocation of money through the time.

The Region Gotland - the environmental strategist, mentions the difficulties they have encountered in expanding power in certain areas of Gotland. The municipality has a legal obligation to plan for land use, and they have identified areas suitable for wind power in their comprehensive plan. However, these areas have not been developed for wind power due to environmental and economic concerns, such as the impact on wildlife and illegal populations. The municipality faces challenges in making plans that consider all opposing aspects, as they may not receive enough information from institutions such as the military. There are too many conflicting interests that make it difficult for politicians to make functional decisions.

The representative of the County Administrative Board regarding the roadmap of each sector and their direction highlighted that there are several sectors in Sweden that developed their own roadmaps but there is one specific roadmap which is fossil free Sweden (Fossilfritt Sveriges), and they developed their roadmaps under the initiative of fossil free Sweden roadmap. The roadmaps are including cement industry roadmaps, concrete industry roadmap, construction and civil engineering sector, electricity sector, gas sector, petroleum and biofuel industry and many other sectors (e.g., concrete industry, steel industry, etc.) all towards national climate gaols. Regarding the roadmaps, the regional development strategy states that Gotland should be a pioneer to be carbon neutral and even climate positive and sets some goals for how much energy renewable energy that should be produced on Gotland.

The representative of the Region Gotland stated that the sectoral integration at the regional level in Gotland should be remained to be seen because the plan itself has only been adopted by the acknowledge of commission and the first calls are already in operation. The plan will help to enhance the capacity of the electricity grid on Gotland, and it will probably not have significant effect on the transportation sectors or those sectors that contribute to the transition to decarbonization. Concerns have also raised regarding the elaboration of CCS techniques which is not in place.

Training and skilling

The representatives of the county of Gotland generally emphasized that the program was launched professionally and hoped to be implemented properly due to time constraints available for the most critical part, implementation.

According to the representative of the civil sector-energycentrum, the final JGTP plans are very set in stone and the process of creating them did not offer any opportunities for learning for their organization. In specific cases where changes need to be made without changing the plan, the representative would like to see more involvement from nearby communities, such as Slite, in the process to create a greater connection with the society surrounding the cement plant. They believe that involving those close to the plant, such as those in the supply chain or in its vicinity, would have been a positive outcome.

Territorial impact awareness

The three regions were selected to receive funds primarily due to the presence of industrial plants that generate a significant amount of carbon dioxide through the program industrial process. The central government of Sweden decided that they only look at the list of individual plants that provide the most carbon emissions, despite the fact that with just transition fund basically it's about all the aspects including economic composition, available resources and skills, the historical and cultural traditions, demographic trends, the strength of institutions and multi-actor partnerships, collaboration culture, and other reasons. So, they sort of choose the regions based on the purpose of decarbonization of industries.

Heritage is quite relevant place-based specificity. for instance, there is an old traditional when it comes to producing construction material, cement, or concrete, especially in the northern east coast of Gotland (the city of Slite). The fact that many people are still working in this industry. So, there is definitely industrial heritage here that should be taken it to consideration.

There are strategic areas in Gotland which are identified are cement industry and food and agriculture industry and tourism industry as place-based specificities, however, the food industry is not financially supported. The environmental strategist of Gotland added:

“The energy transition in the area should focus on the cement industry, including carbon capture and storage, as it is a major contributor to environmental problems including climate change. If the cement industry is successful, then it will have a positive impact on the success of the rest of the Gotland's efforts. The goal is to support each other in the transition.”

The final plan of Just Green Transition accurately targets regional just transition specificities and challenges. The representative of Region Gotland has expressed their satisfaction with the Just Transition Plan, stating that it has captured the important challenges faced by the regional and Swedish economy. However, they also recognize that the plan has its limitations and that there are technological challenges involved in the timeline for implementation. The representative notes that the region is an island with an insular economy, relying heavily on aviation and maritime transportation and seasonal industries such as agriculture, hospitality, and tourism, which makes it difficult to attract and retain skills. According to respondent, the conflicts between stakeholders are inevitable when it comes to industrial activities and extraction of raw materials from the soil as this will always result in ecological challenges.

The cement industry, the transportation sector, and CCS are considered as the major issues by the environmental strategist of Gotland. Due to the necessity for ferry development on Gotland as an island and the lack of technical expertise, a technical aspect of transition may be evident.

Overall referring to respondents, it appears that the place-based context in the JTF program is beneficial and extremely pinpointing. Although the three plants in question in Sweden have always had ambitious, the fund may be able to speed up

their transition. Using a place-based strategy, laws would start with the local conditions in a way that would make the program more adapted to the setting where the industry is located. Thus, it ought to make sense and presumably, this has been done in such a way that we can now demonstrate results as well, the representative of the civil sector-energycentrum stated. Furthermore, providing funds can accelerate and facilitate the place-base solutions.

While the environmental strategist of Gotland stated that in the process of transition it is difficult to be optimistic because it is so gradual. many political judgments are in incorrect direction in the process.

6.3. Assessing Territorial Governance

Themes were realized based on the codes, which were extracted in accordance with the interpretation of the interviews. Table 6.1 illustrates the fundamental concepts that were emphasized by involved stakeholders during interviews. Refer to Appendix A to grasp a further detailed information which interprets how well the planning process of JTF program in Sweden aligns with the indicators and dimensions of territorial governance in the ESPON TANGO project (2013).

Table 6.1 – An overview of principal commonalities of interviews

Stakeholders	Dimensions	Indicators	Codes	Themes
1.Coordinator 2.Norrbotten 3.Gotland	1. Coordination actions of actors and institutions	1.Governing capacity 2.Leadership 3.Subsidiarity	C1 - Mandatory program from government with specific aim of decarbonization; with pre-defined structures to involve relevant actors and sectors. C2 - Responsibility of Coordination by Tillväxtverket. C3 - Responsibility of regional development and climate strategy by county council of regions. C4 - Communicating through digital tools, meetings (thematic, bi-lateral), written consultation, etc. in group of different actors to have an inclusive process. C5 - Government, national political level, and EU discussions concerning the inclusion of potential regions in JTF program.	T1 – Good leadership and coordination by EU Commission and Tillväxtverket T2 - Good coordination and collaboration with Tillväxtverket T3 - Bottom-up process T4 - Unstable and limited budget, time matters, top-down process T5 - Challenge with political decisions and time constraint T6 - Not involving all the relevant stakeholders properly

			C6 – Identify potential organization to involve actors. C7 – challenges in the planning process in terms of budget, schedule, political decisions, changes due to the new guidelines. C8 - Trust the pre-existing regional development strategies and the smart specialization strategy and communicate with them. C9 – Uneven level of awareness and involvement among actors.	T7 - Well-organised planning process T8 – Trust the pre-existing strategies
	2. Integration of policy	1.Public policy 2.Cross-sector synergy	C10 - Conflicts of interest among regional stakeholders regarding the hydrologic power in Norrbotten, and cement industry permissions in Gotland, etc. C11 - Planning process of JGT helped sectoral integration at the regional level to increase cooperation among actors. C12 – Strong interaction among institutions, regions, and municipalities in the planning process, in all various aspects of regional development, and synergies because of value chain. C13 - The spillover effects of transformation of the major sectors are almost not taken into consideration in the plans. C14 - The spillover effect of cement industry on the construction sector business and spillover effect of district heating and cooling in surrounding village of cement plant have been considered in the plan as it affects the entire Sweden. C15 – Specific roadmap for each sector such as steel and mining sectors, construction sector, etc. C16 - The specific direction of the roadmaps for different sectors such as hydrogen, green energy, etc. C17 – The process of green transition did not help sectoral integration.	T9 - Conflicts of interests in the sectors of regions T10 - Proper and well-organized JGT planning process helped sectoral integration T11 - Strong connection and synergies among sectors, actors, and strategies T12 - No consideration of the spillover effects of transformation of major sectors on the related sectors T13 - Specific roadmap for each sector T14 - No sectoral integration in the transition process T15 - Balance between socio-economic impact assessment and environmental impact assessment T16 - Less considered the spill-over effect of transformation of the major sectors on the related sectors T17 - Considering the spillover effects of transformation of major sectors on the related sectors

	3. Mobilization of stakeholder participation	1.Democratic legitimacy 2.Public accountability 3.Transparency	C18 – strong interest of stakeholders to participate and highly stratified regarding the process of the JTPs. C19 – Responsible and supportive institutional actors in socio-economic impact assessment (e.g., Nordregio and Trinomic). C20 – Strong connection among social demographic issues and capacity of industries to deal with climate change. C21 - Transparency by posting the preliminary versions on the Tillväxtverket website and receiving written comments. Trustworthiness was difficult to establish because of the pandemic and online meetings. C22 - Good match between the sustainability goals C23 - No balance between socio-economic impact assessment and the environmental impact assessment. C24 – No emphasis on socio-economic actions.	T18 - Strong interest of actors to collaborate T19 - Transparency in coordination of actors and planning process T 20 - Focus of the plan on environmental issues - no balance between environmental and economic impact assessment
	4. Adaptability of plans to new contexts	1.Reflexibility 2.Adaptability	C25 – Changes in drafting the plan because of the political decisions and discussions at various levels. C26 – Takeaways from the program and planning process including to engage all actors from early stages, transparency in the process, good dialogue between regional and national decision makers, being patient. C27 – Transferable lesson is to engage all actors simultaneously to understand the issues at the regional and institutional level.	T21 - Changes of plan in the planning process T22 - Institutional and individual learning
	5. Releasing place-based / territorial specificities and impacts	1.Territorial relationality 2.Territorial knowledgeability	C28 – Territorial challenges including Lack of competence (e.g., less educated population) in Gotland Island and shortage of workforce in Northern part of Sweden, and cultural damage of working in steel industry, high fossil emissions of industrial sector in Gotland. C29 – Territorial specificities and capacity of region for implementation including physical	T23 - Territorial challenges, specificities, and capacity of the region for implementation T24 - Relevant place-based approach

			infrastructure in Norrbotten, geographic resources and steel pump industry, and strategic areas in Gotland such as food and cement industries. C30 – Successful and relevant approach design which reflects the context and aim of the plan. C31 – Improvement needs in some aspects of infrastructures such as railways and highways, constructing and housing.	

As we discussed earlier in the chapter on literature review, Territorial Governance (TG) contains five dimensions, twelve indicators, and twenty components. The interpretation demonstrates that there are commonalities between the produced themes and the indicators of TG.

The pre-defined framework and decarbonization of the major emitter industries as well as the ETS installation with the high CO2 emission, has strong compatibility with the component **three and twelve** of TG which are the **structures of coordination and insights into the territorial governance processes** respectively. It means the structure of coordination of actions among actors and stakeholders and how to involve them in the planning process are completely clarified and pointed out by the government. In this light, it's a top-down process while it could be a bottom-process as it affects the local level more than on upper levels. The relation to this theme is component **two** which is the **distinguishing modes of leadership**. However, the platform for the participation and involving the stakeholders among institutions and actors to achieve green development in regions is the Sustainable Development Goals (SDGs), Agenda 2030, and regional development strategy. The theme is compiled with component **five** which is the **structural context for sectoral integration**.

Simultaneously, the government and EU Commission spread the power to other levels to coordinate the process in more detail such as the representative of the national level at the regional level and then regions (to draft the program) since they are aware of the issues and requirements in transitions (compiled with the

component **one** of dimension one, i.e., **distributing power across levels**). In this light, the process is coordinated and led towards the planning for a low-carbon economy professionally by Tillväxtverket as they had several experiences in managing the funds in previous projects. Despite the existence of the different challenges in the planning process, the national agency managed the coordination of the process through digital and bilateral meetings with different levels of stakeholders and indigenous people (Sami people in the northern part of Sweden). Additionally, they raised awareness and offered an inclusive initiative by using a variety of communication techniques, such as media coverage, workshops, and conferences. However, several sectors in the Gotland region are less engaged in the process, though they were made aware of it through their representatives (e.g., the county administrative board and civil sector).

There was a good collaboration among regions and Tillväxtverket to share the relevant and potential stakeholders through local or regional connections (e.g., labor organization) according to the fundamental criteria, which organizations will be affected by the transition of industries to zero carbon emissions.

Generally, all the involved stakeholders of different levels were highly interested to participate (e.g., good collaboration between Norrbotten and Västerbotten). Also, they were quite satisfied and supportive in the planning process of JGTPs to achieve the main objective of the national initiative and the main roadmap in Sweden (compiled with component **eleven**, **integration of interests/views**). A few stakeholders were missed in the process (e.g., SMEs, schools, healthcare systems, etc.) for different reasons such as a lack of a sufficient amount of people in the region and the less capacity of people to be involved constantly with the same quality. So, it is compiled with components **four and ten** which are as follows: **dealing with constraints to coordination** and **securing democratic legitimacy and accountability**. At the end of the process, the national agency provided also written consultations and feedback through the website of Tillväxtverket. The communication activities about the JTF program are completely compiled with component **twelve** of dimension three.

In addition to political decisions as an unexpected challenge in the planning process, unstable and limited budgets and timelines could be two of the salient examples of the challenges in the planning process which are compiled in component **four**. The other issues in the initial steps were transparency in the process regarding the coordination of actors and the planning process but then it went out as different types of public calls and all the meetings and interactions among actors started (compiled with component **nine** which is the **identification of stakeholders**). Another significant problem was establishing credibility and trust in the pandemic through online meetings to include the relevant stakeholders.

There were many conflicts and discussions among stakeholders at different levels regarding the process. For instance, it was better for the two counties of Norrbotten and Västerbotten to have one regional development plan. The other conflicts of interest and discussion among stakeholders were mainly regarding the involvement of potential counties and stakeholders, actions of different sectors (e.g., the permission of the cement industry in Gotland), issues of top-down process and multi-level governance (Component **four**), new directions from politicians (political decisions), etc.

The main discussions in Norrbotten were mainly regarding the infrastructure including hydrologic power, land use particularly for reindeer hardening for indigenous people, wind power, and transportation, all these discussions are extremely important to solve in a regional or local context. However, all these issues and conflicts have been addressed by the main coordinator of the JTF program in Sweden (Tillväxtverket) professionally and it is compiled with components **seven (Dealing with sectoral conflicts)** and **eight (acknowledging sectoral conflicts)** in the second dimension (Integration of policy sectors) of TG.

One of the factors that helped the success of the Just Green Transition process and being included in the Just Transition Fund was to **trust the pre-existing regional development strategies** (e.g., Smart Specialization Strategy (S3) as there is a close connection with the regional development strategy, has more impact to the contribution of the JGTPs.) and **roadmap of each sector** with their specific direction (e.g., Green electricity) under the umbrella of the main roadmap

which is the fossil free Sweden initiative (compiled with component **six**, **achieving synergies across sectors**). However, one of the interviewees stated that regional strategies contributed to the content of just green transition plans quite a bit.

The JTF program helped strong connection and integration among sectors and actors (e.g., institutions, regions, and municipalities), nevertheless, all the involved sectors had strong connections from projects several years back. For instance, strong synergies as there is a value chain (compiled with component **six** of dimension two of TG, achieving synergies across sectors). Also, there are strong synergies in social demographic issues and the ability of the industry to its climate transition. It is quite compiled with component **eleven** of dimension three of TG (Mobilisation of stakeholder participation).

The proper and well-organised planning process of Just Green Transition helped sectoral integration at the regional level to increase cooperation among actors. As an example, the most important sectors in region Norrbotten to address the issues of the plan and integrate with other relevant sectors are mining as there are steel industry and iron ore mining (compiled with component **five** of dimension two of TG). However, the process of green transition did not help sectoral integration in the county of Norrbotten since they already have a quite close connection and it narrowly defined to increase the synergies or collaboration between different sectors. Therefore, there is a **mismatch** with component **five**. Some of the stakeholders stated that although there is a strong commence it is quite early to discuss that sectoral integration happened with aid of the JGT process.

The steel and metal industries, such as SSAB in Norrbotten and Boliden in Västerbotten, are two of the most significant sectors that are needed to meet the concerns of the plan (compiled with component **five**). Moreover, there are several important policy sectors that needed to be addressed for a successful JGT. The first policy sector is competence development because the current labor market in Norrbotten is in high demand for skilled workers in both private and public sectors. The second policy sector that requires significant attention is the housing and construction sector. due to the requirement to accommodate the considerable quantity of constructed houses and apartments. The third policy sector that is

crucial to address properly is the policy sector of gender equality which calls for progressive reforms and ideas. There is a need to improve the level of education and work systems because traditionally, both men and women have obtained an education before taking a job in the typical male and female business sector. Therefore, there is a **mismatch** with component **five** as there is a weakness in some key policy sectors.

Initially, the scope of the JGTPs was quite broad and flexible but after a while, it changed to a narrower direction through negotiations with EU Commission. In this regard, the plans due to the political decisions during the planning process changed. The final plans with a quite explicit direction are not so much flexible to be adapted to a new context unless under the circumstance of extraordinary events (e.g., new regulations from EU Commissions). It is completely compiled with components **fifteen (evidence of forward-looking actions)** and **sixteen** (i.e., **scope of the flexibility/experimentation**) of dimension four (Adaptability of plan to new contexts) of TG.

All these changes (because of the internal Swedish discussions between government and national and regional authorities) during the planning process could lead more to institutional and individual learning if universities and public schools were involved more directly (compiled with components **thirteen and fourteen** which are **institutional learning and individual learning and reflection** respectively). Some of the stakeholders stated that learning will happen moving forward.

Meanwhile, there are various lessons that can be applied to other regions. The first lesson is to engage all stakeholders from very early in the process. In this regard, it might be conceivable to comprehend the requirements of national or regional authorities and industries. The second lesson is being transparent in the discussions. The third lesson is the importance of effective communication between the EU Commission, national decision-makers, and regional decision-makers. The fourth lesson, which relates to the two counties in northern regions of Sweden, is that having a single regional development plan was preferable because they are relatively similar. The final lesson is not to rush the process and to exercise

patience and tolerance. Be a good listener and consider the viewpoints of everyone. The discussion of place-based solutions among the various levels requires additional time. Experts must therefore be involved in order to combine needs and propose territorial solutions (compiled with components **nineteen (utilisation of territorial (expert) knowledge) and twenty (integration of territorial analysis)**.

Each county has different types of specificities and challenges. For instance, the county of Norrbotten is confronted with a huge lack of competence and skilled labor, and cultural damage to working in the steel industry which endangers the capacity of industry direction transition. It is compiled with component **seventeen, criteria/logic of defining intervention area**, of dimension five, releasing place-based/territorial specificities and challenges, of TG.

Also, there are challenges in some actions and their risks such as opening new mines, and work with ETS installations; it has many risks regarding the unknown processes, permits for the electricity, decisions, financial aspects, timeline, environmental permits for the cement industry, etc. it is compiled with the component **eighteen (coping with the hard/soft functional aspects)** of dimension five of TG. As a result, depending on the measures taken in the upcoming future, there may be some difficulties during the implementation phase. The implementation phase is not currently being discussed, and it is too early to do so because the current priority is the planning phase (compiled with component **fifteen**).

The challenges and necessities regarding the county of Gotland are more concentrated to raise the level of education, particularly for the technical matter. For example, in the CCS process, needs more electrical engineers and other competent people to install the capacity for electricity on Gotland (components **seventeen and eighteen**). Although, the biggest challenge on Gotland was regarding the permission for mining in the cement industry (component **eighteen**).

The strategic areas on Gotland are high fossil emissions (almost 90% of the industrial emission on Gotland), the cement industry, the food industry, and the

tourism sector. The included sector in JTF program is the cement industry which is the largest polluter in Gotland. Energy transition in the whole area will focus on the cement industry and it must include carbon capture storage. The biggest challenge for local people is transportation as they are based on the island, the transportation sector should be developed (Components **seventeen and eighteen**). As a consequence, sustainability is the best approach for place-based solutions (components **nineteen and twenty**) but a reflection of the place-based approach in Gotland is extremely slow (**Mismatch** with component **twenty**).

The county of Norrbotten has some of the critical infrastructures to implement the program and has several specificities such as geographic resources, steel pump industry, battery factory, green steel, historical and cultural traditions, etc. Also, this county has several difficulties such as fewer available resources and skills, railways and highways needing to be developed, etc. According to the challenges, to meet the demand to recruit more people, It is necessary to attract more people to the northern counties by developing more facilities rather than only having industrial zones. Also, three should be devoted attention to reskilling and upskilling (component **eighteen**).

The decision-makers elaborated a relevant strategy, a place-based approach, for running the JTF program in three counties of Sweden. Some of the stakeholders were satisfied with the reflection of the place-based context in the final JGTPs. The extracted theme is compiled with one of the components of dimension five of TG, component **twenty**.

The spillover effects of the transformation of major sectors on the related sectors are almost not considered in the plan of region Norrbotten there is a **mismatch** with the structural context for sectoral integration (component **five**). While it is considered in region Gotland completely as the transformation of the cement sector will have an effect on the construction sector in entire Sweden. The other example on Gotland can be district heating or cooling in the surrounding village where the cement plant is located (component **five**).

The environmental protection agency (EPA) was in charge of providing environmental impact assessment and Nordregio and Trinomics for socio-

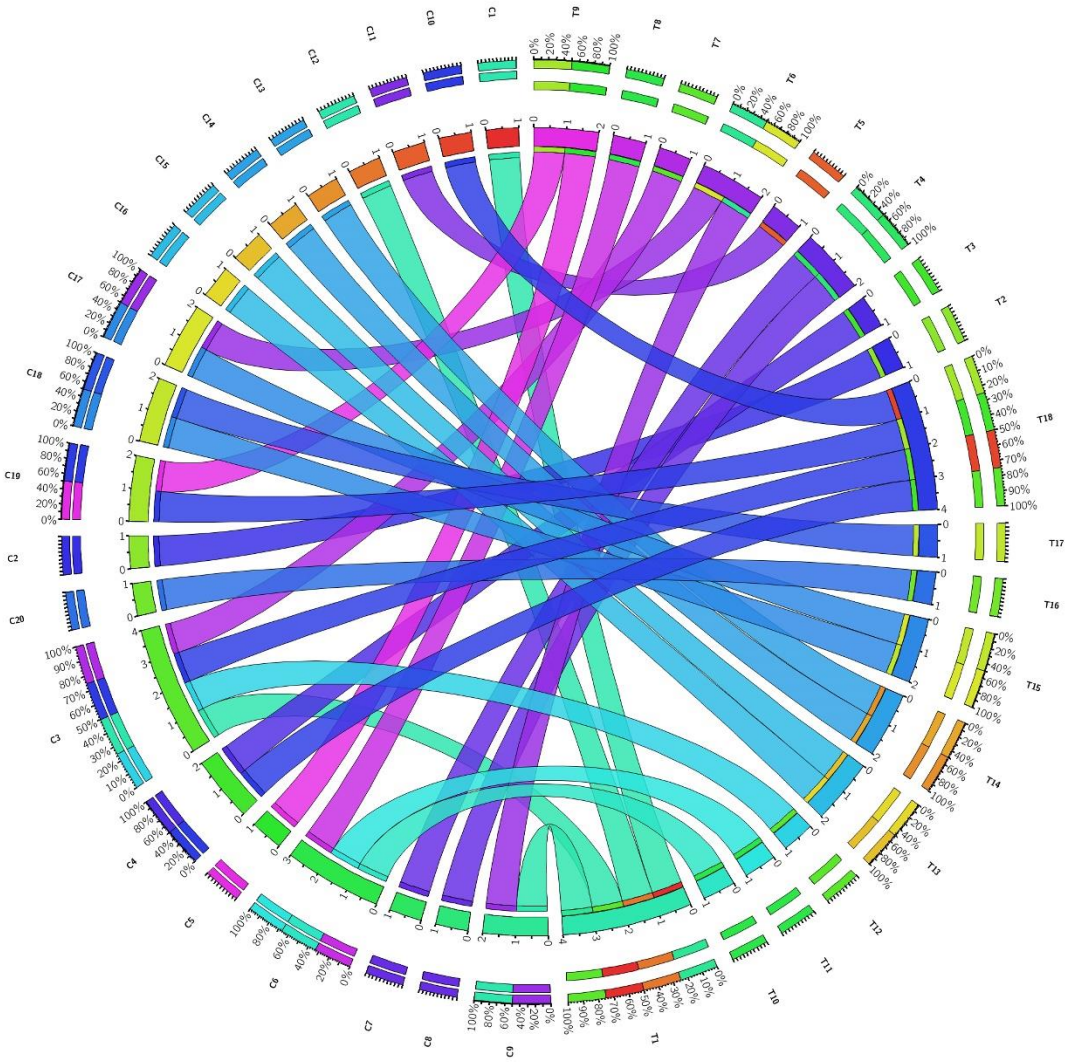
economic impact assessment. Despite the many discussions regarding the social aspects (e.g., skills and competence) and highly developed assessments, there is no balance between socio-economic impact assessment and environmental impact assessment in Norrbotten and Gotland. The primary concentration of the program is more on environmental aspects. In this light, there is a **mismatch** between component **six** and **eleven (integration of interest/viewpoints)**.

The final plans (Norrbotten and Gotland) targeted the regional JT specificities and challenges accurately if we consider the actual problems. For instance, in Norrbotten the actual problems are including to attract more people and reducing the emits from the SSAB in Luleå otherwise in terms of people, it did not target the regional JT issues (compiled with the component **seventeen**).

In the planning process, there was a big dialogue between indigenous people and local people. However, citizens are not involved directly and actively who have quite a critical role in society. It is compiled with component **ten** of dimension three of TG. Local actors are already in transitioning process even before the JTF program compiled with component **nineteen**.

In sum, due to all specificities and challenges of each county, the selected approach to proceed with the place-based approach was quite suitable design to the JTF program in Sweden. Because Sweden is a very long country with demographic issues and less intensity of people in different sectors particularly in socio-economic sectors (component twenty). Generally, there were just six mismatches between some of the extracted themes and components of the TG.

The whole interrelations between themes and components of the TG are projected in Figure 6.1. The graph illustrates the combination and frequency of the interlinkage between themes and components.



C: Component

T1: Good leadership

T2: Leadership mode

T3: JTF program challenges

T4: Conflicts of interest

T5: Sectoral integration

T6: Transparency

T7: Good collaboration

T8: Strong synergies

T9: Spillover effects

T10: Specific sectoral roadmaps

T11: Balance SEIA and EIA

T12: Well-organized planning process

T13: Flexibility

T14: Learning

T15: Territorial awareness

T16: Place-based approach

T17: Implementation capacity

T18: Stakeholder involvement

Figure 6.1 – Interrelationships of themes and components of TG

According to the graph, the major themes with higher interlinkages are Theme 1 (good leadership) and Theme 18 (stakeholder involvement). Theme 1 has relation with components 1 (distributing power across levels), 3 (structures of coordination), 9 (identification of stakeholders), 12 (insights into the territorial governance processes). Theme 18 (stakeholder involvement) connected to components 3, 4, 10, and 19 which are structures of coordination, dealing with constraints to coordination, Securing of democratic legitimacy and accountability, and utilization of territorial (expert) knowledge respectively.

In the opposite direction, that is the component 1 (distributing power across levels) which has the higher relations with themes 1, 7, 12, and 18 which are good leadership, good collaboration, well-organized planning process, and stakeholder involvement respectively.

Back to the combination of abovementioned strong interrelations it is notable that Just Transition plans in the Sweden hardly tried to be comprehensive and inclusive. However, it is still needed to involve local stakeholders and affected groups to be considered as fully inclusive plan.

7. Conclusions

7.1. Introduction

The Just Transition approach is becoming more widely recognized and utilized in the pursuit of a low-carbon society and economy. Research has shown that the concept of Just Transition involves the transition from a fossil-fuel based economy to a low-carbon and sustainable economy that prioritizes social justice and inclusiveness. Just Transition addresses not only environmental concerns, but also social and economic issues. Coordination and active participation from all parts of society is necessary to achieve a fair, equitable, and sustainable transition. To promote equity, all fundamental aspects of Just Transition should be pursued concurrently, including initiatives such as green job creation, sustainable economic growth, upskilling and reskilling programs, stakeholder involvement, and more. This approach offers a range of benefits and opportunities across different sectors of society. According to Karlsson et al. (2020), the transition to a low-carbon economy is expected to provide multiple economic benefits, including improved energy security.

Referring to literature in the field, the study focuses on three main concerns about the planning process of the Just Green Transition in Sweden, examining the challenges and best practices, potential consequences, and compatibility with Territorial Governance criteria.

More in detail, as the preparation and implementation of the Just Transition Mechanisms and the related TJTPs throughout Europe is still at an embryonic stage, this research aimed at:

- Exploring the characteristics of the governance of the TJTPs in a country – Sweden – that is at a rather advanced stage in the process.
- Use the collected knowledge to draw lessons that may be useful for other countries that only now are starting to develop their TJTPs (as in the case of Italy).

To meet the concerns and aims of the research, the study commenced with the comprehensive desk review investigating discourses in the literature. This followed

with precise and intensive analysis of TJTPs of Sweden to highlight significancy of the governing system of TJTPs, investment sectors, strategies, synergies and their challenges. The research pursuit with conducting interviews to examine the level of accuracy of the TJTPs' significances from which the best practices and transferable lessons for Italy extracted.

The novelty of the current research is to evaluate how much Territorial Just Transition planning process is aligned with the framework of Territorial Governance of ESPON TANGO project. To achieve this, thematic analysis implemented on interviews to evaluate to what extent the components and indicators of TG contribute to the extracted themes. According to the investigations and projection of the interlinkages between the extracted themes and components of TG, the planning process of JTPs in Sweden meet all the available indicators of TG.

All in all, the specified objectives of the study have achieved despite the challenges in the process of data collection such as missing affected groups and local stakeholders in interviews to gain more comprehensive insight over the outcomes of TJTPs. However, to perfectly satisfy the objectives was prone to the presence of prerequisites and circumstances which they are highlighted as the limitations and recommendations for future studies.

To sum up, findings are reporting that all involved stakeholders were quite satisfied with the direction of the JTF program and the way of coordination of actions among actors and the planning process by Tillväxtverket in Sweden and Territorial Cohesion Agency in Italy, although it was a quite dependent and top-down process. Even though the governmental system of Sweden is decentralized, and Italy has a centralized system, in the case of the JTF program there was a mandate from the government, to decarbonize and mitigate the big emitters, which brought some challenges in the multi-level governance.

Furthermore, the decentralized governance structure in Sweden facilitated the quicker programming of Just Green Transition Plans, compared to Italy, which began the process later than Sweden. The Regions are tasked with the responsibility for regional development and the creation of plans for transition,

sustainability, and green economy in industrial sectors as they have a better awareness regarding the demands of these areas.

The JTF program has placed a strong emphasis on addressing companies with high emissions and mitigating their environmental impact. As a result, the EIA has been given much greater priority than social factors in the program's plans. This may be attributed to the strength of Sweden's welfare system, which provides support for its citizens. Consequently, there is a notable imbalance between the socio-economic impact assessment and the environmental impact assessment in the JTF program.

Although the transition process is ongoing, it is a fairly long-term process, and it might be challenging for different stakeholders to participate on an equal term depending on their economical or administrative capabilities. It may be premature to judge the planning process, but it can be observed that it is generally not quite inclusive, and some stakeholders or countries were left behind in the funding process.

7.2. Contribution to policy-making: what can Italy learn from Sweden

The purpose of the recommendation framework is to outline the key lessons and considerations for successful planning process and implementation of a Just Transition Plan (JTP) in the Italian context. The framework considers the experiences and challenges faced by Sweden during the planning process of Just Transition and aim to provide guidance for other regions undergoing a similar transition. The recommendations follow as below:

- **Stakeholder involvement**

It is important to consider the perspectives and needs of all relevant stakeholders. This means to actively engage everyone who may be impacted by the program or who has a vested interest in its success. Also, it is crucial to actively listen to their concerns and needs, which means not only solicit input from stakeholders, but also take the time to fully understand their perspectives and what they are hoping to

achieve. This could involve conducting surveys, holding focus groups, or having one-on-one conversations with stakeholders.

In the case of this research, it was not possible to include all relevant stakeholders in the interviews. Thus, the results of the thesis reflects the attitudes of a selected groups of stakeholders towards TJTPs.

- **Rights of all social groups**

Respect the rights of all segments of society during the transition process. Moreover, pay attention that the implement actions do not harm selected social groups in a particular way, to the benefit of others.

By considering the needs and perspectives of all stakeholders, you can ensure that the transition is fair and equitable for everyone involved, and that it benefits all segments of society in a sustainable and positive way.

- **Mitigation of big emitting industries**

Consider the mitigation of large emitting industries when identifying stakeholders as they play an important role in the transition process. At the same time, make sure that their engagement in the implementation of the Plans do not entail only the economic benefits related to the minimization of their environmental impact, but also their commitment to implement action towards a more equitable society.

- **Balance between Environmental and Socio-economic Impact Assessment**

Ensure that both environmental and socio-economic factors are taken into consideration during the transition process, as the goal of JTP is inclusivity. Sweden did not consider the balance between EIA and SEIA in Norbotten effectively while Norrbotten is facing a shortage of workers.

To ensure that both environmental and socio-economic factors are taken into consideration during the transition process, it is important to conduct comprehensive impact assessments that consider both types of impacts.

- **System complexity**

Be aware of the complex nature of the system, including factors such as population, labor, workforce, and competence, which can vary greatly between different regions.

By taking a comprehensive and flexible approach like data-driven decision making, collaboration and partnership, and investment in education and training, decision-makers can develop and implement effective strategies that are tailored to the unique needs and demands of different regions.

- **Technologies uncertainty**

Recognize that some technologies may not be successful. A just transition seeks to ensure that the benefits and costs of technological change are distributed fairly and equitably among all stakeholders, including workers, communities, and the environment. When technologies are not successful, this can have significant impacts on these stakeholders, and it's important to plan and respond in a way that minimizes harm and supports those who are most affected.

- **Challenge of narrowing down**

Consider the fact that it's important to ensure that the focus of the plan and fund is narrow enough to be effective and efficient, while on the other hand, it's important to ensure that the plan and fund are comprehensive enough to make sense for all stakeholders, including companies and their value chains.

- **Synergies among institutions and sectors**

Provide strong synergies among institutions such as schools, municipalities, and ministers to provide relevant skills, research and innovation, competence investments and support for the young generation for a successful JTP.

- **Regional integration plan**

Evaluate the impact of the regional sectoral integration plan, such as the one in Gotland, as it may not have a significant impact on all sectors. The plan aims to improve the capacity of the electricity grid on Gotland but is unlikely to have a significant impact on the transportation or decarbonization sectors.

- **Necessary infrastructure**

Ensuring the availability of necessary infrastructure, including railways, and funding, is essential for the successful implementation of a JTP. By planning carefully, securing reliable sources of funding, leveraging public-private partnerships, using appropriate financing mechanisms, and monitoring progress regularly, etc., can help to ensure that the JTP is supported by the necessary infrastructure and funding.

- **Consideration of resources**

Consider the availability of resources, such as investments in battery factories, green steel, and fossil-free steel production, and the shortage of competence and skilled labor. By allocating resources carefully, investing in training and education, encouraging innovation and research, and monitoring progress regularly can help to ensure that the JTP can achieve its goals.

- **Capacity of municipalities**

The institutional capacity of municipalities can be a challenge, especially in smaller municipalities with limited resources. This may impact the ability to build necessary infrastructure. It is important to note that expanding the institutional capacity of a municipality requires a long-term commitment and a concerted effort from all stakeholders involved.

- **Consumer involvement**

The transition to a more sustainable future requires the involvement and support of consumers. The demand for environmentally friendly products from consumers is driving the transition, but resistance from customers who prefer traditional products can make the process difficult.

- **Early start and Time management**

Starting the JTP process early can provide more time to engage with stakeholders and respond to any changes required by the EU Commission. Time planning is also important, as tight deadlines for important milestones can result in inefficiencies. In addition, setting conditions for companies and actors applying for funding can help ensure the success of the JTP.

7.3. Contribution to the theoretical debate

In this section of the research, the investigation will be contributed to the theoretical aspects that are highlighted in the literature review of the research.

The concept of Just Transition has made a significant contribution to the theoretical debate on several fronts. initially, it has broadened the discourse of sustainable development beyond the common emphasis on environmental and economic considerations. The Just Transition framework recognizes that sustainability must also address social and equity concerns, particularly in the context of the energy transition. This has shifted the focus to the need for a more holistic approach to sustainability that considers the social and economic effects of energy transition on communities and workers.

In addition, the Just Transition concept highlights the significance of territorial governance and local involvement in the energy transition process. By emphasizing the need to involve local communities and workers in the planning and implementation of energy transition plans, the Just Transition framework acknowledges the vital role of these stakeholders play in ensuring the success of energy transition.

Moreover, Just Transition has also challenged conventional methods of energy transition by emphasizing the requirement for an inclusive, participatory, and rights-based approach towards sustainability. This has prompted discussions about the significance of involving stakeholders and the necessity for just, equitable and inclusive energy transition policies that consider the needs and perspectives of all members of society. Ultimately, the concept of Just Transition has made a valuable impact on the theoretical discourse surrounding sustainable development, energy transition and territorial governance.

However, the JTPs face several serious challenges such as lack of funding, resistance from industries, inadequate compensation, complexity, uncertainty, and slow progress. These difficulties can hinder the successful implementation of the plans and their intended outcomes. Predicting and planning for all the impacts of the transition is difficult due to the uncertain future. This vagueness of the JTPs make it complicated to secure enough funding to support the transition and offer

appropriate compensation and assistance to impacted communities. Additionally, opposing to the concept of the JTPs, they were neither completely include all stakeholders nor treating different nations in an equal manner to receive funds. Initiative of the process was bottom-up planning approach, while practically it proceeded up in a top-down system. Moreover, Transforming the economy to be more sustainable takes time, and progress may be slow, which can lead to frustration and disappointment, particularly among those communities and workers who are most impacted by the transition.

7.4. Limitations of thesis and future research perspectives

This part of the thesis acknowledges any restrictions or limitations that impacted the research and its results. This demonstrates transparency, credibility, and helps to contextualize the findings. Additionally, including the future research perspectives in the same section, can offer a roadmap for future studies and illustrate the opportunity for continual exploration and improvement in the field. This includes proposals for addressing the limitations of the current study, as well as suggestions for expanding the scope of the research in new directions.

Limitations of thesis

The current research has several limitations that should be noted. The first limitation of this study was the availability of stakeholders for interviews. The researcher communicated a quite significant number of stakeholders specifically affected groups, however a few shares of stakeholders had openness or capacity in their agenda to participate in the interviews. Hence, the outcome reflects a partiality in the gathered evidence that is skewed towards the viewpoint of one particular group of stakeholders, while the opinions and perspectives of other groups as like affected groups, minorities and indigenous people and so on were not considered. The second limitation was that some stakeholders were not fully engaged in the interview process, leading to a lack of detail in certain sectors, such as the civil sector.

The third challenge relates to the English documentation of plans in the EU. The plans are developed and available on the Just Transition platform in local languages, making it difficult to confirm the accuracy of online platform-generated translations of these documents into English. This creates a potential obstacle for cross-comparison and understanding of these plans between different countries and regions. Another obstacle was language barrier in the interviews in the case of Italy. A few potential interviewees could communicate through English language, and this is one of the reasons of a few interviews conducted in Italy. On the other hand, considering the time framework of developing thesis, the researcher could not communicate and conduct interviews with stakeholders of Taranto.

Furthermore, in the case of Norrbotten, contacting with stakeholders was quite difficult as they are facing with lack of workforces in the region. Therefore, they could not reply to emails immediately and all the interviews in the county of Norrbotten and Italy proceeded quite slow and parallelly.

The other challenge of this study was the inconsistent timing of the submission and approval of the TJTPs in the case study countries. This resulted in difficulties in obtaining the latest data and made it challenging to ensure that all the information used was up to date.

The initiative was to make comparison among two countries in terms of territorial governance in the TJTPs but since Italy submitted their proposal plan quite later than Sweden, it was not possible to share the result and satisfaction of the consequences in the interviews. The goal of this study was to compare territorial governance in TJTPs (Transition Job Training Programs) between two countries, but the later submission of the proposal plan by Italy made it difficult to gather information about the outcomes and satisfaction of the program in the interviews. As a result, a comprehensive comparison between the two countries was not possible. Despite this limitation, the data collected from Sweden provided valuable insights into territorial governance in TJTPs and the challenges faced by these programs.

Despite these challenges, efforts were made to ensure the validity and reliability of the data used in this study. The current study provides valuable insights into the topic and highlights the need for further research to address these limitations.

Future research perspectives

The current research provides a comprehensive analysis of planning process of Just Transition Plan. Future research on the planning process of Just Transition Plans could focus on the following areas:

1. **Engaging affected parties**

This can be achieved through conducting a comprehensive study at the local level that involves affected groups and local stakeholders, particularly citizens. Moreover, it is recommended to utilize the primary data resources such as in-depth interviews or survey to gain a more comprehensive view of the perspectives and experiences of these actors.

2. **Strengthening validity and reliability**

Researchers could achieve this by utilizing multiple research techniques to increase the robustness of their findings. This might involve a combination of qualitative and quantitative methods, as well as case studies, to provide a more nuanced view of the planning process.

3. **Monitoring the approved plans**

Future studies should wait until the establishment of approved plan before proceeding with any research. This is due to the fact that the plan could experience changes in funding, actions, investments, and technologies, making it challenging to study a plan that is still subject to change.

The current research provides a solid foundation for future research on the planning process of Territorial Just Transition Plans. Further examination in these areas will deepen our knowledge of how to effectively plan and implement Just Transition Plans that are inclusive, participatory, and based on rights. Overall, continued research in this area will play a crucial role in advancing Just Transition efforts and creating a better future for all.

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Appendix A

Content analysis of planning process of the JGTPs in the counties of Norrbotten and Gotland:

Coordinator - National agency				
Dimensions of Territorial Governance (TANGO-2013)	**Interviews**	**Codes**	**Themes**	**Indicator of Territorial Governance (TANGO-2013)**
Coordination actions of actors and institutions	Tillväxtverket	- Mandatory program from government with the specific aim of decarbonization of the industries and ETS installation with the high CO2 emissions. - Highlighting the required actors that should collaborate closely but still long process to identify all the relevant stakeholders by government and EU Commission	- Pre-defined structure/ mandates for involving relevant stakeholders in the planning process **(Compiled with the component 3: Structures of coordination)**	1. Governing capacity 2. Leadership 3. Subsidiarity
		- List of specific sectors that should be involved in country report. - Using meeting and workshops to make stakeholders aware about the JTF. -Digital meetings and coordination during pandemic. - Collaboration among actors, involving indigenous people. - Written Consultation process.	- Good leadership and coordination by EU Commission and Tillväxtverket through digital tools such as online and bi-lateral meetings **(Compiled with the component 3: Structures of coordination)**	
		-Trust the pre-existing regional development strategies as well as the strategy of smart specialisation and communicate with them.	**- Trust the pre-existing strategies**	
		- Development of climate strategy for each region by county council.	- Bottom-up process **(Compiled with the component 2: Distinguishing modes of leadership)**	
		- Budget changed, time constraint At the end, the Västra Götaland County did not receive fund, so it was another challenge by commission.	- Program challenges such as Unstable and limited fund, timeline, and top-down process **(Compiled with the component 4: Dealing with constraints to coordination)**	
Integration of policy		- Conflicts of interests among stakeholders in the region particularly in hydrologic power in Norrbotten and permit of cement industry in Gotland but some addressed properly.	- Conflicts of interests in the sectors of regions **(Compiled with the components 7 and 8: Dealing with sectoral conflicts and acknowledging sectoral conflicts)**	1. Public policy packaging 2. Cross-sector synergy

		- Planning process of JGT helped sectoral integration at the regional level to increase cooperation among actors.	- Proper and well-organized JGT planning process helped sectoral integration **(Compiled with the component 5: Structural context for sectoral integration)**	
Mobilization of stakeholder participation		- Strong interest of stakeholders to participate. - Responsible actors. - Satisfaction of process and JTPs and JTF. - Supportive role of institutions in socio-economic impact assessment such as Nordregio and Trinomics. - Very strong connection among sectors, e.g., social demographic issues and ability of industry to its climate transition.	- Strong interest of actors to collaborate **(Compiled with the component 11: Integration of interests/viewpoints)**	1. Democratic legitimacy 2. Public accountability 3. Transparency
		- Transparency through sharing the draft versions on Tillväxtverket website and receive the written consultations. - Difficult to make Trustworthiness due to the pandemic and through online meetings.	- Transparency in coordination of actors and planning process **(Compiled with the component 9: Identification of stakeholders)**	
		- No direct and proper involvement of citizens and the affected groups.	- No direct involvement of citizens **(Mismatch with the component 10: Securing of democratic legitimacy and accountability)**	
Adaptability of plan to new contexts		- Plans changed during the planning process. - The broad scope of the plan changed to a narrower scope through negotiations with EU commission.	- Plans changed due to the broad scope of plan at the initial steps **(Compiled with the component 16: Scope of flexibility/experimentation)**	1. Reflexibility 2. Adaptability
		- Flexibility of plan to change under specific circumstances of extraordinary events.	- Flexible to change and adopt to new contexts under specific circumstances **(Compiled with the component 15: Evidence of forward-looking actions)**	
Releazing place-based/ territorial specificities and impacts		- Lack competences such as less educated population in Gotland Island is highlighted as the territorial challenge. - The biggest challenge is the shortage of workforce particularly in the northern part of Sweden, it endangers the capacity of industry direction transition. - Cultural damage of working in the steel industry is another territorial challenge.	- Territorial challenges and specificities of the region; Lack of competences and workforces, cultural damage, etc. **(Compiled with the component of 17: Criteria/logic of defining intervention area)**	1. Territorial relationality 2. Territorial Knowledgeability
		- Issues in opening a new mine. - Challenges to work with ETS installations: It has many risks regarding the unknown process, permits the electricity, decisions, financial aspects, timeline – wider environmental permits for cement industry of Gotland.	- Challenges with actions and their risks **(Compiled with the component of 18: Coping with hard and soft/functional spaces)**	
		- Elaborate a relevant place-based approach for the three regions. - Satisfaction of reflection of place-based context in the final JGTPs.	- An overview of the regions and a relevant strategy for running the JTF program **(Compiled with the component of 20: Integration of territorial analysis)**	
Region Norrbotten				

Coordination actions of actors and institutions	Interviewee 1- Region Norrbotten	- Professional coordination by the national agency, Tillväxtverket.	- Good leadership and coordination by EU Commission and Tillväxtverket through digital tools such as online and bi-lateral meetings **(Complied with the component 3: Structures of coordination)**	1. Governing capacity 2. Leadership 3. Subsidiarity
		- Good collaboration of Region Norrbotten with Tillväxtverket to share relevant stakeholders to being involve including agencies, labor organization, etc. - The fundamental criteria to identify was like which organizations will be affected by the transition to zero carbon emissions from this industry. - Participation by bilateral meetings/ workshops in the framework of groups of different stakeholders to have an inclusive process.	- Good coordination and collaboration with Tillväxtverket **(Compiled with the component 3: Structures of coordination)**	
		- There are quite a few issues with multi-level governance.	- Issues of top-down process **(Compiled with the component 4: Dealing with constraints to coordination)**	
		- Time constraint, limited fund, and the top-down process.	- Program challenges such as Unstable and limited fund, timeline, and top-down process **(Compiled with the component 4: Dealing with constraints to coordination)**	
	Interviewee 2 – County administrative board	- The process of coordination and generally the process is getting better but at the first steps, it was much top-down coordination rather than bottom-up process.	- Top-down process **(Compiled with the component 2: Distinguishing modes of leadership)**	
		- Normal channel of communications including meetings, media coverage, conferences, workshops, etc. were used to raise the awareness of the planning process.	- Communication activities about the JTF program **(Compiled with the component 12: Insights into territorial governance processes)**	
	Interviewee 3 - Luleå University of Technology	- I Involved from the early stages in the Region Norrbotten through the meetings - We had a couple of joint meetings and workshops/ discussions between industry and the other stakeholders from the academic sides and regions quite early. - Coordination of Stakeholders in the planning process worked quite well. - As a university we had a dialogue with the regional development part of all the region.	- Good coordination and collaboration with Tillväxtverket **(Compiled with the component 3: Structures of coordination)**	

		- Regarding the governance capacity, government of Sweden decided that give the responsibility of coordination to Tillväxtverket and Responsibility for regional development rests on the regions. - Big discussion between national political level, Swedish government, and the EU Commission regarding the regions that should be included in the JTF.	- Bottom-up process **(Compiled with the component 2: Distinguishing modes of leadership)**	
		- Regions are more aware rather than national authorities what is needed for the transition to sustainable and green economy in these industrial sectors. - Regions should have a big responsibility to formulate the plans. - It was better if join focuses to make one development plan for both regions Norrbotten and Västerbotten.	- Formulation of plan by regions **(Compiled with the component 1: Distributing power across levels)**	
		- Unexpected events or challenges was political decisions.	- Challenge with political decisions **(Compiled with the component 4: Dealing with constraints to coordination)**	
	Interviewee 4 – Environmental Protection Agency (EPA)	- The coordination was very much done by Tillväxtverket. - Labor Employment Agency were sort of pinpointed to be coordinators or not coordinates cooperating with the Tillväxtverket. So, I think at our agency, we mainly were in contact with the Tillväxtverket and the other agencies and we had a few coordination meetings, we received drafts, etc. - while it was Tillväxtverket, who were the ones really coordinating with other with other actors, with the regions, etc. So, we at the EPA did not really have coordination or were in contact with the with other actors in this process.	- Good coordination and collaboration with Tillväxtverket **(Compiled with the component 3: Structures of coordination)**	
		- Tillväxtverket received a task from the government to be the ones responsible to develop the just transition plans for the different regions and then the Environmental Protection Agency, the Energy Agency, and the labor.	- Good leadership and coordination by EU Commission and Tillväxtverket **(Compiled with the component 3: Structures of coordination)**	
	Interviewee 5 - National growth department	- Most stakeholders were quite interested to participate because they saw a great opportunity for this fund and every stakeholder wanted to as clearly as possible to like show what they needed from the fund and their benefits of it and their own participation in the whole transition. - Everyone was very keen on promoting themselves and explaining why it's so important that their region or this company or whoever they spoke for, were actually a part of the fund and part of the plan.	- Strong interest of stakeholders to engage in the JTF program **(Compiled with the component 11: Integration of interests/viewpoints)**	

		- The unexpected events were when we got new directions from politicians, because the local politicians didn't agree with our planning that this is that that was the hardest. And it took a lot of time and effort to reset our work and a lot of do overs, we had to do a lot of things again. So, adding the time was the timeline itself was crazy. So, the schedule was very tight. - we've got new guidelines and new orders from the government, and we had just a couple of weeks to rewrite the whole thing. So, we're, there was quite a lot of work, which was, were quite challenging, but we made it. - One of the main barriers was time constraints. - We were in between everyone's opinion and tried to make something good. So, that was a very big challenge.	- Challenge with time constraint and political decisions **(Compiled with the component 4: Dealing with constraints to coordination)**	
Integration of policy sectors	Interviewee 1- Region Norrbotten	- Strong integration among institutions, regions, and municipalities in the planning process. - Close Compiledship in all different aspects of regional development - We had strong synergies as there is a value chain.	- Strong connection and synergies among sectors, actors, and strategies **(Compiled with the component 6: Achieving synergies across sectors)**	1. Public policy packaging 2. Cross-sector synergy
		- Close connection of the Smart specialization strategy (S3) to the regional development strategy had more impact to contribution of the JGTPs.	**- Trust the pre-existing strategies**	
		- The most important sector in Norrbotten to address the issues of the plan is steel sector. Generally mining, as there is iron ore mining and steel processing and ore processing in the region.	- The existence of most important sector in the region to integrate with other relevant sectors **(Compiled with the component 5: Structural context for sectoral integration)**	
		- There was not conflict between different sectors; there was quite a lot of discussions and maybe conflicts but there is a lot of collaboration between Norrbotten and Västerbotten County.	- Strong interest of actors of two regions to collaborate **(Compiled with the component 11: Integration of interests/viewpoints)**	
		- The spillover effects of transformation of the major sectors are almost not taken into consideration in the plans.	- No consideration of the spillover effects of transformation of major sectors on the related sectors **(Mismatch with the components 5 and 19: Structural context for sectoral integration and Utilization of territorial (expert) knowledge)**	
		- The specific direction of the roadmaps: hydrogen: the reduction of the ore, green energy: reducing the iron ore, heating: heating the iron in the steel plant, green electricity, etc.	- Specific roadmap for each sector **(Compiled with the component 6: Achieving synergies across sectors)**	

		- The proceed did not help sectoral integration, not the process of the green transition. Because they already have a very close connection. It narrowly defined to increase the synergies or the coordination between different sectors.	- No sectoral integration in the transition process **(Mismatch with the component 5: Structural context for sectoral integration)**	
	Interviewee 2 – County administrative board	- The platform for the participation among institutions and actors is basically the SDG and Agenda 2030. - There is a platform in the formal document of Regional Development Strategy. The responsibility for developing and disseminate that document is at the Region Norrbotten.	- Existence of specific platform to achieve the green development in the region **(Compiled with the component 5: Structural context for sectoral integration)**	
		- Important policy sectors that need to be addresses for a successful JGT: competence development, policy sector of housing and constructing, progressive reforms and ideas.	- Weakness in some key policy sectors **(Mismatch with the component 5: Structural context for sectoral integration)**	
		- Helped sectoral integration at the regional level: it is much too early to conclude whether the current process is optimized for sufficient sectoral integration. - The green transition process stretches several from now and decades into the future. However, I do think there is a good start so far.	- Proper and well-organized JGT planning process helped sectoral integration **(Non assessable)**	
	Interviewee 3 - Luleå University of Technology	- Most important sectors to address the issues of the plan including steel industry like SSAB in Norrbotten, and the metal industry such as Boliden in Västerbotten.	- Key sectors for the issues of the plan in the regions **(Compiled with the component 5: Structural context for sectoral integration)**	
		- The spillover effects of transformation of major sectors on the related sectors is not so much considered in the plan.	- Not considering the spillover effects of transformation of major sectors on the related sectors **(Mismatch with the components 5 and 19: Structural context for sectoral integration and Utilization of territorial (expert) knowledge)**	
		- The actors and sectors are already built Compiledship. For instance, we in academia have very close Compiledship with eh sectors since many years back.	- Strong connection and synergies among sectors, actors, and strategies **(Compiled with the component 6: Achieving synergies across sectors)**	
		- Regional strategies contributed to the content of JGTPs in a good way and the scope was too narrow.	**- Trust the pre-existing strategies**	
		- I'm not sure that the planning process of JGTPs helped sectoral integration at the regional level and it could have done much more but to be fair, it is too early to judge it.	- JGTPs planning process did not helped sectoral integration **(Non assessable)**	
		- Conflicts in land uses particularly for reindeer hardening for indigenous people, wind power, transportation, all these confidential conflicts, they are Extremely important to discuss and really solve in a regional or local context.	- Conflicts in land use and infrastructure **(Compiled with the components 7 and 8: Acknowledging sectoral conflicts and dealing with sectoral conflicts)**	

		- A good match between the sustainability goals, so, balance between socio-economic impact assessment and environmental impact assessment.	- Balance between socio-economic impact assessment and environmental impact assessment **(Compiled with the component 6: Achieving synergies across sectors)**	
	Interviewee 4 – Environmental Protection Agency (EPA)	- I think that in many, not only in the just transition fund, but in many, many different processes, we see a close Compiledship between the industry, the regions, the universities, the agencies, where we together learn to understand how, what are the different needs of the different actors etc.	Good Compiledship among institutions and actors across policy sectors integration to achieve JG development in the regions **(Compiled with the components 5 and 6: Structural context for sectoral integration and achieving synergies across sectors)**	
		- From our site being the Environmental Protection Agency, we were mainly involved in the environmental impact assessments were of course very much aware about the social aspects and it is key part of the just transition fund, and we very much agree with the purpose, but let's say our expertise is closely more close to the environmental impacts. - we had a lot of discussions around the social aspects what kind of program or initiatives would also help social aspects. We talked a lot about, you know, competence skills, etc. So, we were involved in the discussion, but our expertise is mainly within the environmental assessments.	- Balance between social and environmental aspects **(Compiled with the component 6: Achieving synergies across sectors)**	
		- I think there has been different roadmaps - About direction of roadmaps, I find it hard to go into details, but I think highlighting what are the barriers what are the needs for different sectors? I think were the main - In the fossil free Sweden initiative, I think all the sectors that now receive support from the just transition fund, they had already within Fossil Free Sweden, prepared their Fossil Free roadmaps. So, I think they were helpful. Definitely. - The industry again in communication with Tillväxtverket, elaborated on that…But I think those roadmaps from the fossil free Sweden and I'm sure they were, they were helpful in this.	- Specific roadmap for each sector **(Compiled with the component 6: Achieving synergies across sectors)**	
		- I think that process helped sectoral integration at the regional level, but I don't know	- Not sure about the sectoral integration at the regional level **(Not assessable)**	

	Interviewee 5 - National growth department	- Conflicts between definitely Norrbotten and Västerbotten. - Our first suggestion was to exclude the Västerbotten from the plan - Stakeholders of Västerbotten could explain their way and their plays into the just transitional plan, and how the steel and the metal sector are interconnected in some ways. - It was quite challenging for us to navigate through everyone's interests and see and compare that to what the fund's actual goal is and the aim for the fund is that also has had to like correlate with the just transition plans, the Green Deal from EU which is the starting point of everything. So that was the main goal and we had to like shift in everything all stakeholders own interests. So, it complied with the goals and main issues that was the part the like the whole idea of the of the fund.	- Conflicts of interests in the sectors of regions **(Compiled with the components 7 and 8: Dealing with sectoral conflicts and acknowledging sectoral conflicts)**	
		- Spillover effects considered quite some bit, because if you want to make a change at a site, like SSAB in Norrbotten then everything up to that site has to change as well. - Downstream use and upstream use every like delivery company that works in the mine or works with something that has to do with the transportation or maintenance everything they have to be having learned new technologies they have to learn how to work fossil free because if the whole value chain is supposed to be Fossil Free, the delivery guys cannot work with or suppliers cannot work with fossil driven vehicles for instance. - It's a huge, huge transition. It's not just about the actual sites like the steel plant is it's about all everyone connected to it and everyone buying from factory also everyone's selling to them. So, it's a huge machinery that has to make the has to make a transition in order to make it work. And this is where the regional stakeholders were very helpful in in planning and looking out all the way upstream and downstream and we had a tremendous help from Nordregio as well doing studies of this sort. So, it was very, very good.	- Less considered the spill-over effect of transformation of the major sectors on the related sectors **(Mismatch with the components 5 and 19: Structural context for sectoral integration and Utilization of territorial (expert) knowledge)**	
		- Strong connection among actors and sectors; We haven't seen the results yet. But indeed, I think it will help make the Compiled ship stronger.	- Soon to discuss about the strong connection among sectors and actors **(Not assessable)**	

		- Regional strategies contributed quite a bit actually. Because they had to comply. They can't be conflicting strategies. The strategies have to comply. So quite a bit of work was put into making them go hand in hand, actually, I'm trying to adapt and adjust the plans and the work ahead to see through that both that every strategy could work together and making them stronger together and the results better as a result of that.	- **Less contribution of regional strategies to the content of just green Transition Plans**	
		- very much so because the aim of the fund is to make a transition in the regions that are mostly affected of the transition. So that comes with social and environmental transition. So, you have to like to take into consideration like, what's the called upscaling of workers is one very big issue and if you want to upscale workers, what do you need? From the deliveries point of view? Do you have to upscale knowledge upwards and backwards in the value chain? So, it has it's very, like both of them very much social, like competence and upscaling workers and everything very important as well as just as transition in the actual companies.	- Balance between social and environmental aspects **(Compiled with the component 6: Achieving synergies across sectors)**	
		-There are roadmaps in every sector, and we gather there are roadmaps in every sector. - The steel sector has one roadmap, and the mining sector has one roadmap and we started by reading them, reaching out to the stakeholders in taken apart to develop these roadmaps and they very much guided us in our work and the stakeholders like Jernkontoret and Sverige, which is the steel organization and mining organizations like branch organization, you can say helped us in a great way. And they have also been a part of developing the roadmaps for the industries. So, it was very important work.	- Specific roadmap for each sector **(Compiled with the component 6: Achieving synergies across sectors)**	
Mobilization of stakeholder participation	Interviewee 1- Region Norrbotten	- A few stakeholders missed; we would need to have more dialogue with SMEs of different stakeholders as well as schools, healthcare systems, etc. but generally managed to include all relevant stakeholders. - Region Norrbotten is always in dialogue with stakeholders. We probably have more consultations the just minimum level. Lack of sufficient amount of people in the Region Norrbotten.	- Involve all stakeholders actively **(Compiled with the components, component 4, 10, and 19: Dealing with constraints to coordination, securing of democratic legitimacy and accountability, and Utilization of territorial (expert) knowledge)**	1. Democratic legitimacy 2. Public accountability 3. Transparency
		- No balance between socio-economic impact assessment and the environmental impact assessment. - The environmental impact assessment is taken into consideration a lot more than social aspects.	-Focus of the plan on environmental issues **(Mismatch with the component 11: Integration of interests/viewpoints)**	

		- Transparency of Swedish government on the biggest emitters to receive fund. - Big discussions with Norrbotten and Västerbotten about the focus of funds in Sweden. - Emphasis of government on the big emitters.	- Explicit purpose of JTF program **(Compiled with the components 11 and 12: Integration of interests/viewpoints and insights into territorial governance processes)**	
	Interviewee 2 – County administrative board	- Regarding the satisfaction of process: My contention is that the process is in full swing, and hence, far to early drawing any firm conclusions. - The transition process is in itself quite abstract and on a long-term basis, which makes it challenging for different stakeholders depending on their economical or administrative capacitive to participate on equal terms.	-Well-organized planning process **(Compiled with the component 3: structures of coordination)**	
	Interviewee 3 - Luleå University of Technology	- I've provided comments on Norrbotten and Västerbotten. - The organisation was quite quiet for quite a while. And then, suddenly everything went out as different type of public calls than for actions. So, I guess that could have been a bit more interactivity in the later stages, but I think in the earlier stages I have nothing to complain about. I think that was organized quite well. - I heard that the discussion among government, national and regional authorities were ongoing, and changes appeared in one and half year, but the process was not transparent.	- Transparency in coordination of actors and planning process **(Compiled with the component 9: Identification of stakeholders)**	
		- I don't think there was a big dialogue with indigenous people and local people. - For the local people in the Chamber of Commerce and not sure how much they were engaged either. Of course, we were engaged quite early from the academic side and we I guess you can call us local people as well. - I agree involving local actors is important.	- Not direct and active involving citizens and local actors **(Mismatch with the component of 10: Securing of democratic legitimacy and accountability)**	

	Interviewee 4 – Environmental Protection Agency (EPA)	- To raise awareness regarding the JTF program, a number of meetings, Tillväxtverket, but also a few meetings were where the commission were present, and they presented their the background for the JTF. - we were also invited to participate or listening into some of the meetings that the Tillväxtverket hosted with some of the region's, some of the industries. - In those meetings, we were more listening in actually taking an active part. - Satisfaction of coordination: I think from our side, from my side, I'm satisfied, I think we contributed well within the different agencies' competences. - The Tillväxtverket were very much my sense is that they really did a great job in you know, understanding the context the substance in doing their parts of the coordination, etc. So, so I did not lack anything in terms of coordination.	- Good coordination and communication activities regarding the JTF program **(Compiled with, component 3: (Structures of coordination) and components 9 and 12: Identification of stakeholders and insights into territorial governance processes)**	
		- It was very clear that it was the growth analysis things Tillväxtverket who were the main driver of the of the process.	- Transparency in coordination of actors and planning process **(Compiled with the component 9: Identification of stakeholders)**	
		- I think it was a pretty well set up process	- Well-organized planning process **(Compiled with the component 3: structures of coordination)**	
	Interviewee 5 - National growth department	- When I read the program now, it's not very super clear either about the process of Norrbotten and Västerbotten and the reason of exclusion at the initial steps but I see still Västerbotten has challenges in how they want to actually perform their transition at sites in Boliden. So, there's a lot of research needed and so on. So, hopefully, they will find measures that will help them in their transition.	- Transparency in coordination of actors and planning process **(Compiled with the component 9: Identification of stakeholders)**	

		- Regarding the satisfaction in process; it was challenging at first and it was challenging along the way, because they didn't always agree with us, agree with our analysis and analysis that were made from Nordregio and Trinomics, which helped us very much during the process. - It was quite challenging several times. A lot of decision making were based on political agreements rather than environmental progress. So, it became we became like playing party in a chess game and we just moved round, and we had to adapt depending on which politician said Who and which region. - It was a lot of political hustling that we can affect which we were just affected by it. So that was a bit challenging. And it took a lot of energy. Quite some time as well. But in the end, it all worked out. Well. I think and hopefully the fund will be very successful.	- Challenges in process but successful process **(Compiled with the component 3: structures of coordination)**	
		- We very much used regional platforms like region Västerbotten and so on region Norrbotten. So, they have the local and regional connections, local and regional know how, which companies and other stakeholders that would be like in the scope of the fund and we started by reaching out to them and they helped us with the contact information to other stakeholders like the companies that were pointed out and so we've got in contact with the right persons quite quickly. - We also work with county administrative board, which is also very local, like the state's local offices in every county, so they also helped us with the right connections and the right input for working with our questions.	- Good leadership and coordination by EU Commission and Tillväxtverket through local and regional connections, digital tools such as online and bi-lateral meetings **(Complied with the component 3: Structures of coordination)**	
Adaptability of plan to new contexts	Interviewee 1- Region Norrbotten	- The plan is not very flexible. - It has been very directed and is quite clear.	- Fixed plan with explicit direction **(Mismatch with the component 15 and 16: Evidence of forward-looking actions and scope of flexibility/experimentation)**	1. Reflexibility 2. Adaptability
		- The biggest and unexpected event was the decisions from the government.	- Challenges in the planning process **(Compiled with the components 4 and 16: dealing with constraints to coordination and scope of flexibility/experimentation)**	
		- It could be more institutional learning if we would involve the university and public schools more directly. It will be more learning for companies from the plan.	- Institutional learning **(Compiled with the component 13: institutional learning)**	
	Interviewee 2 – County	- We absolutely need to be as much flexible as we can. Sweden and the county of Norrbotten are part of the global economy, and thus, subjected to the megatrends. As these trends are changing, so need us to change.	- Flexible plan as trends changes **(Compiled with the components 15 and 16: Evidence of forward-looking actions and scope of flexibility/experimentation)**	

		- Regarding the institutional and individual learning, we learn as we go in this matter.	- Learning in moving forward **(Compiled with the components 13 and 14: Institutional learning. And Individual learning and reflection)**	
	Interviewee 3 - Luleå University of Technology	- All the changes were related to the internal Swedish discussions in the government, also Compiled between the government and national authorities as well as the regional authorities. -Several discussions with EU Commission.	- Changes regarding the political decisions **(Compiled with the component 16: Scope of flexibility/experimentation)**	
		- We always learn something from anything. - First lesson: we need to engage all stakeholders very early in the process. - Second lesson: have been quite transparent in the discussions - Third lesson: A good dialogue between the regional decision makers and the national decision makers and the Commission, the European dimension. - Transferable lessons: you need to have all stakeholders around the table because you can understand the needs of industries, the needs of authorities, whether they are at national or regional level. - I don't think it's optimal to have a different development plan	- Institutional and individual learning **(Compiled with the components 13 and 14: Institutional learning and Individual learning and reflection)**	
		- A risk in the implementation is that it can be easily to miss out. - Another risk can be missing engagement from the right stakeholders: main stakeholders: big industries, SMEs, municipalities, regions, education, and research institutions. We are in the implementation phase but it's quite soon to comment on it.	- Risks and challenges in the planning process and the implementation **(Compiled with the component of the 15: Evidence of forward-looking actions)**	
		- We are rolling out the plan right now and I think it's important now down to settle down a bit and see what is coming out and then review that. At some stage, in the future and see how it is going. - It can be change, you also need to have some patience. - Let it roll now for a while, review, and evaluate after one or two years and see if you can change something which I don't think. - At this stage, I don't see any necessity in involving any disruptive changes. - It's more like you do some small adjustments and see if it's going in the right way and that the actions take you know or giving the right results and so forth.	- Soon to discuss about the flexibility but now there is no necessity to change **(Non assessable)**	

	Interviewee 4 – Environmental Protection Agency (EPA)	- They were different drafts be in same to agencies I'm sure to other actors and of course, the draft evolved over time. - There were many discussions on which region sectors are to be included. - First, we developed the just transition plans for Norrbotten and Gotland and then we were asked by the government to develop for Västra Götaland and then Västerbotten. And then, as it turned out, it was Västerbotten, Norrbotten, and Gotland. - It was a challenge for Tillväxtverket to grasp all the technical details of the plan or the program during the planning process, so I think they had a great task in coordinating or all of different areas. - With the new tasks given to the project group along the way, due to political judgements which I fully understand, but it did put some time constraints to some of the work during the during the process.	- Changes in the plan during the planning process due to the political decisions **(Compiled with the component 16: Scope of flexibility/experimentation)**	
		- Difficult to say how much is the plan flexible to adopt to next contexts	- Somehow fixed plan **(Mismatch with the components 15 and 16: Evidence of forward-looking actions and scope of flexibility/experimentation)**	
		- I think in this process, when developing the different programs, it was of course important to learn from the industry and regions, what are their let's say, next step into technological development	- Institutional and individual learning **(Compiled with the components 13 and 14: Institutional learning and Individual learning and reflection)**	
	Interviewee 5 - National growth department	- I don't know if there were any other reason than political actually. We had no other rationale to change, and the learning is that the institutional learning is that we are politically guided. We are just like you we work at the government agency, and we carry out political decisions. That's our job. And even if we don't always agree with the political decisions, it's still our job to carry out the decisions. So, we just have to live with that.	- Changes in the plan during the planning process due to the political decisions **(Compiled with the component 16: Scope of flexibility/experimentation)**	
		- Be patient. Let the process take time. Be a good listener and take everyone's opinion into consideration. That's very important I think and be humble that there are very different interests. Very strong-minded people that have that you have to listen to even if you think they're wrong. So be humble. And listen and try to gentle in your in your way forward. So that you don't be, so you won't be perceived as a bully or, like you know, dictator. You understand but be humble and listen and try to explain. Keep everyone involved from early stage. Try to not forget anyone when you start off or anything, so keep a wide widespread for start.	- Institutional and individual learning **(Compiled with the components 13 and 14: Institutional learning and Individual learning and reflection)**	

Releazing place-based/ territorial specificities and impacts	Interviewee 1- Region Norrbotten	- Final plans targeted regional JT specificities and challenges accurately if we consider the actual problems like importing more people and reducing the emits from the SSAB in Luleå. If we look at the main target to low emission yes but in terms of people no.	- Regional objectives and difficulties were accurately addressed in the final plan **(Compiled with the component 17: Criteria/logic of defining intervention area**	1. Territorial relationality 2. Territorial Knowledgeability
		- Norrbotten has the physical infrastructure to be implemented. -Territorial specificities: geographic resources and steel pump industry.	- Territorial specificities and capacity of the region to start implementation **(Compiled with the component 18: Coping with hard and soft/functional spaces)**	
		- Today place-based approach is quite good design: as Sweden is a long country, there is demographic issues, the intensity of people in the different sectors of the economy is quite different.	- Relevant place-based approach **(Compiled with the component 20: Integration of territorial analysis)**	
	Interviewee 2 – County administrative board	- Territorial specificities such as available resources and skills. - Including the tradition of co-operation between institutions and actors. - The demographic trends are quite challenging in terms of sufficient competence development.	- Territorial specificities and capacity of the region to start implementation **(Compiled with the component 18: Coping with hard and soft/functional spaces)**	
		- Much of the transition processes are based on the specific conditions here in the County of Norrbotten. For one example, the natural resources that are mined, and also the extensive use of hydropower is place-based.	- Relevant place-based approach **(Compiled with the component 20: Integration of territorial analysis)**	
		-Physical infrastructure: stakeholders are well aware of what´s at stake. On the other hand, there are certain features that have for a long time been subject to fierce debate which should be invested in and not. This debate will continue, I think. - Not entirely for the time being. Both infrastructure development such as railways and highways need to be extended. This is also true for constructing and housing.	- Capacity of the region to start implementation **(Compiled with the component 18: Coping with hard and soft/functional spaces)**	
		- Regarding the satisfaction of place-based context in the final JGTPs, suffice to say, I cannot judge on that. I think that time will tell, rather than being presumptuous.	- Uncertainty about the feedback of approach and rely on the results of implementation **(Compiled with the component 15: Evidence of forward-looking actions)**	
	Interviewee 3 - Luleå University of Technology	- Territorial specificities such as industrial and economic composition, available resources, the historical and cultural traditions, available skills. - They are unique in a regional sense because up here in the north. - Heavy investments in industry in the north such as battery factories, green steel fossil free steel. - You need those cultural aspects up here as well. - It's also indigenous people rights.	- Territorial specificities of the region **(Compiled with the components 17 and 18: Criteria/logic of defining intervention area and coping with hard and soft/functional spaces)**	

		- Challenges: a huge lack of skills, skilled labor. - It's not enough, there is skilling an upscaling of existing stuff, but we also need to recruit more people. - To recruit more people, we also need to be an attractive society and that then the cultural aspects come in place. So, it's an integrated, quite complex system and the reality of course in the north of Sweden is different from the South. But in general terms, all these things come in play, but in different dimensions.	- Shortage of workforces and skilling and upskilling in the region **(Compiled with the component 18: coping with hard and soft/functional spaces)**	
		- Necessary to engage of all stakeholders to be aware of all regional needs. - A good dialogue between the regional decision makers and the national decision makers and the Commission, the European dimension. - Discussion at the three levels but with conflicts in interests. - Necessary to have discussions and evaluate the arguments in different directions. - Needs more time to discuss about the place-based solutions.	- Involve experts to integrate interests and provide territorial solutions and analysis **(Compiled with the components 19 and 20: Utilization of territorial (expert) knowledge and Integration of territorial analysis)**	
		- Regarding the way that the plan reflects the place-based context; generally, it is relevant. - Those actions invested both in Norrbotten and Västerbotten. They are important, but again. The scope should have been broader on a scale. - It's a good start. I would have wished that it's that actions could have been a bit broader, and I wish that I could have integrated more. But in a general way, I think they are in the right realm, because these are important areas for these regions.	- Relevant place-based approach **(Compiled with the component 20: Integration of territorial analysis)**	

	Interviewee 4 – Environmental Protection Agency (EPA)	- The decomposition of the industry with being a part of the Swedish economy. - The Swedish emissions and being aware that it is also a region where this industry plays a big role. - sometimes it is challenging to find the right skill in a region. - Norrbotten was a great example of how the just transition fund can be used because you've got a big industry with big emissions with certain really specific challenges that t there is a need of a labor force with the right skills. - The just transition fund in some regions in Europe, maybe were thought of now we were closing down a coal mine here. So, these people need to go work somewhere else. But in this case, it was never really about closing down steel industry. It was about transforming the steel industry and in order to do that, we will need investments, we will need skills etc. - I think it does because it's, it provides an opportunity for the industry for the workers to be part of a transition that needs to that needs to take place.	- Territorial specificities and challenges of the region **(Compiled with the components 17 and 18: Criteria/logic of defining intervention area and coping with hard and soft/functional spaces)**	
		Critical infrastructure: I think in some cases, this is what we tried to address for Gotland with some grids. With skills for Norrbotton and Västerbotten, but also the hydrogen infrastructure, etc. So, as for now, the infrastructure is not in place, but I hope the JTF will help or contribute to getting the infrastructure in place.	- Capacity of the region to start implementation **(Compiled with the component of 18: Coping with hard and soft/functional spaces)**	
	Interviewee 5 - National growth department	- Which features I'm guessing the whole transition because every one of these sites are quite unique in their compositions. SSAB in northern Sweden is like the first plant in the world to fully produce Fossil Free steel. That's quite unique. - If you look at Cementa in Gotland, they want to be the first or one of the first to develop Fossil Free cement which is quite unique, which hasn't been done yet. And they have the knowledge they have the possibility to do it, but there's a long way to do it. You need power, you need a lot of development and a lot of research but it's feasible. So that's, that's quite interesting.	- Territorial specificities and challenges of the region **(Compiled with the components 17 and 18: Criteria/logic of defining intervention area and coping with hard and soft/functional spaces)**	
		- Well, I hope so, reflecting the place-based context was the aim of the plan. So, I really believe so yes. - I'm very satisfied. I think it's a great plan. I have seen some of the some of the funding needs that have come in for application. That have been very interesting actually. So hopefully it will be great success.	- Relevant place-based approach **(Compiled with the component 20: Integration of territorial analysis)**	

		- Well, it's a part of a transition. All the infrastructure is not there now, especially when it comes to competence and skill. - Also, when it comes to meeting the power need electricity. It's not there yet. It's a part of the transition. It has started. The infrastructure will get there I hope because without the infrastructure, the proper infrastructure, the green infrastructure, it won't be possible to do the transition. So, it's a critical question that infrastructure has to get there. But it's the parallel process, it works, it goes on at the same time as the transition so it's a part of the association itself.	- Capacity of the region to start implementation **(Compiled with the component of 18: Coping with hard and soft/functional spaces)**	
		- I don't know. That's a hard question. I think you have to look at the bigger perspective. Lift your eyes and not be too selfish, or too regional in your mind, even if it's very alluring for a local political politician to only look at what's best for your region. You have to look at the bigger picture because transition is a global question. it's a global issue. you cannot Just look at yourself.	- Necessity to consider the transition across the world to provide place-base solutions **(Compiled with the components 19 and 20: Utilization of territorial (expert) knowledge and Integration of territorial analysis)**	
Region Gotland				
Coordination actions of actors and institutions	Interviewee 1 – Region Gotland - Economist	- A national work, carbon free Sweden, was an initiative by central government to elaborate road maps for some key industry sectors in Sweden. Cement industry was strongly involved. - All started from the cement sector.	- Strong involvement of industrial sectors after a while **(Compiled with the components 3 and 4: Structures of coordination and dealing with constraints to coordination)**	1. Governing capacity 2. Leadership 3. Subsidiarity
		- Time constraint and limited fund specifically in decarbonisation of industries	- Program challenges such as Unstable and limited fund, timeline, and top-down process **(Compiled with the component 4: Dealing with constraints to coordination)**	
		- Main coordinator was Tillväxtverket - very open and locomotive also responsive in the entire planning process. - Good collaboration with Tillväxtverket to identify and contact stakeholders.	- Good coordination and collaboration with Tillväxtverket **(Compiled with the component 3: Structures of coordination)**	
	Interviewee 2- County Administrative Board	- Uncertainty and less awareness of county administrative board of Gotland about the planning process and involvement of all stakeholders due to the less involvement (involved just in a couple of interviews). - Strong involvement of the Region Gotland compared to County Administrative Board of Gotland as they are in charge of development and municipality. - key role of Region Gotland. - Strong role of cement industry.	- Not involving all the relevant stakeholders properly **(Mismatch with the components 3, 4, and 19: Structures of coordination, dealing with constraints to coordination, and Utilization of territorial (expert) knowledge)**	

		- The main coordinator and facilitator were Tillväxtverket.	- Good coordination and collaboration with Tillväxtverket **(Compiled with the components 1 and 3: distributing power across levels and structures of coordination)**	
	Interviewee 3 – Region Gotland – Environmental strategist	- Necessity of more concentration on competence development and devote more fund to educate people and raise the level of education for transition, more technical matter. - CCS process; needs more electrical engineers and other competent people to install the capacity for more electricity on Gotland. - we have only research in support of new investments which is needed to improve in a large of electrical grid on Gotland. - As we are an island, we need to have improvements to service large cement factory when they'll go from eventually 60 or 70 megawatts of base consumption for power up to 250 or 300 megawatt consumption of power.	- Challenges of planning process due to the territorial specificities **(Compiled with the components 4, 17 and 18: Dealing with constraints to coordination, criteria/logic of defining intervention area and coping with hard and soft/functional spaces)**	
	Interviewee 4 – civil sector - energycentrum	- Energycentrum as one of the key roles was not actively involved in the planning process.	- Not involving all the relevant stakeholders properly **(Mismatch with the components 3, 4, and 19: Structures of coordination, dealing with constraints to coordination, and Utilization of territorial (expert) knowledge)**	
		- Wonderful planning process	- Well-organized planning process **(Compiled with the component of 3: structures of coordination)**	
		- The main aim was to aid big external exhaust processes to reduce the results of GHG emissions	- Explicit aim and guidance **(Compiled with the component of 3: structures of coordination)**	
Integration of policy sectors	Interviewee 1 – Region Gotland - Economist	- Conflicts of interest about the permission of cement industry to extend duration of mining.	- Conflicts of interests about the cement industry **(Compiled with the components 7 and 8: Dealing with sectoral conflicts and acknowledging sectoral conflicts)**	1. Public policy packaging 2. Cross-sector synergy
		- Recommend several sectors for integration of sectors in the survey including regional economic situation, labor market issues, education, training, and skills. - Every sector with their own roadmaps (e.g., fossil free Sweden).	- Recommend several sectors **(Compiled with the component 6: Achieving synergies across sectors)**	
		- The spillover effect of cement industry on the construction sector business has been considered in the plan as it affects the entire Sweden.	- Considering the spillover effects of transformation of major sectors on the related sectors **(Compiled with the components 5 and 19: Structural context for sectoral integration and Utilization of territorial (expert) knowledge)**	

		- Planning process of JGT helped sectoral integration at the regional level to increase cooperation among actors but it remains to be seen as it's quite soon to discuss, but it will definitely help to enhance the capacity of electricity grid on Gotland.	- Proper and well-organized JGT planning process helped sectoral integration **(Compiled with the component 5: Structural context for sectoral integration)**	
	Interviewee 2- County Administrative Board			
	Interviewee 3 – Region Gotland – Environmental strategist	- There are conflicts about land use, protection, and power. So, we have not succeeded with the plants that we have for expanding the power on some spots on Gotland we pointed out in the former. - Municipality has the obligation by law to have to plan for how the land use shall be planned where going to be allowed to build and have industries and so on. in our comprehensive plan we also pointed out areas for where wind power should be possible to test of course, we could not give in an environmental problem directly in that plan, but in the plan pointed out where on Gotland it would be suitable with the wind power but almost none of those places every leaded begin to exported for wind power because it is not possible to get environmental economic mostly because of birch that can be civil effect by power plants and the most case it has been not illegals. we have illegal population on Gotland, valuable of course, that has been problem for us. - There were many other conflicting interests that developed in time.	- Conflicts of interests in the sectors of regions **(Compiled with the components 7 and 8: Dealing with sectoral conflicts and acknowledging sectoral conflicts)**	
		- spillover effect for district heating also district cooling in surrounding village where the cement plant is located.	- Considering the spillover effects of transformation of major sectors on the related sectors **(Compiled with the components 5 and 19: Structural context for sectoral integration and Utilization of territorial (expert) knowledge)**	
		- The cement industry is a large concern. So, they are larger than regional economy but of course the local strategies can help to push factories development in the right direction. The local strategies and the national law will be the factors that can push factories to the transition.	**- Trust the pre-existing strategies and contribution of local, regional, and national strategies towards transition**	

		- we have initiative, fossil free Sweden. - There are several roadmap, that are very tight together, it is the cement industry roadmaps, it's concrete industries roadmap, and it's construction sector roadmap. those three of course, are very tight together. - So, the Cement Factory roadmap consist of changing the few in the factory to a higher level of the biofuel and that biofuel will not be what you say pristine biofuel, but that will biofuel for waste. So, it can be paid but it can be used by oils but mostly it will be driver use to word etc.	- Specific roadmap for each sector **(Compiled with the component 6: Achieving synergies across sectors)**	
	Interviewee 4 – civil sector - energycentrum			
Mobilization of stakeholder participation	Interviewee 1 – Region Gotland - Economist	- A bit confusion in the initial steps about the tasks, responsibility, and the extend of involvement in the Region Gotland.	- Ambiguous process and scope of involvement in the initial steps **(Mismatch with the component 12: insights into territorial governance processes)**	1. Democratic legitimacy 2. Public accountability 3. Transparency
		- Highly interested to implement. - No conflict in the elaboration of JTF.	- Strong interest of actors to collaborate **(Compiled with the component 11: Integration of interests/viewpoints)**	
	Interviewee 2- County Administrative Board	- Uncertainty and less awareness of County Administrative Board of Region Gotland regarding the communication activities to raise awareness about the JTF program.	- Not involving all the relevant stakeholders properly **(Mismatch with the components 3, 4 of dimension 1 and component 19 of dimension 5: Structures of coordination, dealing with constraints to coordination, and Utilization of territorial (expert) knowledge)**	

	Interviewee 3 – Region Gotland – Environmental strategist	- Not specific activity to raise awareness in Gotland as there were already communication for several years. - This is happening in like an industrial area, so it doesn't affect so many people on Gotland on this area. - We are much more concerned about what happened with larger open pit and there is more possibilities also if the grid get improved will be more possibilities for Households and small companies to get permits to install solar power and wind power or which degree still need Today to be accepted so we have we have a queue actually for Companies and households who wants to install solar and wind but they're not accepted yet because the grid take care of that could be transmitted in that case.	- No specific communication regarding the raising awareness about the JTF program **(Mismatch with the component 12: Insights into territorial governance processes)**	
		- We don't have the socio-economic analysis fully made. - Gotland was pointed out by national government to an energy pilot that should be the coordinator as the project from the national Energy Agency. - The agency is quite professional in multi-material analysis, and they will help us. - That analysis is made on how power production increased, social economics situation on Gotland what does it provided when it will come through and help does it strengthen over the local economy that is positive or a negative, tourism sector, etc. - there are multi criteria analysis made on which fuel are being to choose for the local buses expired as the best option. But it is really hard to have total analyses of the transition but what really comes to the fact that matters if you don't do the transition, then we'll be in a very, very bad situation in few years to come. - Environmentally friendly solution hopefully being not only the best one but also the most economic.	- Focus of the plan on environmental issues; no balance between environmental and economic impact assessment **(Mismatch with the component 11: Integration of interests/viewpoints)**	
	Interviewee 4 – civil sector - energycentrum	- The communication and dissemination activities that used to raise awareness about the JTF program including, through meetings from their representatives and Tillväxtverket. - Did not participate in workshops.	- Communication activities about the JTF program **(Compiled with the component 12: Insights into territorial governance processes)**	
Adaptability of plan to new contexts	Interviewee 1 – Region Gotland - Economist	- Not certain, I think the process was quite successful, but it still needs time.	- Well-organized plan, needs more time **(Compiled with the components 15 and 16: Evidence of forward-looking actions and scope of flexibility/experimentation)**	1. Reflexibility 2. Adaptability

	Interviewee 2- County Administrative Board			
	Interviewee 3 – Region Gotland – Environmental strategist	- Changes to the political decisions. - The Swedish just transition plan was supposed to only be available for the northern part of Sweden where lot of energy intensive companies are located. - we thought that Gotland also should be part of just transition plan because of the limestone industry.	- Challenges with actions and decisions **(Relation with the component of 18: Coping with hard and soft/functional spaces)**	
		- 50 years ago, when we had start to use oil instead of wood in Sweden. We suddenly faced an oil crisis because open countries started to not deliver oil. - it was not very new, but maybe thought of the transition from oil dependency in the heating sector.	- Learning from the process and experiences **(Compiled with the components 13 and 14: Institutional learning. And Individual learning and reflection)**	
	Interviewee 4 – civil sector - energycentrum	- Probably too fixed plan.	- Too fixed plan, no flexibility to change or adopt **(Mismatch with the component 16: Scope of flexibility/experimentation)**	
Releazing place-based/ territorial specificities and impacts	Interviewee 1 – Region Gotland - Economist	-Place-based specificities including the industrial plants in the three regions. - long tradition of making the construction material, cement/ concrete. In a sense, it has been a scale that for ages and the city of Slite which is a very small city.	- The existence of industrial plants and production traditions in the three regions **(Compiled with the component 17: Criteria/logic of defining intervention area)**	1. Territorial Relationality 2. Territorial Knowledgeability
		- Final plan accurately targeted regional purposes and challenges.	- Regional objectives and difficulties were accurately addressed in the final plan **(Compiled with the component 17: Criteria/logic of defining intervention area**	
		- Regarding the reflection of place-based context in the final JGTPs, there was a concern that it will going to be like multi-level governance and very tight collaboration.	- Reflection of place-based context in the final JGTPs instead of multi-level governance and tight collaboration **(Compiled with the component 17: Criteria/logic of defining intervention area)**	
	Interviewee 2- County Administrative Board	- A big challenge in the planning process of JTF in Region Gotland was regarding the permission of mining in the cement industry of Gotland.	- Challenges with actions and decisions **(Relation with the component of 18: Coping with hard and soft/functional spaces)**	

	Interviewee 3 – Region Gotland – Environmental strategist	- Territorial challenges and specificities including high fossil emissions, almost 90% of the industrial emission on Gotland. - Demand of cement industry to more electricity; The carbon sequestered from fuel will need a lot more electricity to the cement factory So, as a matter of fact, maybe the cement production will not become more energy efficient by CCS step, but it will become less than with the climate. - We need to make it possible to deliver much more electricity to the cement plant. That also involves local electricity grid company on Gotland.	- Territorial specificities and challenges of the region **(Compiled with the components 17 and 18: Criteria/logic of defining intervention area and coping with hard and soft/functional spaces)**	
		- Territorial specificities and challenges including the cement industry and food industry. - The food industry is not part of the plan. - Three strategic areas for Gotland; food industry, tourism sector, cement industry. - Energy Transition in the whole area, of course will focus on the cement industry and it must include carbon capture store. - Cement industry is much larger polluter. - For us, people the largest challenge besides the cement industry is to solve the transport sector because we are island, we need dependent ferry. - We have no technical knowledge; it can be technical or social aspect.	- Territorial specificities of the region **(Compiled with the components 17 and 18: Criteria/logic of defining intervention area and coping with hard and soft/functional spaces)**	
		- To improve the process to design place-based solutions, we have to work in different ways to make a sustainable living. The Easiest, but also the most attractive way on Gotland.	- Sustainability; the best approach for place-based solutions **(Compiled with the components 19 and 20: Utilization of territorial (expert) knowledge and Integration of territorial analysis)**	
		- Regarding the way that the final JGTPs reflect the place-based context is too slow. - For now, it's very, very hard to be positive with the transition process because it goes a little slow and we seem like many political decisions goes in the wrong direction. - we will see what how it goes on the national level.	- Slow process (**Mismatch with the component of 20: Integration of territorial analysis)**	
	Interviewee 4 – civil sector - energycentrum	-Relevant approach, place-based, hopefully provides a better chance that the money will be put where they make the most use: sounds like a good approach.	- Relevant place-based approach **(Relation with the component of 20: Integration of territorial analysis)**	
		- General ambition was strong since both public and private sectors are actively involved in the energy transition generally.	- Involve public and private sectors in the energy transition **(Relation with the component of 19: Utilization of territorial (expert) knowledge)**	